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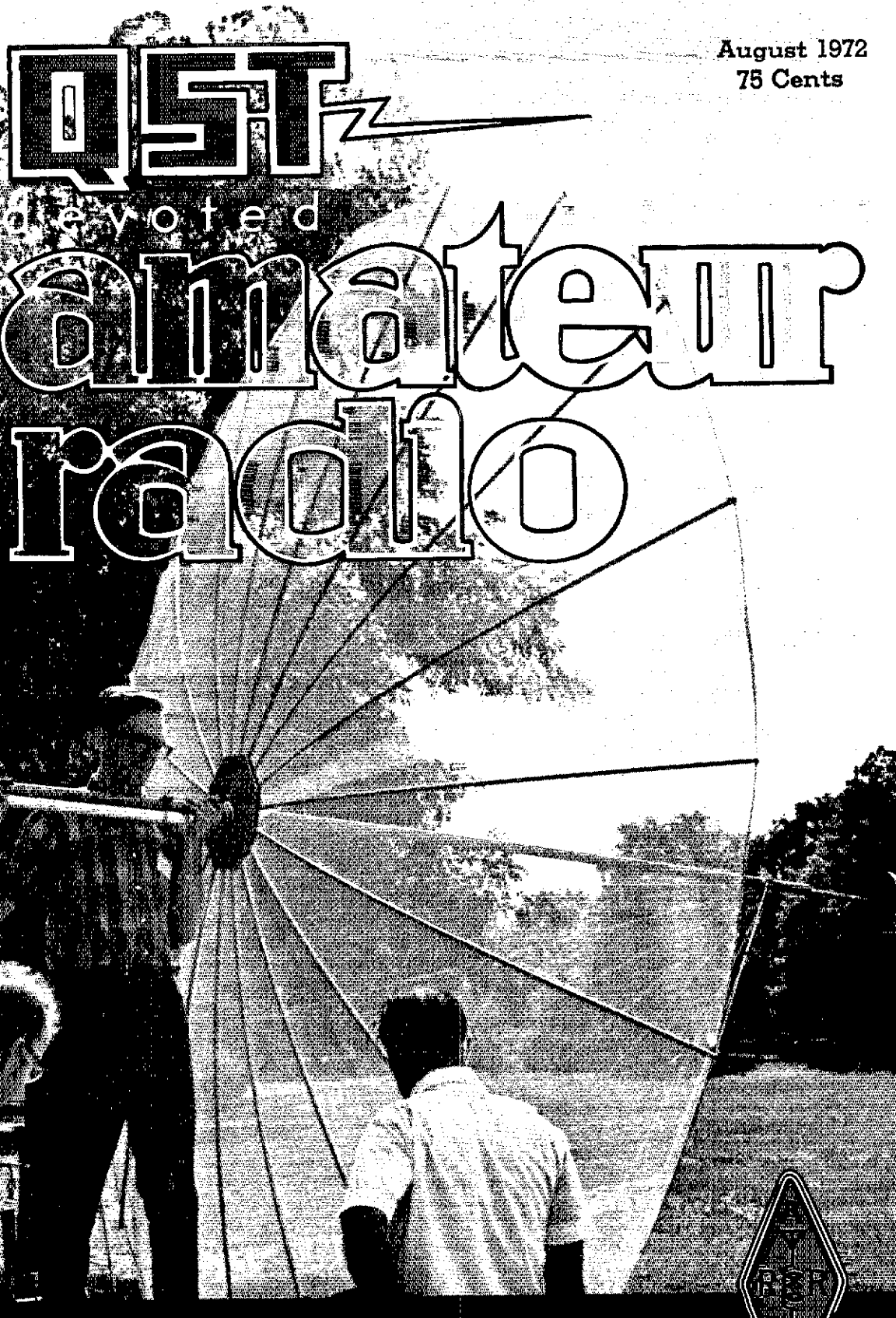

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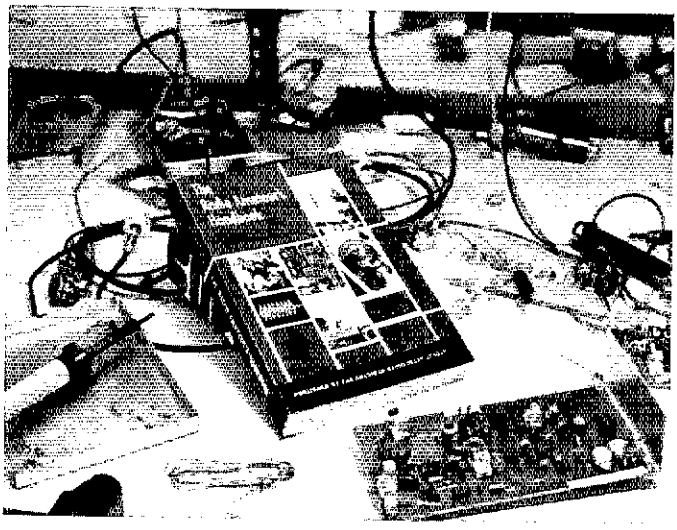

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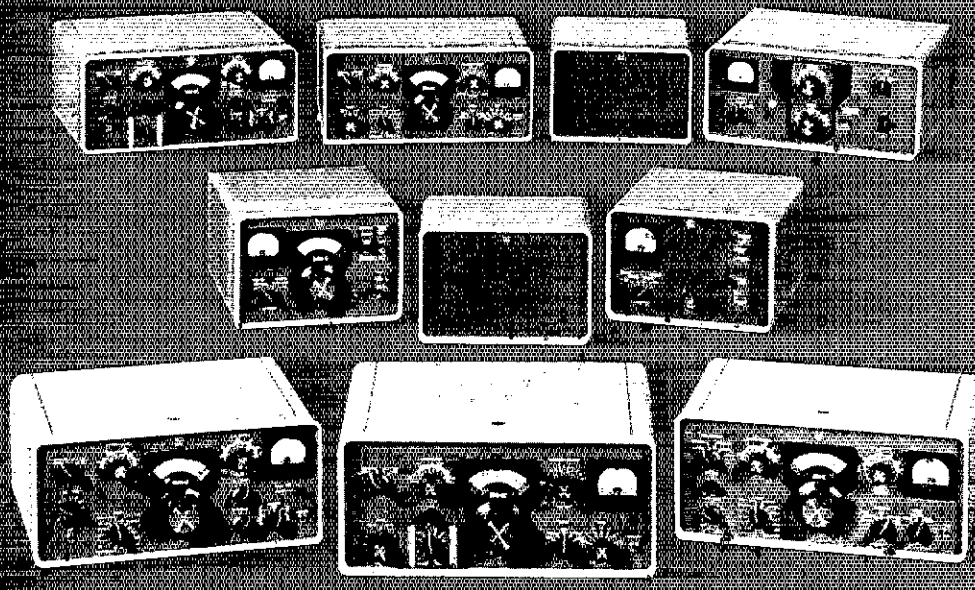

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OUR COVER

A 12-foot dish *does not* have to be heavy and hard to handle. Shown at a WA2WEB hamfest, K2RIW completes on-the-spot assembly for an antenna-gain contest. For construction *details*, see page 16.

QST

AUGUST 1972

VOLUME LVI NUMBER 8

PUBLISHED MONTHLY, AS ITS OFFICIAL JOURNAL, BY THE AMERICAN RADIO RELAY LEAGUE INC., NEWINGTON, CONN., U. S. A. OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

— CONTENTS —

Savoy

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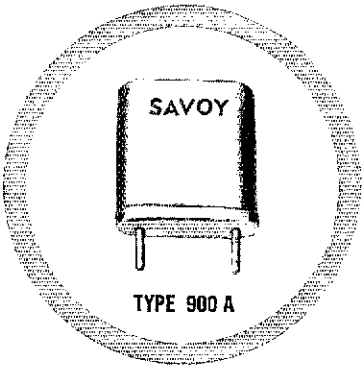
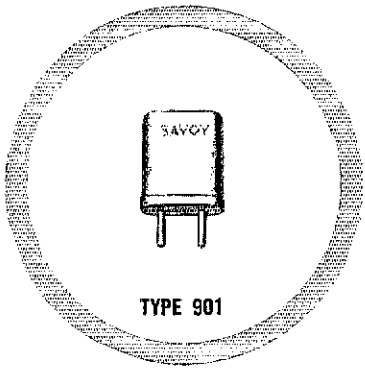
For over 30 years



TYPE 900 A



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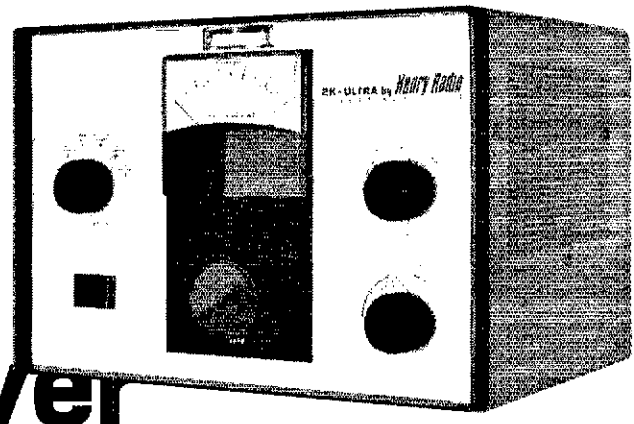

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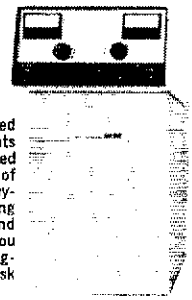

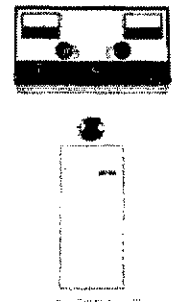

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Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports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

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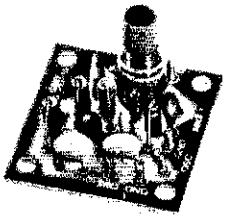

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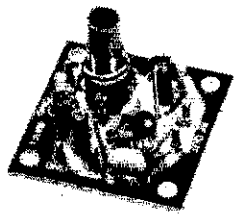

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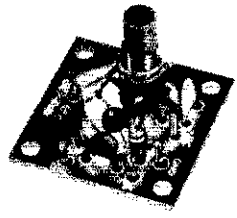

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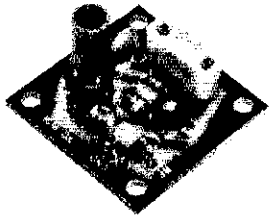

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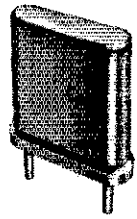

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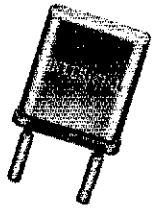

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. 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.

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

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

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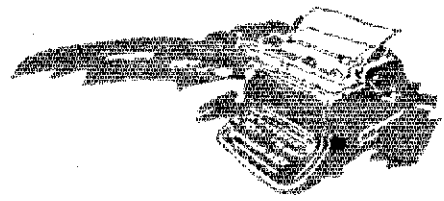
521 Monroe, N.W., Ardmore, OK 73401

*Member Executive Committee

"It Seems to Us..."



SELF-POLICING

THE EARLY REGULATION of radio communication was a responsibility of the Department of Commerce. In 1923, Secretary of Commerce Herbert Hoover called a conference of U.S. radio interests to discuss various regulatory aspects including frequency allocations. The short waves had not yet been developed, and the limited spectrum was even then becoming crowded, with interference a considerable problem. Representatives of the League asked for the assignment of a certain wave band for amateurs.

"But," inquired Mr. Hoover, "how will you prevent interference?"

"Leave that to us," the League replied.

"And," Mr. Hoover stated some years later, "the League is doing the job."

This incident was, perhaps, the start of a tradition of amateur radio self-policing unique in the history of radio regulation. It is a record of which we may all be proud. It was also a necessary measure, for the growth of amateur radio was such that the Government agency could probably not justify sufficient enforcement personnel to do the policing job itself for the amateur service. Indeed, one of numerous reasons why amateur radio was not encouraged in other countries, especially in the early days, was that the monitoring and enforcement task was too monumental.

Are we today failing to live up to our tradition of competent self-policing? Are operators less courteous than they used to be? Do more amateurs today unknowingly – or openly – violate FCC regulations than ever before? Do we have a new breed of ham who has only his own pleasure in mind, who does not know enough about radio theory and practice to keep his rig within sound technical limits as to broadness, splatter, clicks, chirps, harmonics?

We think not – in general. But with the number of amateurs today, and with no increase in the number of available kilohertz for many years, it becomes of even greater importance that we amateurs recognize our responsibility in the strict observance of rules, and our responsibility to ourselves and our fellow hams in intelligent and courteous operating practices. The alternative is chaos. (The Citizens Radio Service is the perfect (!) example.)

A few amateurs feel that we are already approaching chaos, that our self-policing system is inadequate, that FCC fails to do the monitoring job it should and is lax in disciplinary measures. Let us right now assure them – and you – that FCC monitors are on the job. More than 1,000 notices of violation were issued in fiscal year 1971. We expect there would be many more were it not for our own cooperative monitoring service manned by ARRL Official Observers. It was inaugurated in 1926, and thousands of dedicated amateurs have volunteered their time, which would normally be spent in pleasurable operating, instead to comb the bands seeking out "minor" discrepancies before they could become "big" ones. OOs drop the offender a postcard, or perhaps call him on frequency, so that he might correct the condition and avoid a "pink ticket" from FCC. There were some 5,000 such notifications mailed by volunteer observers last year – five thousand instances which were promptly caught before coming to official attention.

Most of these discrepancies are unintentional. There are some in our number, however, who simply won't play the game squarely. They sneak into a restricted band segment without the proper class of license, knowing the odds favor their not getting caught. They come with sideband on a non-voice frequency, usually DX, for snide comments, or appeals to move into the U.S. portion, all unidentified; in doing so they are no better than the CBers whose activities they loudly condemn. They figure that 1,000 watts is sort of a target figure, rather than a strict rule, and so 50% or 100% more isn't going to hurt anyone; but they are a cancer which, ignored and left uncontrolled,

(Continued on page 81)

League Lines . . .

Most of the outside world was neither aware of it nor much interested, if press coverage is any measure, but as of early July several communities hard-hit by "Agnes" were still without adequate communications facilities. Hams filled the breach, as usual. Because, also as usual, there was too little public credit, our p.r. man Don Waters made a special trip to portions of the trouble area both to try for more current media recognition of amateur activities, and to lay the groundwork for later feature stories.

There'll always be an adman. Our Field Day release to the press early in June included the attention-getting words, "A picnic 5,000 miles wide . . ." and it was picked up by a number of papers. Reading one, an aggressive salesman from one of the major breweries phoned us long-distance, asking if his company could get the contract to furnish the beer for the picnic! We aren't saying which company, but we think he'd had more than one.

We've been both praised and damned for not acting to cancel FD activities because of "Agnes." The matter was considered very carefully, including contact with several League officials in the affected area; views were unanimous that the Field Day activity should proceed. Most post-mortems thankfully, indicate that interference from FD to relief operations was minimal. (Most, we said; there are always exceptions.)

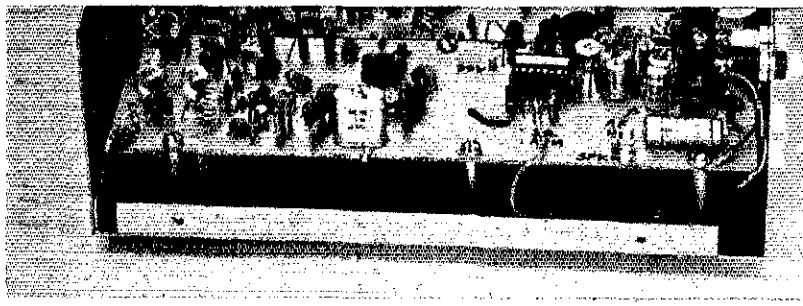
Speaking of emergencies, Navy MARS warns members to be as versatile as possible due to unforeseen situations which could arise. "Reliance on any one mode of operation (i.e., radiotelephone) is not preferred for emergency communications in order to be reliable."

An ARRL Amateur Satellite Service Committee has now been formed, responsive to a Board decision during the 1972 annual meeting of directors, to plan, guide and coordinate amateur communications activities in space. On an interim basis the group includes W2TUK and W4KFC for ARRL; K3JTE and WA4DGU for Amsat; WA6CBX and W6UF/WA7LRU (chairman) for Oscar. An initial meeting in Washington primarily showed that all three organizations have pretty much common goals, and the new mechanism should provide closer liaison in implementation of projects. Both Amsat and Oscar can use plenty of help, in technical, construction, financial, or clerical areas. Contact the former at Box 27, Washington, D.C.; the latter c/o Bill Eitel, Box 153, Dayton, NV.

Apparently there isn't any frequency for W1AW usage which won't cause some one some trouble somewhere. The 3580 channel was found useless by a few members because of excess radiation from the color burst subcarrier on that frequency from some local TV receivers (improperly shielded, we hasten to add!). AW moved a kHz and a half or thereabouts, and this seems to have alleviated that condition. Next problem??!!

CB Magazine, naturally pushing hard for the EIA proposal to take a portion of the 220-MHz amateur band, comments in part in its June issue: "We now feel that the FCC should legalize hobby-type operation on the 27-MHz citizens band since it can't be stopped. But, we also feel that the FCC should step hard on the use of foul language and monopolizing of the channels." Are there really unthinking people who will fall for this line? Readers who will miss the obvious basic question: if FCC "can't" stop hobby-type operation, what magic will they use to stop foul language, etc.? Grrrr again!!

After reading the draft of our editorial for this month (starting on previous page), one of our newer Hq. staffers commented, "Like prejudice, scofflawry is passed on from generation to generation. Most Novices start out with the idea that FCC is more powerful than it really is, then gradually learn indifference or even disrespect from QT's casual comments." Hit home, by any chance?



This photo shows the final breadboard version of the fm receiver. Some of the bypass capacitors are located on the foil side of the pc board in this example. The template and parts-layout sheet provides for topside mounting of the capacitors. The differences between the receiver shown here and the final model are quite minor.

A Single-Conversion 2-Meter Fm Receiver

BY DOUG DeMAW,* W1CER

AN FM PURIST is not likely to settle for second-rate receiver performance in this day of vhf-band saturation. A satisfactory fm receiver must be able to separate the various repeater output frequencies without being affected by IMD and overload problems. The sensitivity must be good, and so should the limiting characteristics. Few low-cost designs satisfy the foregoing criteria. The circuit of Fig. 1 represents a practical compromise between cost and circuit complexity, yet provides performance which is comparable to that of many commercial fm receivers in use by amateurs.

Several weeks of experimentation were required to produce the circuit described here. This is the last of five models designed and tested by the writer. Some early versions utilized the double-conversion concept, but despite good performance they were far too costly to construct – $100 or more. Single-conversion models using ICs, FETs, and bipolar transistors suffered poor overall gain and inferior selectivity because of efforts to minimize the number of stages used. Finally, the RCA CA3089E was introduced[1] to the commercial market. This indeed appeared to be the fm-receiver builder's long-awaited panacea. Preliminary data sheets offered by the manufacturer carried the implication that the new chip was ideally suited to communications circuits as well as to entertainment-bandwidth fm receivers. A single IC could provide i-f amplification, limiting, quadrature detection, squelch, relative signal-strength metering, afc, agc, and audio amplification? All this for less than $5? The new device appeared to be the answer to this writer's supplication! So, two copies of the new IC were obtained for use in experimental receivers.

What followed is not a happy story, and it is best to spare the reader those cheerless details. After several weeks of laboratory endeavor, considerable discourse with the engineers at RCA, and no small amount of unsavory self-rhetoric the circuit of Fig. 1 evolved. The missing-data syndrome had again become manifest in connection with a manufacturer's data sheet. No mention was made of the more-than-subtle differences in circuit requirements when using the new chip for narrow-band reception. A high-*Q* quadrature-detector coil was essential for use in communications receivers. Instability was sure to haunt any builder who did not follow some mighty rigid layout and bypassing procedures, none of which are mentioned in the data sheet. The final key to proper performance was discovered when a second data sheet was released, showing some new component values for use with the CA3089E. This, plus some final measures in bypassing, made possible a circuit that offered good performance, and which could be duplicated by any builder with moderate workshop experience.

The single-conversion solid-state fm receiver described here is intended as a mate for the Fm Pip-Squeak Transmitter from March 1971 QST. *This design centers around a $3.65 multifunction IC, the CA3089E. Circuit simplicity, good performance, and low cost are the keynotes in this project. Construction costs should not exceed $50 if all parts are bought new, in single-lot quantity. Those lucky enough to have fertile junk boxes should be able to duplicate the receiver for less than $25.*

* Technical Editor, *QST*.

1 DeMaw, "Two New ICs for the Receiver Builder," *QST* for Oct. 1971, p. 37.

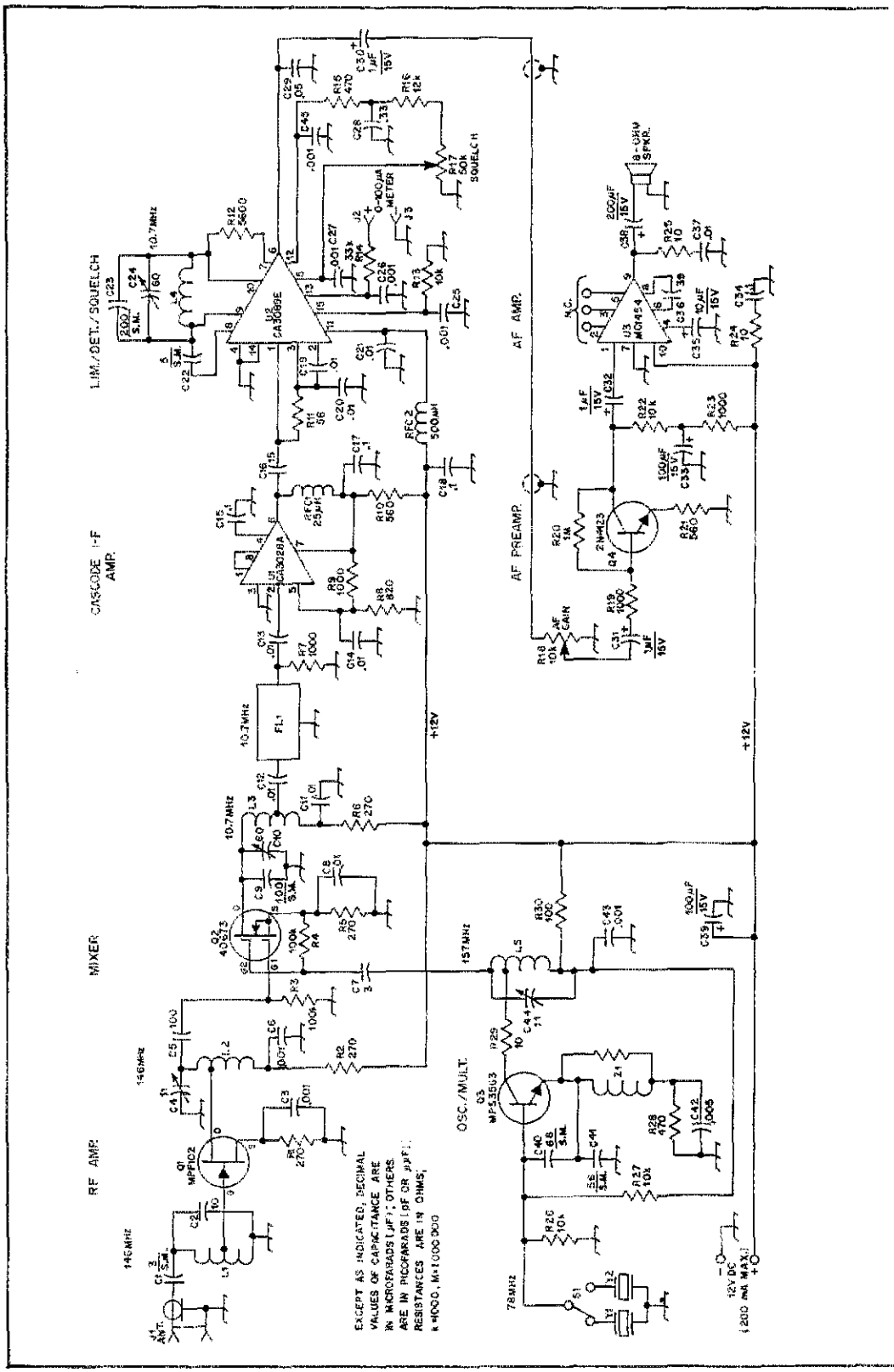

RF AMP.
MIXER
CASCODE I-F AMP.
LIM./DET./SQUELCH
AF PREAMP.
AF AMP.
OSC./MULT.
EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μμF). RESISTANCES ARE IN OHMS; K=1000, M=1000000
12V DC (200 mA MAX.)
8-OHM SPKR.
SQUELCH
METER
AF GAIN

Fig. 1 — Schematic diagram of the fm receiver. Fixed-value capacitors are disk ceramic unless otherwise noted. Polarized capacitors are electrolytic. Fixed-value resistors are 1/2-watt composition types. Numbered components not in parts list are identified for pc-board layout purposes only.

C1 — 3-pF silver mica. For precise matching substitute a 10-pF trimmer for the fixed-value capacitor.

C2, C4, C44 — 11-pF pc-mount miniature air variable (E.F. Johnson 187-0106-005, avail. from Newark Electronics).

C10, C24 — Subminiature ceramic trimmer, 15 to 60 pF (Erie 538-011F-15-60, available from Newark Electronics, or surplus from Reliance Merchandising, 2223 Arch St., Phila., PA 19103).

FL1 — See text and footnotes.

J1 — Coax receptacle of builder's choice.

J2, J3 — Binding posts or pin jacks.

L1 — 5 turns No. 18 tinned bus wire, 1/4-inch ID x 1/2-inch long. Tap gate of Q1 at 2-1/2 turns from hi-Z end.

L3 — 16 turns No. 22 enam. wire to occupy entire circumference of Amidon T-50-3 toroid core. Tap at 6 turns from hi-Z end for FL1.

L4 — 1-μH high-Q inductor, unloaded Q 150 or greater. 18 turns No. 24 enam. wire to occupy entire circumference of Amidon T-37-2 toroid core (Amidon Assoc., 12033 Otsego St., N. Hollywood, CA 91607).

L5 — 5 turns No. 18 tinned bus wire, 1/4-inch ID x 1/2 inch long. Tap collector via R29 at 1 turn from hi-Z end.

Q1, Q3, Q4 — Motorola transistor.

Q2 — RCA MOSFET.

R17 — 50,000-ohm linear-taper carbon control.

jR18 — 10,000-ohm audio-taper carbon control.

RFC1 — 25-μH choke (Millen J300-25 or equivalent).

RFC2 — 500-μH choke (Millen J300-500 or equivalent).

S1 — Spdt miniature slide or wafer switch, nonshorting.

U1, U2 — RCA integrated circuit.

U3 — Motorola integrated circuits.

Y1, Y2 — International Crystal Co. receiving crystal ground to Pearce-Simpson Gladding 25 specs. Nylon crystal sockets available from International Crystal Co.

Z1 — Rf choke consisting of of 8 turns No. 24 enam. wire, close-wound on body of 1000-ohm 1-watt carbon resistor. Solder coil leads to resistor pigtails.

Circuit Highlights

A JFET was chosen for rf amplifier Q1, Fig. 1. Neutralization is unnecessary provided the gate and drain elements are tapped down on their respective tuned circuits. For simplicity's sake only two tuned circuits are used ahead of the mixer, which uses a dual-gate MOSFET. The combination of FETs Q1 and Q2 assures low IMD and provides good immunity to overloading. Output from the mixer is supplied to FL1. This is a four-pole 10.7-MHz i-f filter which is fed from a 900-ohm tap point on tuned circuit C9-C10-L3.

The oscillator/multiplier stage, Q3, is a carbon copy of that used by Pearce-Simpson in their Gladding 25 fm transceiver. It is one of the simplest circuits one can use, yet it performs well. Injection to the mixer is supplied at 157 MHz (10.7-MHz i-f plus the frequency of the received signal). The oscillator crystal frequency is one half the injection frequency – 78 MHz in this example. No netting trimmers are necessary if crystals for the Gladding circuit are ordered and used. Frequency doubling from 78 MHz is accomplished in the collector circuit of Q3.

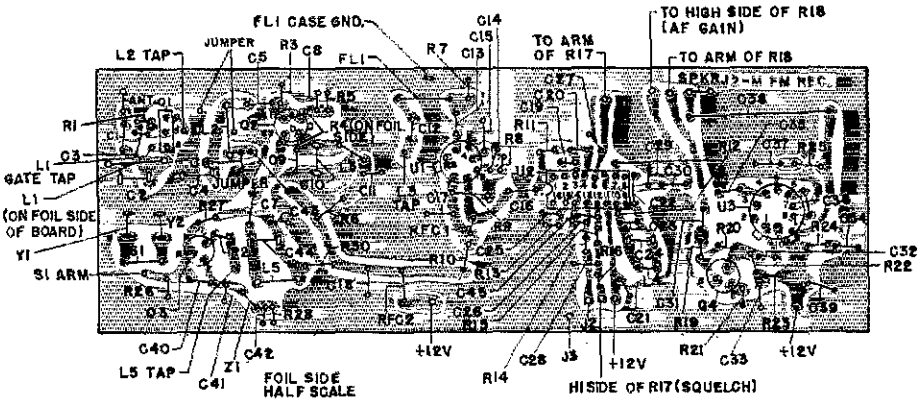
I-f amplifier U1 is a CA3028A wired for cascode operation. FL1 connects to input terminal 2 through a .01-μF blocking capacitor. Terminating resistor R7 is selected for the characteristic impedance of the filter used. The KVG filter has a 910-ohm bilateral impedance, so if precise matching is desired one can use a 910-ohm resistor in place the 1000-ohm unit at R7. Output from U1 is fed to multifunction chip U2, across R11. Information on the CA3089E data sheet indicates that higher values of resistance can be used at R11, or the secondary winding of an i-f transformer can be used in place of a resistance. Considerable experimentation proved that instability is almost certain to occur when a tuned circuit is connected across terminals 1 and 3 of U2, or when the resistance value of R11 is greater than a couple of hundred ohms

Audio output from U2 is amplified by Q4 before being routed to U3, a transformerless 1-watt output IC. Though the MC1454 is designed to work into a 16-ohm speaker, good results can be had when using an 8-ohm speaker. The latter value of impedance will lead to slightly more audio distortion than would exist with a 16-ohm load. Good communications quality will result with either load impedance.

Construction

How the receiver is packaged can best be decided by the builder. Two choices are offered: dividing the board in two parts and stacking one section above the other on standoff posts. If this is done it will be necessary to cut the board midway between U1 and U2. If compactness is not necessary the constructor can follow a one-piece-assembly format, keeping the board its 8 × 2-11/16-inch size.

Those who desire additional crystal positions can make the board slightly longer. This will provide room for more crystal sockets, but will



Pc board template and parts layout for the fm receiver.

require that a switch with more positions be used for S1.

It is recommended that transistor and IC sockets be avoided except at Q4 and U3. Short leads between the bodies of the devices and the pc board must be maintained to prevent unstable operation. The use of sockets will cause instability unless low-profile receptacles are used. Similarly, the pigtails on the bypass capacitors should be kept as short as possible in all parts of the rf circuit.

The wiring which connects the audio and squelch controls to the circuit board should be of the shielded variety. If the board is cut into two sections, as mentioned earlier, use shielded cable between U1 and U2, routing the i-f signal from pin 6 of U1 to pin 1 of U2. *Don't leave out C 16 when doing this!*

The leads from S1 to the crystal sockets must be kept as short as possible – less than 1-1/2 inches each. As a further aid to circuit stability mount the pc board on a metal cabinet wall or chassis by means of four or six metal standoff posts. This technique is beneficial in preventing rf ground loops.

Checkout and Alignment

It should be stressed that there is no simple way to align an fm receiver. A stable signal generator will be required, preferably one with fm capability. Initial alignment cannot be properly effected by using off-the-air fm signals. A weak-signal source can be built by using the modulator and crystal oscillator stage of the fm Pip-Squeak, described in March 1971 *QST*. Whatever method is used, make certain that the test signal is no farther off frequency than 200 Hz from the desired frequency of reception. Ideally, the signal source should be *exactly* on the chosen input frequency of the receiver..

Connect the signal generator to J1. Attach a meter across J2 and J3. Make certain that a speaker is hooked to the output of U3. Assuming that an ohmmeter check shows no shorted or open circuits in the completed assembly, connect a 12-volt dc supply to the receiver. With the squelch turned off (maximum hiss noise) adjust C2, C4, and C44 for an upward deflection of the relative-signal-strength meter (at J2 and J3). Next, adjust C10 for maximum meter reading. Repeat these steps two more times. All tuning adjustments should provide fairly sharp peaks when the circuits are tuned to resonance.

A frequency-modulated signal will be required for on-the-nose adjustment of the detector (L4 and C24). C24 should be adjusted slowly until the point is found where best audio quality occurs. Audio recovery will be the lowest at this point, creating the illusion of reduced receiver sensitivity. If no fm signal is available for this part of the alignment, tune the detector for minimum hiss noise as heard in the speaker. After the detector is aligned, readjust C10 for best audio quality of a received fm signal. It may be necessary to go back and forth between C10 and C24, carefully tweaking each capacitor for the best received-signal audio quality. The detector should be adjusted while a strong signal (100 μV or greater) is being supplied at J1.

Adjustment of the squelch control should provide complete muting of the hiss noise (no signal present) at approximately midrange in its rotation. If the audio channel is functioning properly one should find that plenty of volume occurs at less than a midrange setting of R18.

Performance

In two models built, both identical to the circuit of Fig. 1, sensitivity checked out at roughly 0.8 μV for 20 dB of quieting. This sensitivity figure is by no means spectacular, but is quite ample for work in the primary signal contour of any repeater. The addition of a dual-gate MOSFET preamplifier ahead of Q1[2] resulted in a sensitivity of 0.25 μV for 20 dB of quieting. The barefoot receiver requires approximately 0.5 μV of input signal to open the squelch. A more elaborate circuit would have provided greater sensitivity, but at increased cost and greater circuit complexity.

2 Blakeslee, "Converting the GE MTS Progress-Line Transceiver for Amateur Service" (preamp circuit), *QST* for June 1971, p. 22.

The i-f selectivity is such that no adjacent-channel spillover could be detected while monitoring in an area where repeaters provided outputs on 146.79, 146.85, 146.88, 146.94 and 146.97 MHz. Ample front-end selectivity exists to prevent spurious responses from out-of-band commercial fm and TV signals.

Hard limiting occurs at signal input levels in excess of 10 μV, with 3 dB of limiting exhibited at 1μV. Addition of an outboard preamplifier will greatly improve the limiting characteristics, and this would benefit those who are dealing primarily with weak signals.

Some Closing Comments

A KVG XM 107S04 i-f filter (FL1)[3] is used in the circuit of Fig. 3. However, any 10.7-MHz filter with suitable bandwidth characteristics for amateur fm reception can be substituted for the unit specified. During the development period a Piezo Technology Comline filter was used at FL1.[4] The model tried was a PTI 2194F, which sells for $10 per unit in single lots. Club groups may wish to take advantage of the 5 to 9 price break . . . $5.95 each. The PTI 2194F gave performance similar to that of the KVG unit.

Each brand of filter has its own characteristic impedance, so if substitutions are made it will be necessary to change the tap position on L3 to assure a proper match between Q2 and FL1. Similarly, the ohmic value of R7 will have to be changed.

Detailed information on the CA3089E can be obtained from the RCA data sheet, File Number 561. Useful information for those working with RCA solid-state devices can be found in Form No. 1CE-402, available on request from the manufacturer.[5]

Not all builders are equipped to produce their own printed-circuit boards. Those who desire to purchase a ready-made board for this receiver should contact known fabricators of pc boards for *QST* projects.[6] It is likely that some of the suppliers will have the boards for sale.

Acknowledgements

The writer wishes to express his sincere appreciation for the courteous assistance offered by Lew Baar (applications engineer) and George Hanchett, W2YM, of the RCA solid-state group. Without their expertise many of our problems connected with the CA3089E might never have been resolved. A hearty "thank you" goes to Al Blank, K1TFA, who provided his capable assistance in assembling and helping to test two breadboard models of the fm receiver.

[3] A product review describing the filter's characteristics was given in *QST* for June, 1972, p. 56. The filter sells for $15.95 and can be ordered from Spectrum International, Box 87, Topsfield, MA 01983.

[4] Piezo Technology Inc., Box 7877, Orlando, FL 32804.

[5] RCA Solid-State Division, Box 3200, Somerville, NJ 08876.

[6] Inquire concerning availability and price by writing to Spectrum Research Laboratory, Box 5824, Tucson, AZ 85703. QST

August 1922

. . .An interesting collection of technical articles includes a follow-up on the previous month's *announcement of superregeneration, this time with* some circuit data. A prize contest is announced for the best superregen constructional designs. Boyd Phelps, ex-9BP, a new addition to the Hq. staff, collaborated with KBW on the superregen article, and also had separate stories on wave traps and the care of storage batteries.

. . .There is an item by well-known A. L. Groves on coils for short-wave cw reception, advocating solenoids over variometers; J. M. Miller of Jewell has an article on uses of measuring instruments, and there is a short piece by 3BEC on low-power cw transmitters. Among newly marketed components described is the Amrad S tube, subsequently a favorite rectifier in amateur power supplies.

. . .Stuart Ballantine's new book, "Radiotelephony for Amateurs", is reviewed by the editor with high praise – and with amazement that the author could dispense with the mathematical approach for which he was so well known. "Who's Who in Amateur Radio" has a portrait of Clyde Darr, 8ZZ, whose *QST* covers in the 20s gave hams so many chuckles.

. . .Side note: In "Strays" is the remark that Prof. Goddard, 5ZJ from New Mexico State College, paid a visit to Hq. and 1AW. No mention of rockets, which were considered toys in those days!

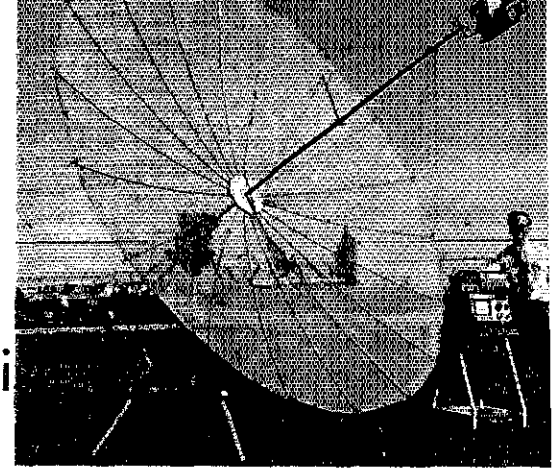
August 1947

. . .In this issue, the initial short in what turned out to be a long-continuing technical battle with TVI was fired by Mack Seybold, W2RYI. Confronted by an interference crisis when his next-door neighbor installed a TV receiver, W2RYI's tenacity and engineering approach led eventually to a happy solution. It was based on harmonic traps and a low-pass filter at the transmitter, plus traps for the 20-meter fundamental in the receiver's antenna line. This work established the ground for future progress.

. . .An article on a 120-watt speech amplifier/modulator, by W1JEQ, emphasizes the desirability of confining the frequency response to the important speech frequencies. The modulator used a pair of 807s.

. . .War-surplus gear being a popular subject, W2EVI describes a cathode-coupled 28-MHz converter for use with the BC-779 receiver. The oscillator is crystal-controlled and the receiver is used as a tunable i-f. The use of Selsyns (also war-surplus item) in a beam-position indicator is the subject of an article by J. S. Tomczak of NRL. Also, an overload protection circuit using thyratrons is discussed by W2YM in his first appearance as a *QST* contributor. And W1DX has some good advice on coupling to flat lines.

Vhf continues to make records, with 50-MHz contacts between Okinawa, Iwo, and Japan reported. – *W1DF*



The stressed parabolic dish setup for 2287.5-MHz Apollo reception. A preamplifier is taped to the feed horn.

A Twelve-Foot Stressed Parabolic Di

BY RICHARD T. KNADLE, JR.,* K2RIW

VERY FEW ANTENNAS evoke as much interest among uhf amateurs as the parabolic dish, and for good reason. First, the parabola and its cousins – Cassegrain, hog horn, and Gregorian – are probably the ultimate in high-gain antennas. The highest-gain antenna in the world (148 dB) is a parabola. This is the 200-inch Mt. Palomar telescope. (The very short wave length of light rays causes such a high gain to be realizable.) Secondly, the efficiency of the parabola does not change as it gets larger. With collinear arrays, the loss of the phasing harness increases as the size increases. The corresponding component of the parabola is lossless air between the feed horn and the reflecting surface. If there are few surface errors, the efficiency of the system stays constant regardless of antenna size.

Some amateurs reject parabolic antennas because of the belief that these are all heavy, hard to construct, have large wind-loading surfaces, and require precise surface accuracies. However, with modern construction techniques, a prudent choice of materials, and an understanding of accuracy requirements, these disadvantages can be largely overcome. A parabola may be constructed with a 0.6 f/d (focal length/diameter) ratio, producing a rather flat dish making it easy to surface and allowing the use of recent advances in high-efficiency feed horns. This results in greater gain for a given size of dish over conventional designs.

* 316 Vanderbilt Parkway, Dix Hills NY 11746

1 Wilson, and Knadle, "Houston, This Is Apollo. . .,"*QST*, June, 1972.

2 The near field (distance at which gain can be accurately measured) of this antenna is 398 feet on 1296 MHz. The contest range was only 150 feet; therefore, the actual gain is probably considerably higher. Parts of the surface are out of focus when a gain measurement is made at a range that is too close to the dish.

The Technique

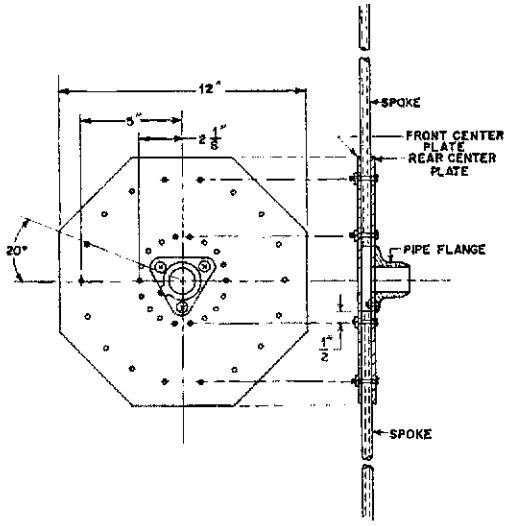
The usually heavy structure which supports the surface of most parabolic dish antennas has been replaced in this design by aluminum spokes bent into a near-parabolic shape by string. These dielectric strings serve the triple function of guying the focal point, bending the spokes, and reducing the error at the dish perimeter (as well as at the center) to zero. By contrast, in conventional designs, the dish perimeter, which has a greater surface area

Here is an easy way to build a lightweight, portable, high-gain parabolic dish which can be used for 432- and 1296-MHz mountain topping and antenna-gain contests; on 2300 MHz it has been used to receive the Apollo 15 and 16 voice transmissions;[1] it also can be used for 3300 and 5600 MHz. The graphs allow prediction of antenna gain, accuracy requirements, and reflector screen efficiency.

A commercially built antenna was not available to the author, and therefore this dish was constructed. Its portability (disassembled it fits into the trunk of a car), ease of assembly (it takes about 45 minutes), light weight (22 pounds), and adaptability (it may be adjusted for many focal lengths by tightening the strings), makes it very valuable. The construction materials cost approximately $45.

This particular antenna has won four first-place and two second-place trophies in three consecutive antenna-gain contests by displaying 17.5 dB gain over a dipole on 432 MHz and a calculated gain of 27 dB over an isotropic source on 1296 MHz.[2] Solar noise measurements on 2300 MHz suggest a gain of 36 dB over an isotropic source.

Fig. 1 — Center plates details. Two center plates are bolted together to hold the spokes in place.



than the center, is furthest from the supporting center hub so it often has the greatest error. This error is pronounced when the wind blows. Here, each of the spokes is basically a cantilevered beam with end loading. The equations of beam bending predict a near-perfect parabolic curve for extremely small deflections. Unfortunately, the deflections in this dish are not that small and the loading is not perpendicular. For these reasons, mathematical prediction of the resultant curve is quite difficult. A much better solution is to measure the surface error with a template and make the necessary correction by bending each of the spokes to fit. The uncorrected surface is accurate enough for 432- and 1296-MHz use. All of the aforementioned trophies taken by this parabola in antenna-gain contests were won using a completely natural surface with no error correction.

By placing the transmission line inside the central pipe which supports the feed horn, the area of the shadows or blockages on the reflector surface is much smaller than in other feeding and supporting systems, thus increasing gain. For 1296 MHz a backfire feed horn was constructed to take full advantage of this feature. On 432 MHz I have found that a dipole and reflector assembly produces 1.5 dB additional gain over a corner-reflector type feed horn. Since the preamplifier is located right at the horn on 2300 MHz, a conventional feed horn may be used.

Construction

Care must be exercised when drilling holes in the connecting center plates so that assembly difficulty will not be experienced later. See Fig. 1. A notch in each plate will allow them to be assembled in the same relative position. The two plates should be clamped together and drilled at the same time. Each of the 18 one-half-inch diameter aluminum spokes has two No. 28 holes drilled at its root to accept 6-32 machine screws which go through the center plates. The 6-foot long spokes are created by cutting in half standard 12-foot lengths of tubing. A fixture built from a block of aluminum assures that the holes are drilled in exactly the same position in each spoke. The front and back center plates constitute an I-beam-like structure, which gives the dish center considerable rigidity. Fig. 2 shows a side view of the complete antenna. Aluminum alloy (6061-T6) is used for the spokes while 2024-T3 aluminum alloy serves for the center plates. Aluminum has approximately three times the strength-to-weight ratio of wood used in other designs.[3] Additionally, aluminum does not become water-logged or warped. The end of each of the 18 spokes has an eyebolt facing the dish focus point which serves a double purpose: to accept the No. 9 galvanized fence wire which is routed through the screw eyes to define the dish perimeter, and to facilitate rapid assembly by accepting the S-hooks which are tied to the end of each of the lengths of 130-pound test Dacron fishing string. The string bends the spokes into a parabolic curve. Dacron was chosen because it has the same chemical formula as Mylar. This is a low-stretch material which keeps the dish from changing shape. The galvanized perimeter wire has a five-inch overlap area which is bound together with bailing wire after the spokes have been hooked to the strings.

The aluminum window screening is bent over the perimeter wire to hold it in place. At the suggestion of WB2HXQ, the window screening is now placed on the back of the spokes, thus achieving greater surface accuracy. It was thought originally that the spokes in front of the screening might cause surface perturbations and decrease the gain. However, the total spoke area is small. Placing the aluminum screening in front of the spokes requires the use of 200 pieces of bailing wire to hold the screening in place.This procedure in-

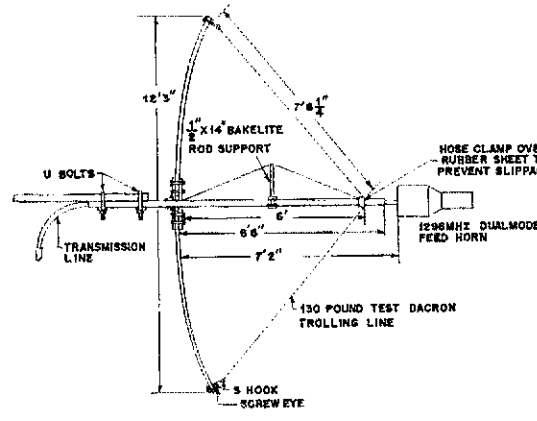


Fig. 2 — Side view of the stressed parabolic dish.

[3] Katz, K2UYH, "Simple Parabolic Antenna Design," *CQ*, August 1966 p. 10.

TABLE I

Materials List for the 12-foot Dish

1. Aluminum tubing, 12-feet × 1/2-inch OD × .049-inch wall, 6061-T6 alloy, 9 required to make 18 spokes.
2. Octagonal mounting plates 12 × 12 × 1/8 inches, 2024-T3 alloy, 2 required.
3. 1-1/4-inch ID pipe flange with setscrews.
4. 1-1/4 inches × 8 feet, TV mast tubing, 2 required.
5. Aluminum window screening, 4 × 50 feet.
6. 130-pound test Dacron trolling line from Finney Sports, 2910 Glansman Rd., Toledo, OH 43614, $3.80 for a 100-yard spool.
7. 38 feet of No. 9 galvanized fence wire (perimeter), Montgomery Ward Farm and Garden Catalog.
8. Two Hose Clamps 1-1/2 inch, two U bolts, 1/2 inches × 14 inches Bakelite rod or dowel, water-pipe grounding clamp, 18 eye bolts, 18 S

creased the assembly time by at least an hour. For contest and mountaintop operating (when the screening is on the back of the spokes) no other fastening technique is required than bending the screen overlap around the wire perimeter.

Surface

A four-foot-wide roll of aluminum screening 50 feet long is cut into appropriate lengths and laid parallel with a 2-inch overlap between the top of the unbent spokes and hub assembly. The overlap seams are sewn together on one half of the dish using heavy Dacron thread and a sailmaker's curved needle. Every seam was sewn twice, once on each edge of the overlapped area. The seams on the other half were left open to accommodate the increased overlap which occurs when the spokes are bent into a parabola. The perimeter of the screening then is trimmed. Notches are cut in the three-inch overlap to accept the screw eyes and S-hooks. The first time this dish was assembled, the screening strips were anchored to the inside surface of the dish and the seams sewn in this position. It is easier to fabricate the surface by placing the screen on the back of the dish frame with the structure inverted. The spokes are sufficiently strong to support the complete weight of the dish when the perimeter is resting on the ground.

The 4-foot wide strips of aluminum screening conform to the compound bend of the parabolic shape very easily. If the seams are placed parallel to the *E*-field polarization of the feed horn, minimum feedthrough will occur. This feedthrough, even if the seams are placed perpendicular to the *E*-field, is so small that it is negligible. Some constructors may be tempted to cut the screening into pie-shaped sections. This procedure will increase the seam area and construction time considerably. The dish surface appears most pleasing from the front when the screening perimeter is slipped between the spokes and is then folded back over the perimeter wire. When disassembly is desired, the screening is removed in one piece, folded in half, and rolled.

The Horn and Support Structure

The feed horn is supported by the 1-1/4-inch aluminum television mast. The transmission line which is inserted into this tubing is connected first to the front of the feed horn which then slides back into the tubing for support. A setscrew assures that no further movement of the feed horn occurs. During antenna-gain competition, the setscrew is omitted allowing the 1/2-inch semirigid (CATV cable) transmission line to move in or out while adjusting the focal length for maximum gain. The TV mast is held firmly at the center plates by the two setscrews attached to the pipe flange which is mounted on the rear plate. On 2300 Mhz the dish is focused for best gain by loosening these setscrews on the pipe flange and sliding the dish along the TV mast tubing (the dish is moved instead of the feed horn).

All of the fishing strings are held in position by attaching them to a hose clamp which is permanently connected to the TV tubing. A piece of rubber sheet under the hose clamp prevents slippage and keeps the hose clamp from cutting the fishing string. A second hose clamp is mounted below the first as double protection against slippage.

The high-efficiency 1296-MHz dual-mode feed horn, detailed in Fig. 3, weighs 5-3/4 pounds. This weight causes some bending of the mast tubing, however this is corrected by a 1/2-inch diameter Bakelite support. It is mounted to a pipe grounding clamp with an 8-32 screw inserted in the end of the rod. The Bakelite rod and grounding clamp are mounted midway between the hose clamp and the center plates on the mast. A double run of fishing string slipped over the notched upper end of the Bakelite rod counteracts bending.

The success of high-efficiency parabolic antennas is determined primarily by the feed-horn effectiveness. The multiple diameter of this feed horn may seem unusual. This newly designed and patented dual-mode feed, by Dick Turrin,[4,5] achieves efficiency by launching two different kinds of waveguide modes simultaneously, which causes the dish illumination to be more constant than conventional designs. The illumination drops off rapidly at the perimeter, reducing spillover. The feedback lobes are reduced by at least 35 dB because the current at the feed perimeter is almost zero; the phase center of the feed system stays constant across the angles of the dish reflector. The larger diameter section is a phase corrector and should not be changed in length. Theory predicts that almost no increase in dish efficiency can be achieved without increasing the feed size in a way that would increase complexity, as well as blockage. The feed is optimized for a 0.6 f/d dish. The dimensions of the feeds are slightly modified from

4 Turrin, "Technical Report No. 5, "A Paraboloidal Reflector Antenna for 1296 MHz," *The Crawford Hill VHF Club – W2NFA*, Holmdel, N.J., 1970, p. 13.

5 Turrin, Patent No. 3,413,641, "Dual Mode Antenna."

the original design in order to accommodate the cans. Either feed type can be constructed for other frequencies by changing the scale of all dimensions.

Multiband Use

Many amateurs construct multiple-band antennas by putting two dishes back to back on the same tower. This is inefficient. The parabolic reflector is a completely frequency-independent surface and studies have shown[6] that a 0.6 f/d surface can be steered seven beamwidths by moving only the feed horn from side to side before the gain diminishes one dB. Therefore, the best dual-band antenna can be built by mounting separate horns side by side. At worst the antenna may have to be moved a few degrees (usually less than a beamwidth) when switching between horns, and the unused horn increases the shadow area slightly. In fact, the same surface can function simultaneously on two frequencies making cross-band operation possible with the same dish.

Assembly Order

1) A single spoke is held upright behind the rear mounting plate with the screw eye facing up. Two 6-32 machine screws are pushed through the holes in the rear mounting plate, through the two holes of the spoke, and into the corresponding holes of the upper mounting plate. Lock washers and nuts are placed on the machine screws and hand tightened.

2) The remaining spokes are placed between the machine screw holes. Make sure that each screw eye faces upward. Machine screws, lock washers, and nuts are used to mount all 18 spokes.

3) The 6-32 nuts are tightened using a socket wrench.

4) The mast tubing is attached to the spoke assembly, positioned properly, and locked down with the setscrews on the pipe flange at the rear center plate.

5) The ends of two pieces of fishing string (which go over the Bakelite rod support) are tied to a screw eye at the forward center plate.

6) The dish is laid on the ground in an upright position and No. 9 gauge galvanized wire is threaded through the eyebolts. The overlapping ends are lashed together with bailing wire.

7) The dish is placed on the ground in an inverted position with the focus downward. The screening is placed on the back of the dish and the screening perimeter is fastened as previously described.

8) The extension mast tubing (with counterweight) is connected to the center plate with U bolts.

9) The dish is mounted on a support (if one is used) and the transmission line is routed through the tubing and attached to the horn.

Parabola Gain Versus Errors

"How accurate must a parabolic surface be?" is a frequently asked question. According to the Rayleigh limit for telescopes, little gain increase is realized by making the mirror accuracy greater than ± 1/8 wavelength peak error.[7] John Ruze of the M.I.T. Lincoln Laboratory,, among others, has derived an equation for parabolic antennas and built models to prove it.[8] The tests show that the tolerance loss can be predicted within a fraction of a dB, and less than 1 dB of gain is sacrificed with a surface error of ± 1/8 wavelength. An eighth of a wavelength is approximately three inches at 432 MHz, one inch at 1296 MHz and 1/2-inch at 2300 MHz.

Some confusion about requirements of greater than 1/8-wavelength accuracy may be the result of technical literature describing highly accurate surfaces for reasons of low side-lobe levels. We are concerned more with forward gain than low side-lobe levels; therefore, these stringent requirements do not apply. When a template is held up against a surface ± peak errors can be measured. The graphs of dish-accuracy requirements are frequently plotted in terms of rms error, which is a mathematically derived function much smaller

6 Silver, *Microwave Antenna Theory and Design*, Radiation Laboratory Series, Vol. 12, McGraw-Hill, N.Y., 1949, p. 488.

7 Conrady, *Applied Optics and Optical Design, Part Two*, Dover, N. Y. 1960, p. 626.

8 Ruze, "Antenna Tolerance Theory — A Review," *Proceedings of the IEEE*, April 1966, p. 633.

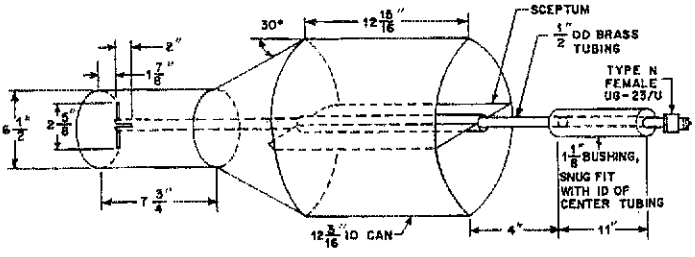


Fig. 3 — Backfire type 1296-MHz feed horn, linear polarization only. The small can is a Quaker State oil container; the large can is a 50-pound shortening container (obtained from a restaurant, "Gold Crisp" brand). Brass tubing, 1/2-inch OD, extends from UG-23/U connector to dipole. Center conductor and dielectric are obtained from 3/8-inch Alumafoam coaxial cable. The dipole is made from 3/32-inch copper rod. The sceptum and 30-degree section are made from galvanized sheet metal. Styrofoam is used to hold the sceptum in position. The primary gain is 12.2 dB over isotropic.

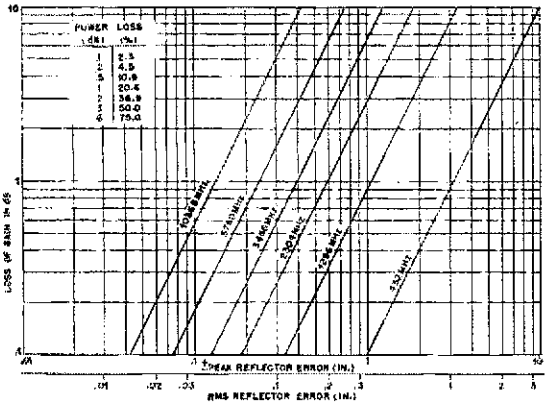


Fig. 4 — Gain loss vs. reflector error. Basic information obtained from J. Ruze, British *IEE*.

(typically 1/3) than ± peak error. These small rms accuracy requirements have discouraged many constructors who confuse them with ± peak errors.

Fig. 4 may be used to predict the resultant gain of various dish sizes with typical errors. There are a couple of surprises, as shown in Fig. 5. As the frequency is increased for a given dish, the gain increases 6-dB per octave until the tolerance errors become significant. Then gain deterioration occurs rapidly. Maximum gain is realized at the frequency where the tolerance loss is 4.3 dB.[9] Notice that at 2304 MHz, a 24-foot dish with ±2-inch peak errors has the same gain as a 6-foot dish with ±1-inch peak errors. Quite startling, when it is realized that a 24-foot dish has 16 times the area of a 6-foot dish. Each time the diameter or frequency is doubled or halved, the gain changes 6 dB. Each time all the errors are halved the frequency of maximum gain is doubled. With this information, the gain of other dish sizes with other tolerances may be predicted.

These curves are adequate to predict gain assuming a high-efficiency feed horn is used (as described earlier) which realizes 60-percent aperture efficiency. At frequencies below 1296 MHz where the horn is large and causes considerable blockage, the curves are a little optimistic. A properly built dipole and splasher feed will have about 1.5 dB less gain when used with 0.6 f/d dish than the dual-mode feed system described.

9 Ruze, "Antenna Tolerance Theory — A Review," *British IEE Conference Publication Number 21 June 1966, p. 120.*

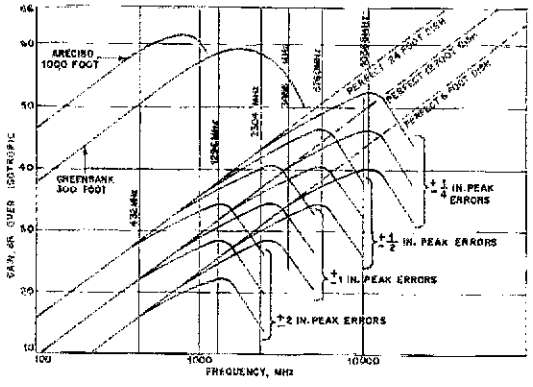


Fig. 5 — Parabolic-antenna gain versus size, frequency, and surface errors. All curves assume 60-percent aperture efficency and 10-dB power taper. Reference: J. Ruze, British *IEE*.

The worst kind of surface distortion is where the surface curve in the radial direction is not parabolic but gradually departs in a smooth manner from an exact parabola. The loss of gain can be severe because a large area is involved.[10] If the surface is checked with a template, and reasonable construction techniques are employed, deviations will be under control and the curves will represent an upper limit to the gain that can be realized.

If a 24-foot dish (with ±2-inch peak errors) is being used with 432-MHz and 1296-MHz multiple feed horns, the constructor might be discouraged from trying a 2300-MHz feed because there is 15-dB gain degradation. However, the dish will have 29 dB of gain remaining on 2300 MHz, making it worthy of consideration.

The near-field range of the 12-foot 3-inch antenna is 703 feet at 2300 MHz. An antenna-testing chamber of this size is not available to the author. By using the sun as a transmitter and observing receiver noise power, it was discovered that the antenna has two main lobes about 4 degrees apart. The template showed a surface error (insufficient spoke bending at 3/4 radius) and a correction was made. A recheck showed one main lobe and the sun noise was almost 3 dB stronger.

Other Surfacing Materials

The choice of surface materials is a compromise between rf reflecting properties and wind loading. Aluminum screening, with its very fine mesh (and weighing 4.3 pounds per 100 square feet) is useful beyond X-band because of its very close spacing. It is easy to roll up and is therefore ideal for a portable dish. However, this close spacing causes it to be a 34-percent filled aperture, which will cause the wind force at 60 miles per hour to be more than 400 pounds on this 12-foot dish. Those amateurs considering a permanent installation of this dish should look into other surfacing materials.

One-inch hexagonal chicken wire, which is an 8-percent filled aperture, is very desirable for 432-MHz operation. It weighs 10 pounds per 100 square feet and exhibits 81 pounds of force with 60-mile-per-hour winds. However, measurement on a large piece reveals 6 dB feedthrough at 1296 MHz. Therefore, on 1296 MHz one fourth of the power will feed through the surface material; but this will only cause a loss of 1.3 dB forward gain. Since the low-wind-loading material will provide a 30-dB gain potential, it is a very good tradeoff. Chicken wire is very poor material for 2300 MHz and higher, since the hole dimensions become comparable to a half wavelength. As with all surfacing materials, minimum feedthrough will

10 See footnote 4.

occur when the *E*-field polarization is parallel to the longest dimension of the surfacing holes. Half-inch hardware cloth weighs 20 pounds per 100-square feet. It has a wind loading characteristic of 162 pounds with 60-mile-per-hour winds. The filled aperature is 16 percent and this material is useful to 2300 MHz.

A rather interesting material worthy of investigation is 1/4- inch reinforced plastic (described in Montgomery Ward Farm and Garden Catalog). It weighs only 4 pounds per 100 square feet. The plastic melts with many universal solvents such as lacquer thinner. If a careful plastic-melting job is done, what will be left is the 1/4-inch spaced aluminum wires with a small blob of plastic at each junction to hold the matrix together.

There are some general considerations to be made in selecting surface materials:

1) Joints of screening do not have to make electrical contact. The horizontal wires reflect the horizontal wave. Skew polarizations are merely a combination of horizontal and vertical components which are thus reflected by the corresponding wires of the screening. To a horizontally polarized wave, the spacing and diameter of only the horizontal wires determine the reflection coefficient (see Fig. 6). Many amateurs have the mistaken impression that screening materials that do not make electrical contact at their junctions are poor reflectors.

2) By measuring wire diameter and spacings between the wires a calculation of percentage of aperture that is filled can be made. This will be one of the major determining factors of wind pressure when the surfacing material is dry. Under ice and snow conditions smaller aperture materials may become clogged, which could make the surfacing material act as one solid sail. The ice and snow will have a rather minor effect on the reflecting properties of the surface, however.

3) Amateurs who live in areas where ice and snow are prevalent should consider a de-icing scheme such as weaving enameled wire through the screening and passing a current through it, fastening water-pipe heating tape behind the screening, or soldering heavy leads to the screening perimeter and passing current through the screening itself.

Parabolic Template

For use at 2300 MHz and higher where high surface accuracy is required, a parabolic template should be constructed to measure surface errors. A simple template was constructed (see Fig. 7) by taking a 12-foot 3-inch length of 4-foot wide tar paper and drawing a parabolic shape on it with chalk. The points for the parabolic shape were calculated at 6-inch intervals and these points were connected with a smooth curve. For those who wish to use the template with the surface material installed, the template should be cut along the chalk line and stiffened by cardboard or a wood lattice frame.

Surface-error measurements should take place with all spokes installed and deflected by the fishing strings, since some bending of the center plates does take place.

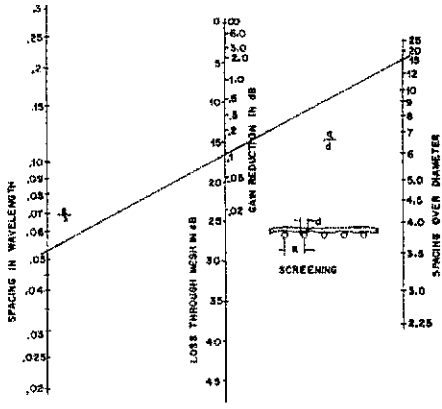


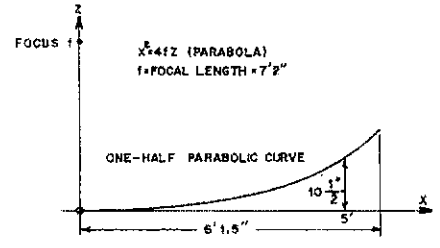
Fig. 6 — Surfacing material quality.[11]

A Feed System for 2287.5 MHz

The modification of a feed horn by W2IMU shown in Fig. 8, launches more accurate circularly polarized waves and has greater efficiency than conventional designs, since it eliminates the need for a hybrid coupler. It is optimized for a 0.6 f/d dish. When power is fed into connector No. 1 only, the 10-32 screws cause the rf to become a counterclockwise circularly polarized wave out of the horn. After bouncing off the dish this becomes a clockwise wave on either transmit or receive. Power fed into connector No. 2 becomes a ccw wave after bouncing off the dish. Therefore, for moonbounce work connect the transmitter to connector No. 1; connect the receiver to connector No. 2. For Apollo reception use only connector No. 1.

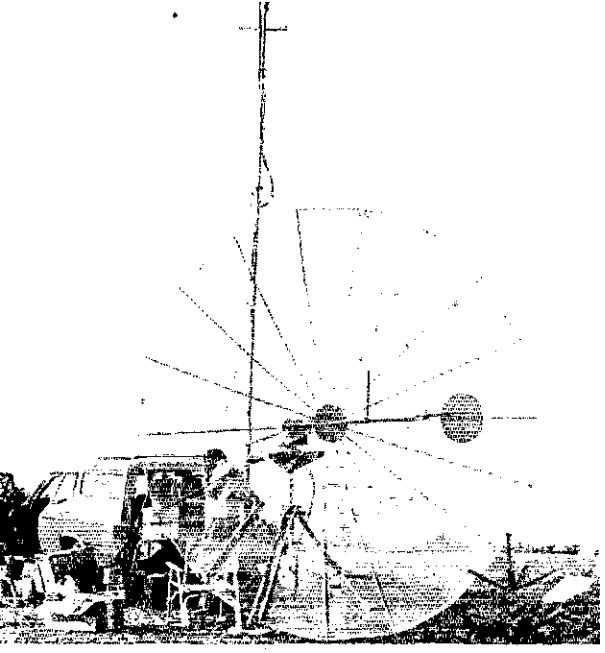
The 1/4-20 screw prevents energy from coupling between connector No. 1 and connector No. 2. If the 10-32 screws are omitted, each connector launches an ordinary linear wave. The small cans are "Scotts Oats" type from Scotland or "Camp" drain cleaner cans from the U.S., 3-3/4-inches ID. The large can is a one-gallon American paint can, 6-1/2-inches ID. The 30-degree section is galvan-

11 Jasik, *Antenna Engineering Handbook*, McGraw-Hill, N.Y., 1961, Chapter 25.



X	Z (TO NEAREST 1/16")	X	Z
.5'	1-5/16"	5.5'	12-3/4"
1.0'	7/16"	6.0'	15-1/8"
1.5'	15/16"		
2.0'	1-11/16"		
2.5'	2-5/8"		
3.0'	3-3/4"		
3.5'	5-1/8"		
4.0'	6-11/16"		
4.5'	8-1/2"		
5.0'	10-1/2"		

Fig. 7 — Parabolic template for 12-foot, 3-inch dish.



The dish may be set up in a remote location. Shown is the 432-MHz dipole and splasher feed operated from Mt. Equinox, Vermont. K20VS is the operator in the background.

ized sheet metal. Tabs on each end add strength and make soldering the cans together easier.

The two UG-58A/U connectors are each fastened to the cans with two 4-40 bolts and 4-40 nuts are soldered to the inside. The outside of the can is tinned in the area of each connector to assure good electrical contact. The ten 10-32 bolts are 1-1/4-inches long with 11/16-inch total length inside the can. Each bolt has a 10-32 nut soldered to the outside of the can and a second 10-32 nut placed on top as a locking device. The 1/4-20 bolt is 1-1/2-inches long with 3/4-inches inside the can. Outside is a 1/4-20 nut soldered to can and a second 1/4-20 nut added for locking purposes.

The two 1/16-inch fiber glass mounting sheets are each slotted along half of their length, slid together at a right angle and epoxy glued. All glued edges of fiber glass are first roughened with coarse sandpaper. Many very small holes are drilled into the fiber glass in the areas of metal contact.

During Apollo reception, connector No. 1 is connected to the preamplifier (if one is used) with a short piece of cable. The preamplifier output cable runs straight to the perimeter of the dish. When no preamplifier is used, consider placing the 2287.5 MHz converter at the feed horn and running power to it. This will result in a lower system noise figure since all cables are quite lossy at 2287.5 MHz.

The inside and outside of the horn may be painted with spray lacquer for preservation. The completely painted horn had a total loss from connector No. 1 to radiated circular wave out the throat of less than 0.1 dB. With this new feed, which was used on Apollo 16, greater than 9 dB of S-band sun noise was realized. The feed used on Apollo 15, pictured on page 64 of June *QST* realized only 6-1/4 dB of sun noise. This may have been caused by loss in the hybrid coupler and wire support.

Possible Variations

The stressed parabolic antenna, as described, is a new construction technique for which a patent application has been filed. Because of its newness, all of its possibilities have not been explored. For instance, a set of fishing strings or guy wires could be set up behind the dish for error correction as long as it does not permanently bend the aluminum spokes. This technique would also protect the dish against wind loading from the rear. An extended piece of TV mast would be an ideal place to hang a counterweight and attach the back guys. It would strengthen the structure.

The author wishes to acknowledge the ample assistance received from W2IMU, W2CTK, K2OVS, K2LCK, WN2MUE and WB2MLH throughout the development of this antenna. QST

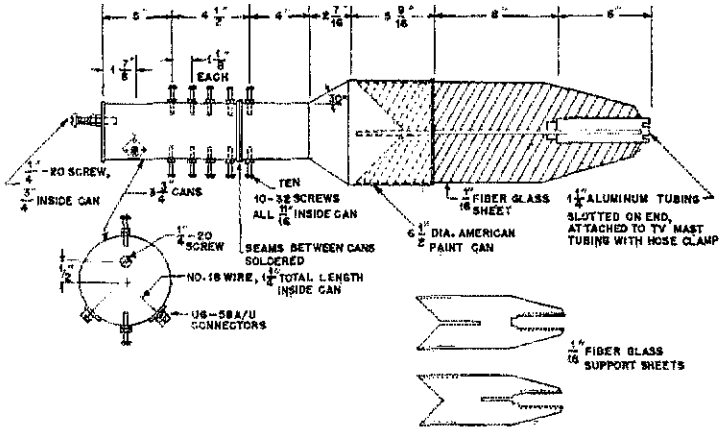
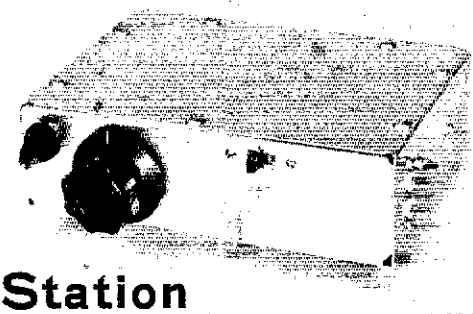


Fig. 8 — Clockwise and counterclockwise polarized 2287.5-MHz feed system; see text.



The Mountaineer—
An Ultraportable Cw Station

BY WES HAYWARD,* W7ZOI, and TERRY WHITE,** K7TAU

A REVIEW OF *QST* for the last decade turns up a surprisingly large number of solid-state QRP transmitters and companion direct-conversion receivers, many of these being described as suitable for portable operation. This usually means the gear can operate from a battery pack, often a sufficient requirement for "portability." While most QRP activity does indeed originate from a comfortable home-station environment, it is not unusual today to find a low-power addict precariously perched upon an isolated mountaintop with earphones under his parka hood and a small transceiver clutched in his gloved hands. To this fellow, portability means something more than mere battery operation. The equipment described here is designed specifically for these ultraportable cw mountaintop applications although it should be of interest to the amateur who is restricted to "semiportable" operation from a motel, camper, or automobile.

Assuming the circuitry must be suitable for duplication, some of the design constraints imposed by ultraportability are outlined below:

1) The receiver, transmitter, and key should all be contained in a single, compact unit and single-control transmit-receive switching should be employed.

2) Several years of mountaintop operating experience on 40-meter cw suggests that a power output of 1/2 to 1 watt offers a suitable compromise between effectiveness and battery weight.

3) Mechanical and temperature extremes are often encountered; therefore crystal control of the transmitter is more desirable than is VFO operation.

4) The number of external adjustments should be minimum.

The above criteria have been applied in the design of the "Mountaineer" transceiver. In order to minimize costs, every effort has been made to choose inexpensive components. With the exception of the toroid cores used for coils, all of the components are listed in one of the major electronics parts catalogs. The toroids are available from Amidon Associates[1] The prospective builder should review the article by DeMaw on parts procurement.[2] The parts cost for the transceiver is about $35.

* 7700 S. W. Danielle Ave., Beaverton, Oregon 97005.
** 19680 S. W. Wright St., Aloha, Oregon 97005.

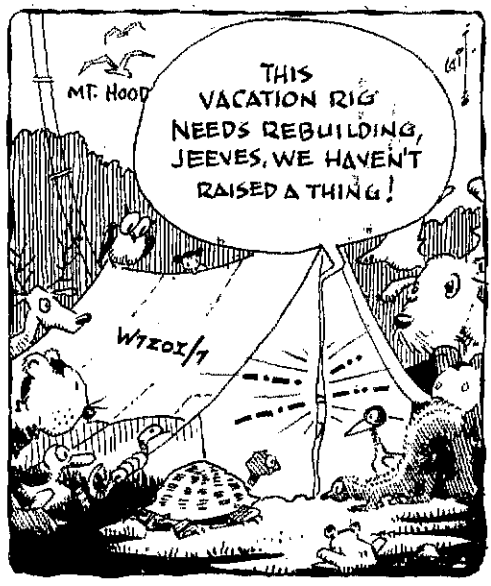
[1] Amidon Associates, 12033 Otsego Street, North Hollywood, CA 91607

Receiver Circuit

Shown in Fig. 1 is a schematic diagram of the receiver section. Following current trends, a straightforward direct-conversion design is used with a dual-gate MOSFET, Q1, as the product detector. The usual *LC* low-pass audio filter is eliminated. Instead, *RC* filtering is employed throughout the three-stage audio amplifier, yielding an audio bandwidth of approximately 2.5 kHz. The audio amplifier is stable and delivers a little more than 90 dB gain. An extra transistor, Q6, is included in the audio amplifier and is saturated when the T-R switch is in the transmit position. This serves to mute the receiver completely.

The local oscillator is a Colpitts circuit using a single pnp transistor. In order to achieve mechanical simplicity, the oscillator is varactor tuned by a

[2] DeMaw, "The Ailing Emporium," *QST*, July, 1972.



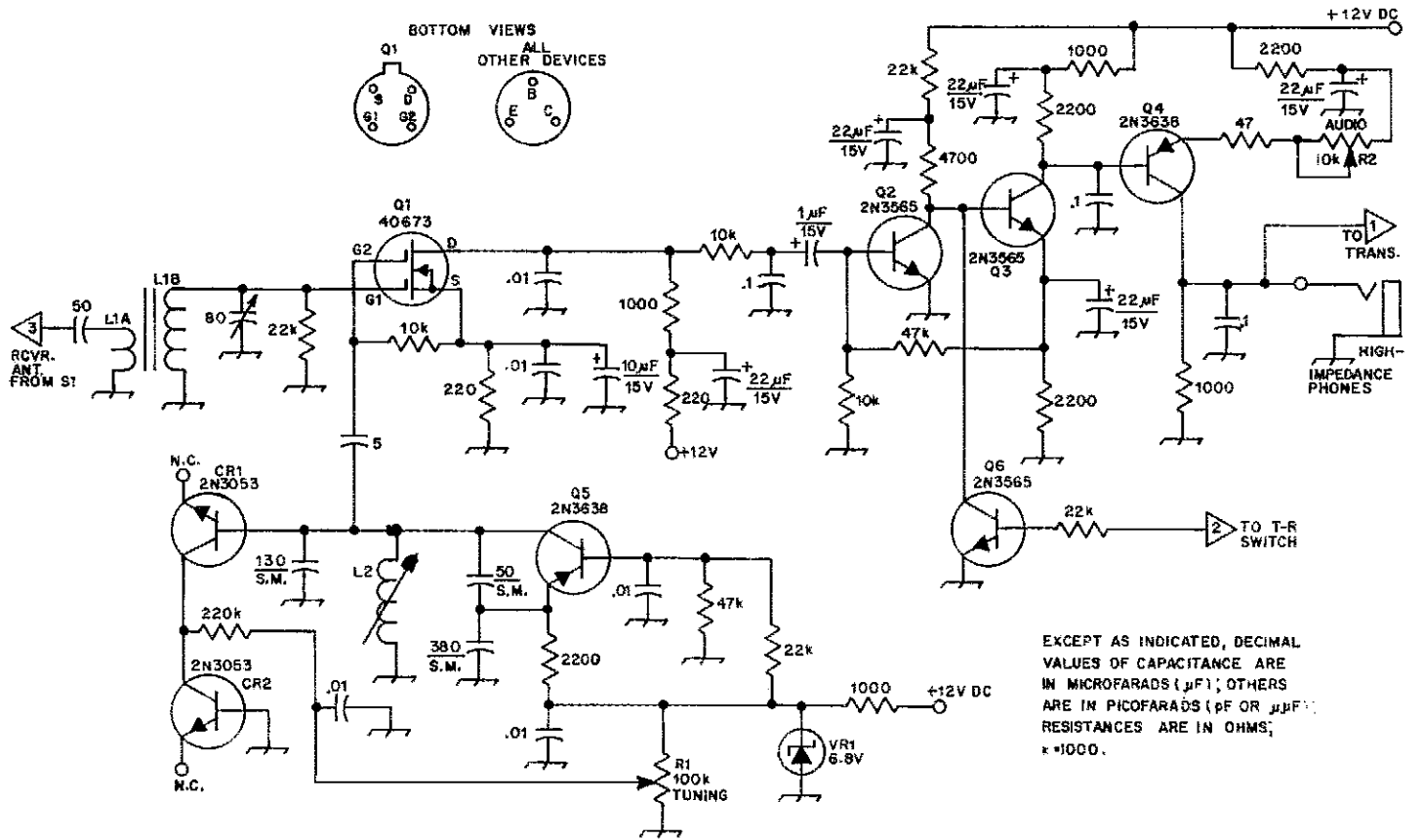


Fig 1 — Circuit diagram for the receiver section of the Mountaineer. Component designations not listed below are for text reference. CR1 and CR2 are the collector-base junctions of 2N3053s and are labeled D1 and D2 respectively on the pc-layout sheets available from the authors.

L1 — 44 turns No. 28 enam. on Amidon T-50-2 core.

L1B — 4 turns No. 28 enam. over L1A.

L2 — 1.6-3.1 µH, 19 turns No. 28 enam. on 1/4-inch dia ceramic form (J. W. Miller 4404 or equiv.).

R1, R2 — Linear taper, composition.

potentiometer which is mounted on the front panel. Varactor diodes are not needed since the collector-base junctions of readily available 2N3053 transistors accomplish the same purpose. The back-to-back diode arrangement assures that the 2N3053s never conduct on any part of the rf cycle, thus minimizing loading of the oscillator. With the components shown, the tuning range of the receiver is 70 kHz eliminating the need for a vernier drive on the tuning control.

The receiver sensitivity is adequate for use with the low-power transmitter. A one-microvolt signal is easily copied and the selectivity is suitable for most portable work. A high-performance audio filter connected between the receiver output and the headphones is a useful accessory for home-station operation. [3] The receiver requires about 14 mA at 12 volts.

Transmitter Design

Shown in Fig. 2 is the circuit diagram for the transmitter. It is very similar to the Milligallon previously described by one of the authors.[4] Q7operates as a keyed crystal oscillator and is used to drive Q8, the power amplifier. The matching circuit in the amplifier output is a pi network designed for a Q of 3. When terminated in 50 ohms, a load resistance of about 80 ohms is presented to the collector of Q8. In spite of the rig's simplicity, the output is exceptionally clean. The second and third harmonics are 32 and 60 dB below the fundamental output respectively.[5] With a 12.5-volt supply, the output power is 650 milliwatts and the total key-down current drain is approximately 100 mA.

The sidetone oscillator consists of Q9 and Q10 which forms a relaxation oscillator similar to the type used as a clock in an electronic keyer. Q11 is an impedance-transforming follower to drive the headphones. The oscillator is activated by a voltage which is derived from the transmitter output. The sidetone frequency is directly proportional to the rf output voltage. Hence, the circuit serves a dual role as a cw monitor and a sensitive output indicator. It eliminates the need for a meter. The diode in the output of Q11 isolates the receiver from the sidetone oscillator.

Also shown in Fig. 2 are the details of the T-R switching circuit. Supply voltage is always applied to the oscillator. However, power is applied to the amplifier only during transmit periods. Hence, during receive, pressing the key turns on Q7, providing a convenient "spot" signal.

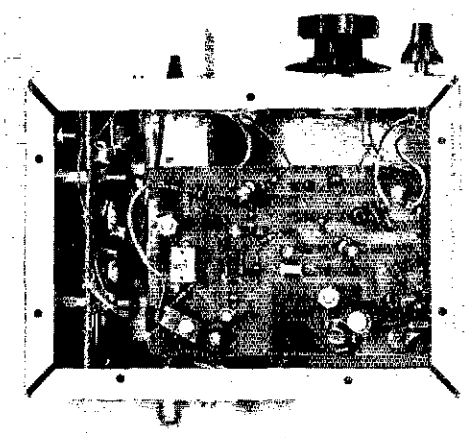
Construction and Operation

At the time of this writing, five complete transceivers have been built and a dozen more are under construction by members of TERAC (Tektronix Employees Radio Amateur Club). Printed-

[3] Hayward, "An RC Active Audio Filter for CW," *QST*, May 1970.

[4] Hayward, "A Milligallon For 15," *QST*, April, 1968.

[5] Measurements were performed with Tektronix type 7704 Oscilloscope and a 7L12 Spectrum Analyzer plug-in unit.



Inside view

circuit techniques are used exclusively.[6] The receiver easily fits on a 3 × 5-inch board. A smaller 1.8 × 4.8-inch board is used for the transmitter and sidetone oscillator. The entire transceiver (including a hand key) will fit conveniently inside a standard 2 × 5 × 7-inch chassis. With a little effort, 8 size AA penlight cells and a suitable electronic keyer could be contained in the same enclosure.[7] The electrolytic capacitors are dipped solid-tantalum similar to the Kemet series E. Silvered mica capacitors are used in the receiver local oscillator; mica compression trimmers tune the receiver input and transmitter oscillator.

Adjustment is very straightforward. The receiver local oscillator is adjusted while listening to the home station receiver. The input circuit of Q1 is peaked for maximum signal with an antenna connected to J1. The tuning capacitor in the transmitter is adjusted for maximum power output and clean keying into a 50-ohm dummy load. Should there by any power-amplifier instability, the 47-ohm base resistor may be reduced in value. The transmitter output network limits the power to less than one watt. Increased output can be obtained, however, by increasing the transmitter supply voltage and by adding a heat sink to Q8. Two-watts output can be obtained with a 24-volt supply. The receiver should not be operated at this voltage, however.

The unit shown in the photographs has one minor deficiency which is of significance to the portable operator. This is the inconvenience of plug-in crystals. Crystal switching is an extremely useful feature which has been incorporated in several other units.

[6] As a service to home constructors, TERAC will supply pc-layout information describing single-sided boards for the units shown. Those interested should send 50 cents in coin and a business size, stamped and addressed envelope to one of the writers at the addresses listed above. Because TERAC is interested in promoting home experimentation, pc boards are being made available to club members, and to *QST* readers as an additional service. The boards are similar to those shown in the photographs and are single sided and drilled (2 oz. copper, 1/16-inch fiber glass backing). The price is $7.50 per set, postpaid. Checks should be made payable to TERAC. Availability of boards and layout information cannot be guaranteed after January 1, 1974.

[7] Hayward, "An Integrated-Circuit QRP Keyer," *QST*, November, 1971.

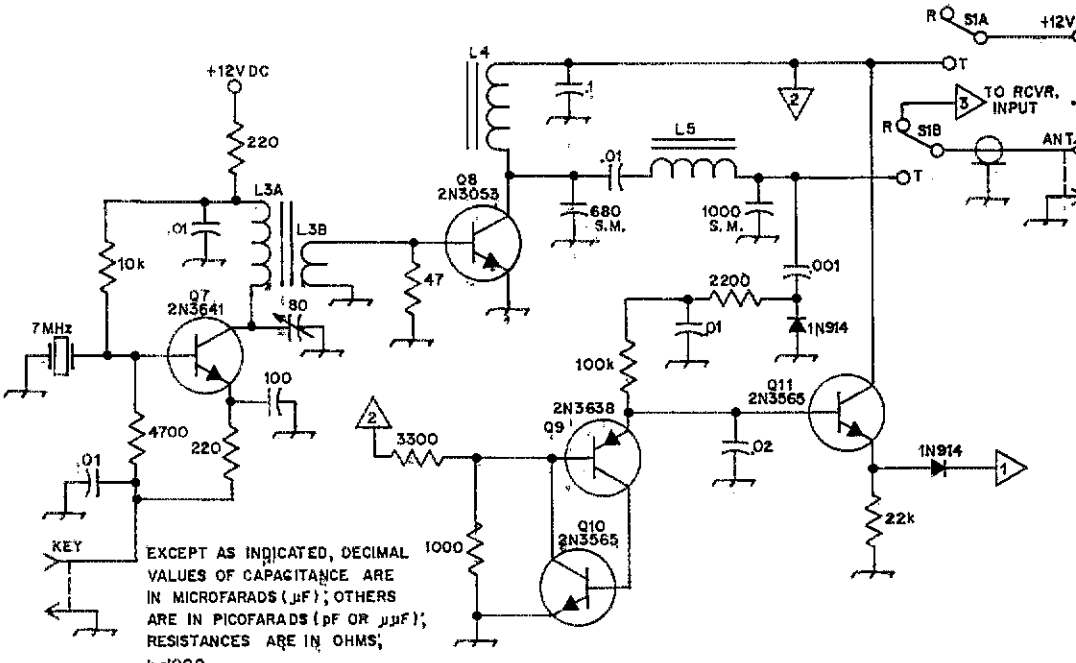


Fig. 2 — Circuit diagram for the transmitter. Component designations not listed below are for text reference.

L3A — 44 turns No. 28 enam. on Amidon T-50-2 core.

L3B — 4 turns No. 28 enam. over L3B.

L4 — 60 turns No. 28 enam. on T-50-2 Amidon core.

L5 — 14 turns No. 22 enam. on T-50-2 Amidon core.

S1 — Spdt slide.

Antennas always present a problem for field work and just about everything imaginable has been tried by the writers over the years. Generally, a simple dipole continues to be the most versatile choice. It may be fed with 75-ohm Twin-Lead or RG-174 miniature coaxial cable. A small center insulator is fabricated from scrap pc-board material. A length of fishing line or nylon cord and an appropriate weight will allow the center of the dipole to be properly placed over the limb of a tree. Above the timberline, the authors use a small 12-foot whip which telescopes to 14 inches. It is lashed to a convenient support (an ice axe) and then serves as a center support for a portable dipole.

The amateur who has never operated from a fairly high, isolated mountaintop location has a tremendous thrill in store for him. Received signals are surprisingly strong and numerous. Signal reports are well inflated above those expected from home-station experience. A little effort in establishing schedules may yield some husky pileups. However, a few words of caution are in order. Earphones should always be used. The last thing a nonham hiker (encountered on the trail) wants to hear in a wilderness environment is the blare of cw emanating from a speaker! Also, the mountain-climbing amateur should not be disappointed if he returns home having made no contacts, for the scenery and solitude of the alpine environment often provide a complete break from the technological world represented by amateur radio.

Acknowledgements

The writers gratefully acknowledge the assistance of the many TERAC members active in this project. Special thanks go to Roger Bateman, WA7MMQ, for his help in making the boards. QST

Strays

I would like to get in touch with . . .

. . . anyone with a photograph of a B-24 aircraft suitable for use on a QSL. G3JOC.

. . . anyone who participated in the Second Transatlantic Tests in 1922 who is still active. W2LWO.

. . . students at Dodge's Radio and Telegraph Institute, Valparaiso, Indiana, in 1930 or 1931. W9DPL.

. . . amateurs interested in radio controlled airplanes. WA2PXW.

. . . former operators of W7YD at the University of Washington. WA7FVD.

. . . amateurs knowledgeable on the avifauna of their region. WØCOS.

. . . amateurs who are active pilots. W7ISB.

. . . operators of X7XOT aboard the *SS Wisconsin* in the summer of 1929. W3KW.

. . . any hams who use the eleven-meter *amateur* band. VE3CUI.

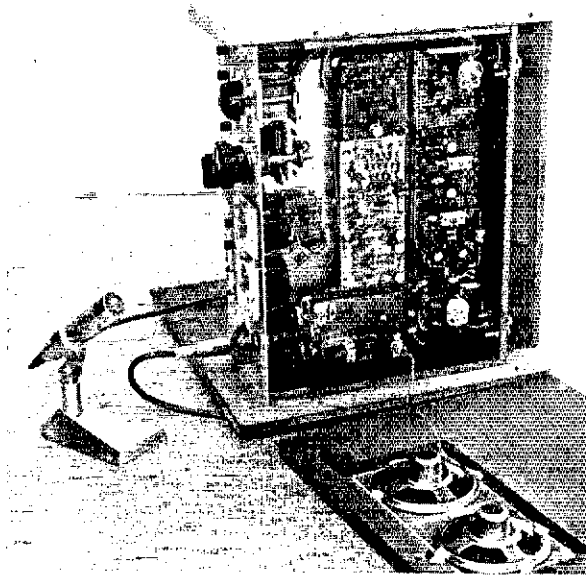


Fig. 13 — The two variable capacitors located on the upper end of the panel provide the VFO bandset and bandspread functions. They are connected to the VFO module via a short length of RG-62/U coaxial cable.

The Flashlight Sidebander

Part II†

BY R. P. BURR,* W2KQP

VFO and Transmitter Mixer

WHILE WORK ON the receiver section was progressing it was necessary to build a stable VFO. The circuit diagram of the VFO, Q21 and Q22, is shown in Fig. 11. High-quality mica capacitors should be used in the rf portion of the VFO circuit, and L4 should be an air-wound inductor.[5] The author fabricated L4 by close-winding about 18 turns of No. 18 wire around a 1/2-in.-dia filter capacitor, allowing the structure to expand to 17 turns of 5/8-inch diameter. The coil was then soldered into the module and was stretched and squeezed until the desired tuning range of 4.9 to 5.6 MHz was obtained. At this point the coil was stabilized mechanically by extruding three beads of hot-melt glue over the windings.

The bandset and bandspread capacitors for the oscillator are mounted on the front panel and are connected to the VFO module by means of a 10-inch length of RG-62/U cable. Because of the somewhat haywire mechanical arrangement used, the frequency of the oscillator can be varied slightly by wiggling the position of the coaxial cable or by banging on top of the cabinet. In the absence of such disturbances, which are infrequent in this writer's operating environment, the frequency stability of the oscillator is remarkable. Once adjusted to a particular frequency, the receiver will operate for hours at a time without the necessity for retuning.

An emitter follower, Q22, drives the transmitter-mixer and the receiver first-mixer inputs. A value of four volts pk-pk is available at the emitter of Q22.

The transmitter mixer is also shown in Fig. 11. A 40841 dual-gate MOSFET was originally tried for this function but did not operate satisfactorily, primarily because the VFO frequency is so close to the output frequency. (The VFO is at 5.0 MHz for a mixer output of 4.0 MHz.) The configuration shown is balanced to eliminate any traces of VFO signal in the output. The silicon diode and the base-emitter diode of Q23 produce a square-wave conduction characteristic in the transistors, so that the common-emitter current of Q24 and Q25 is interrupted at the VFO frequency. The 200-ohm balance control is adjusted to minimize VFO feedthrough to the mixer tank circuit. The setting is not particularly critical. A maximum signal of about 2 volts pk-pk single-sideband energy is available to drive the transmitter PA stages from the collector of Q26, a resistance-coupled amplifier.

Transmitter

With a single-sideband signal of sufficient amplitude available at the operating frequency, the next order of business was to construct the transmitter power amplifier. This section posed a number of interesting problems, including those of linearity, stability and tank-circuit design. The circuit, which was arrived at after much soldering and "scope looking," is shown in Fig. 12.

The transmitter amplifier uses computer-grade transistors which are low cost because of volume production. With proper heat sinking, the 2N5189 should be capable of safely dissipating 4 watts, which is far in excess of the requirement for the Flashlight Sidebander; the device can be purchased for 72 cents.

In order to reduce battery drain and collector dissipation, it was decided to operate the final

* R.D. 3, Lloyd Lane, Huntington, NY 11743.

† Part I of this article appeared in *QST* for July 1972.

[5] Hanchett, "The MOSFET as a Stable VFO Element," *QST*, December, 1966.

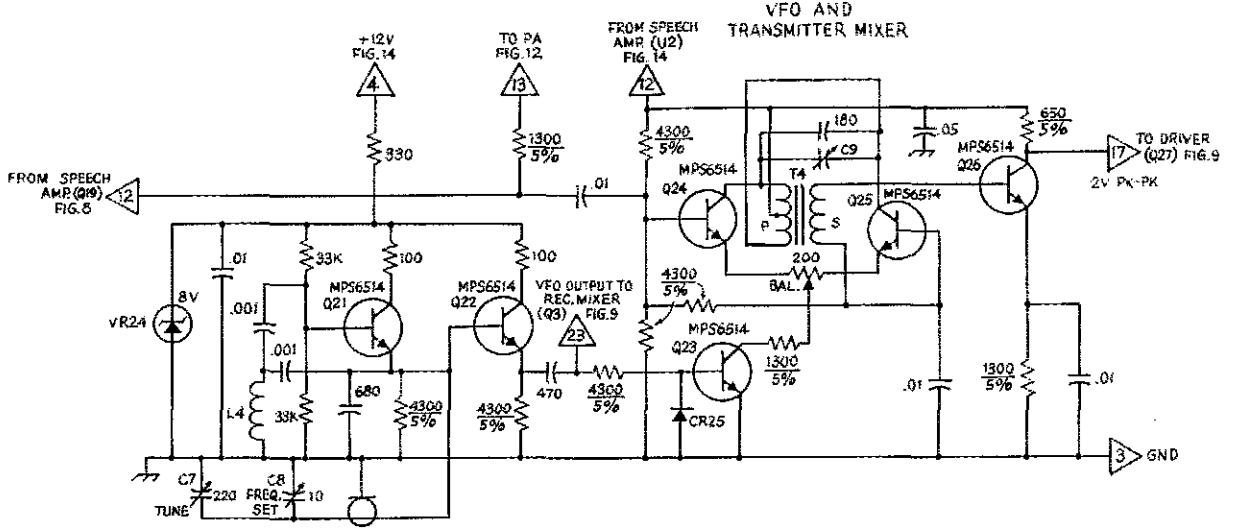


Figure 11 ▲

Figure 12 ▼

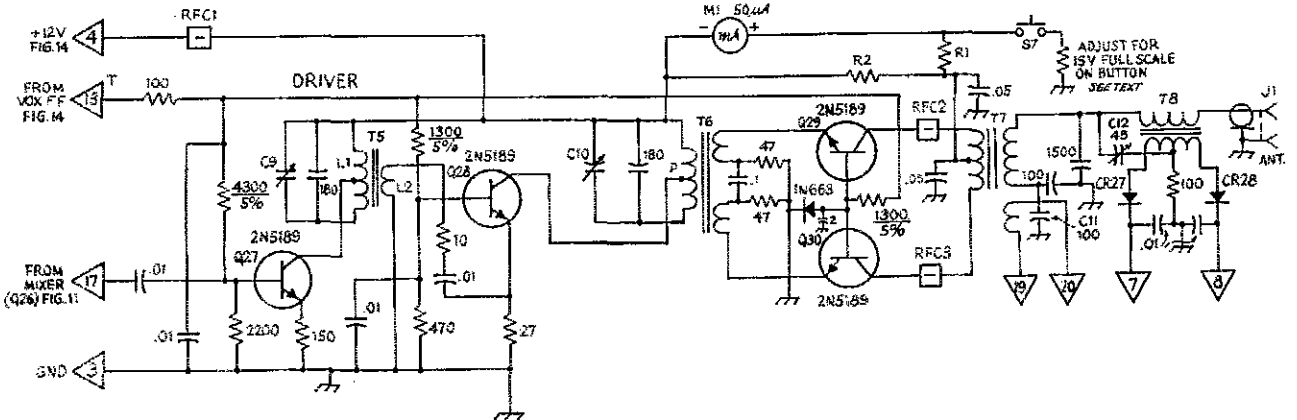


Fig. 11 — VFO and transmitter mixer. Unless otherwise marked, resistors are 1/2-watt composition and capacitors are disk ceramic.
C7 — Air variable (Hammarlund MC-25-M or equiv.).
C8 — Air variable (E. F. Johnson 167-1 or equiv.).
C9 — 7 to 45-pF mica trimmer (Elmenco 462 or equiv.).
CR24 — 8.2 volt Zener, 1 watt (Motorola 1N4738 or equiv.).
CR25 — Silicon diode, 80 PRV, 100 mA (Texas Instrument 1N663 or equiv.).
L4 — 17 turns, No. 18 tinned wire, see text for winding instructions.
Q21-Q26, incl. — Motorola transistor.
R5 — 200-ohm, 1/4-watt composition control, pc mount (Mallory MTC22L1 or equiv.).
T4 — Primary, 60 turns, No. 30 enam. wire, center tapped; secondary, 10 turns, No. 30 enam. wire wound on Amidon T-37-2 toroid core (Amidon Associates 12033 Otsego Street, North Hollywood, CA 91607).

Fig. 12 — Transmitter power amplifier. Unless otherwise marked, resistors are 1/2-watt composition and capacitors are disk ceramic.
C9, C10, C12, — 7- to 70-pf mica trimmer (Elmenco 462 or equiv.).
C11 — Air variable (E. F. Johnson 149-3 or equiv.).
CR26-CR28, incl. — Silicon diode, 80 PRV, 100 mA (Texas Instrument 1N663 or equiv.).
J1 — RCA phono jack, panel mount.
M1 — Microammeter (imported type).
Q27-Q30, incl. — RCA transistor.
R1 — Approximately 180k ohms, selected for full-scale reading on M1 with 15 volts applied.
R2 — Meter shunt; approximately 4 feet of No. 34 enam. wire wound on a 1-watt resistor and adjusted (by adding or removing turns) for 250-mA full scale reading on M1.
RFC1, RFC2, RFC3 — 2 turns of No. 30 enam. wire on a ferrite bead (available from Amidon Associates, 12033 Otsego Street, North Hollywood, CA 91607).
S7 — Miniature spst momentary-contact push-button switch.
T5 — Primary, 34 turns, No. 30 enam. wire tapped at 12 turns from the high-impedance end; secondary, 6 turns, No. 30 enam. wire wound on Amidon T-50-2 toroid core. (Secondary wound over the primary.)
T6 — Primary, 38 turns of No. 30 enam. wire, center tapped; secondary, 8 turns, No. 30 enam. wire, center tapped, bifilar wound. Toroid core used is an Amidon T-50-2. Secondary wound over the primary.
T7 — Secondary, 40 turns, No. 28 enam. wire bifilar wound; primary 1, 3 turns, No. 30 enam. wire; primary 2, 6 turns No. 38 enam. wire, center tapped; both primaries wound over the secondary; an Amidon T-68-2 toroid core is used.
T8 — Primary, No. 28 enam. wire passed through center of Amidon T-37-2 toroid core; secondary, 40 turns, No. 30 enam. wire, center tapped.

stage Class B. The stage was engineered as a grounded-base or emitter-driven system to assure stable operation and to improve linearity. The emitter input impedance for Class B operation is highly nonlinear, changing from a virtual short circuit when current is flowing into the emitter path to a high impedance when the stage is not conducting. A push-pull connection was chosen so that the input impedance of one transistor would complement the other throughout the entire cycle of drive current, thus presenting an improved load to the driver.

To an old vacuum-tube "hand," the tank-circuit design process for a low-voltage high-current transistor amplifier generates some unfamiliar numbers. After making several trial guesses about the current gain which might be available in the final stage, it was decided that the collector current in each stage should swing up to a 400 mA peak while the collector voltage was moving downward from 12 volts to 2 volts minimum, or a 10-volt change. The required load impedance was therefore 25 ohms.

The desired load impedance was achieved by constructing a single-ended pi-network tank circuit on a 5/8-inch diameter toroidal core and winding two three-turn primaries over the secondary for the push-pull final stage. This multiwinding approach becomes both easy and practical when toroidal cores are used, since they provide a high coefficient of coupling between the windings. Coils made with toroids can be designed, approximately, as though they were low-frequency transformers. The working L/C ratio and the size of the tuning capacitor can be varied somewhat to suit the junk-box parts available. In the Flashlight Sidebander, the tank operates at a loaded Q of about 20 using approximately 150 pF of tuning capacitance. The receiver front end is fed from a three-turn link on the final tank coil.

The driver stage is single ended and is operated Class A. Here again the grounded-base configuration was used so that instability problems would not be encountered. The input stage also operates Class A and is stable because it is resistance coupled from the mixer.

To get the transmitter working, the writer used two-tone drive energy generated by applying 4 volts pk-pk of audio to the balanced modulator. The transmitter circuit was then checked stage by stage, beginning at the input. The turns ratio on each interstage transformer was adjusted by a cut-and-try procedure to maximize the undistorted drive current to the following stage, (the antenna, in the case of the final amplifier). Limiting was detected by connecting the scope to the emitter degeneration resistor of the stage being tested. Setting the turns ratio to produce a high reflected load impedance produces maximum amplitude *and* peak limiting of the drive current. If the reflected impedance is low, there will be no distortion, but the current amplitude will be less than maximum. About 250 mA (average current) will be read on the collector-current meter with the two-tone signal applied, as limiting begins. This same meter also can be used to check the voltage when a front-panel push-button switch is depressed.

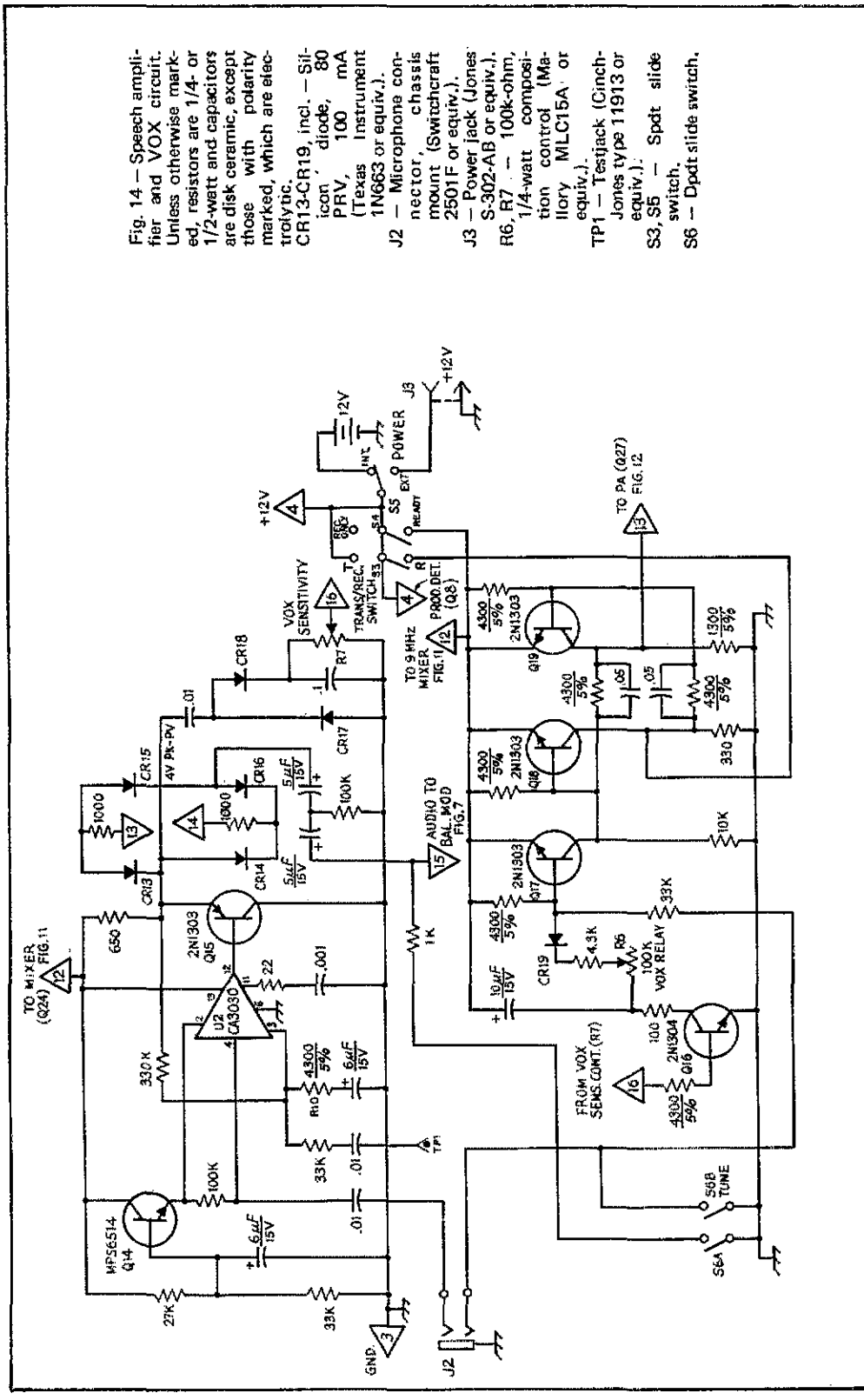


Fig. 14 — Speech amplifier and VOX circuit. Unless otherwise marked, resistors are 1/4- or 1/2-watt and capacitors are disk ceramic, except those with polarity marked, which are electrolytic.
CR13-CR19, incl. — Silicon diode, 80 PRV, 100 mA (Texas Instrument 1N663 or equiv.).
J2 — Microphone connector, chassis mount (Switchcraft 2501F or equiv.).
J3 — Power jack (Jones S-302-AB or equiv.).
R6, R7 — 100k-ohm, 1/4-watt composition control (Mallory MLC15A or equiv.).
TP1 — Testjack (Cinch-Jones type 1913 or equiv.).
S3, S5 — Spdt slide switch.
S6 — Dpdt slide switch.

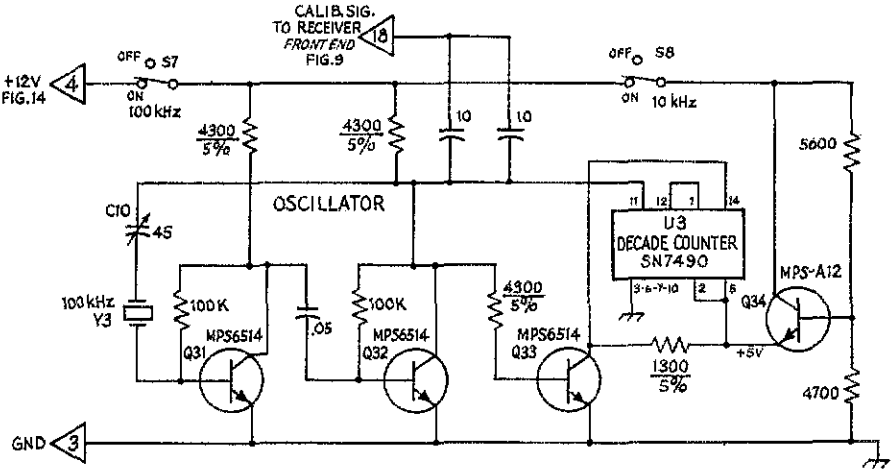


Fig. 15 — The calibrator circuit. Resistors are 1/4- or 1/2-watt composition and capacitors are disk ceramic.

Q31-Q34, incl. — Motorola transistor.
S7, S8 — Spst slide switch.
Y3 — 100-kHz crystal.
U3 — SN7490 decade counter.

The SWR bridge was included in the output circuit because accurate antenna matching is especially important when using a QRP rig. Furthermore, the bridge serves as a handy check of transmitter operation. As mentioned previously, the bridge is normally connected to read forward power so that the meter kicks upward with speech. Pressing a spring-return push button on the front panel switches the meter to indicate reflected power.

Speech Amplifier and VOX

The speech amplifier and VOX system are shown in Fig. 14. Operating voltage for the various switching diodes, the R line and the T line are obtained from the flip-flop, Q18 and Q19, which is triggered from the speech amplifier. There is no anti-VOX function provided since experiments indicated it was not necessary.

The speech amplifier is a single IC operational amplifier followed by an emitter follower, Q15, to increase the available voltage swing. Gain from the microphone is adjusted by the magnitude of the shunt feedback resistor, R10. Q14 is a voltage divider for the IC.

The switching arrangement, which reduces battery drain for receiving only, is shown at the right side of Fig. 14. With the function switch in the READY position, power is applied to the speech amplifier and VOX circuits, and the receiver is connected via the R line to the VOX flip-flop. With the switch in the RECEIVE ONLY position, power is removed from the VOX and speech circuits, and the R line is connected directly to the battery. Under these conditions the battery drain drops from about 125 mA to 75 mA, thus extending battery life.

The audio gate shown to the right of the speech amplifier disconnects the audio signal from the balanced modulator when receiving. This step is necessary, since it was found undesirable to de-energize the balanced modulator while receiving because the resultant change in BFO loading produced a slight frequency shift. Disconnecting the audio avoids unbalancing the modulator with local noises which would, of course, develop a signal that would block the receiver.

The VOX performance is excellent. The switching action is very smooth and produces an essentially noiseless and click-free transition from receive to transmit.

The TUNE switch is connected so as to toggle the VOX flip-flop and to inject a large dc voltage to unbalance the balanced modulator. The resulting carrier is used when adjusting the final amplifier for maximum output.

Calibrator

During the early stages of planning the mechanical arrangement for the transceiver it became apparent that the small size of the front panel would make it difficult to use a tuning dial with good visual readout. As a result, it was decided to use electrical bandspread for easy tuning and to use a crystal calibrator to set the bandspread range.

The calibrator circuit is shown in Fig. 15. Q31 and Q32 operate as a crystal-controlled multivibrator driving an SN7490 decade counter.[6] Q33 drives the IC, and Q34 is a voltage divider for the counter IC. The IC divides the 100-kHz energy first by 2 to 50 kHz (available at pin 1 of the '7490) and then by 5 to 10 kHz. If the division order is reversed to 5 and 2, the 10-kHz output will be a square wave and even-order harmonic output will be weaker.

Since the range of the bandspread capacitor is a little over 20 kHz, it is always possible to locate at least two of the 10-kHz markers within the dial

6 Benskin, "A Crystal Calibrator for General Coverage Receivers," *QST*, December, 1970.

(Continued on page 50)

• *Beginner and Novice*

A Convenient Antenna-Switching and Transmatch Unit

Here is the completed Transmatch and antenna switching unit. Vernier dials, Lafayette type 99-H-6030, are used to drive the capacitors. The slow tuning rate permits a more precise adjustment.

BY EDWARD B. NOEL,* W8CS

A COMBINATION ANTENNA switching unit and Transmatch is handy if one changes bands frequently, and particularly where use is made of all the hf amateur bands. A compact and versatile unit, shown in Fig. 1, has been built here at W8CS, based on past articles which have appeared in *QST*, plus a couple of the author's ideas. The circuit permits feeding the output of the transmitter to an internal dummy load, to a wide-range Transmatch, or to a coax- fed antenna such as a beam. If fed to the Transmatch, the output can be switched between two coax lines, or to a terminal for a random wire, or to balanced feeders with either high- or low-impedance loads. Also, a double-meter SWR bridge is built in. All this is housed in a homemade 7-3/4 × 10-1/4 × 11-inch box painted in two shades of gray to match my Collins equipment.

SWR Indicator

The SWR bridge is an etched-circuit Monimatch.[1] The bridge has two 100-μA meters, one which reads relative forward power, and the other, relected power. Tuning is greatly speeded up by being able to observe the forward and reflected readings simultaneously. The bridge unit was built in the 2-1/4 × 2-1/4 × 5-inch Minibox exactly as described in the article. One-inch-square holes were cut in the back panel of the main cabinet to permit the coax outlets mounted on the Miniboxes to protrude through, so the Minibox could be clamped flush to the inner surface of the back panel. Bringing out both terminals of the SWR bridge permits the bridge to be used independently if needed. A short external cable is then used to connect to another coax fitting which leads to the arm of the function switch.

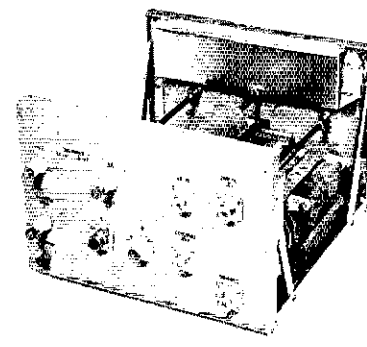
Since the two meters mounted on the front panel are so close to a strong rf field, they must be very carefully shielded and bypassed. Until the separate meter housing was made tight and additional .001 μF bypass capacitors were added to the long leads right at the meters, the twin-meter unit gave erratic readings. A switch was added to the back of R1 dual potentiometer to open the ground circuit to stop meter-needle movement during normal transmission.

The first position on the function switch connects the transmitter to a 52-ohm, 100-watt Ohmite dummy antenna. Whenever a wide frequency shift or a band change is made the transmitter

* 1361 Oakridge Drive, Cleveland Hts., OH 44121.

[1] McCoy, "An Etched Circuit Monimatch for Checking Your Antenna Systems," *QST*, October, 1969. Also Transmission Lines chapter, *The Radio Amateur's Handbook* 1972 edition.

W8CS describes a piece of equipment that many hams, Novice or higher license class, will want to build. Designed to handle transmitters in the 100- to 200-watt class, this equipment eliminates many of those antenna problems that plague the ham.



This back view shows the arrangement of the SO-239 coax fittings and ceramic stand-off terminals for various antenna feeders.

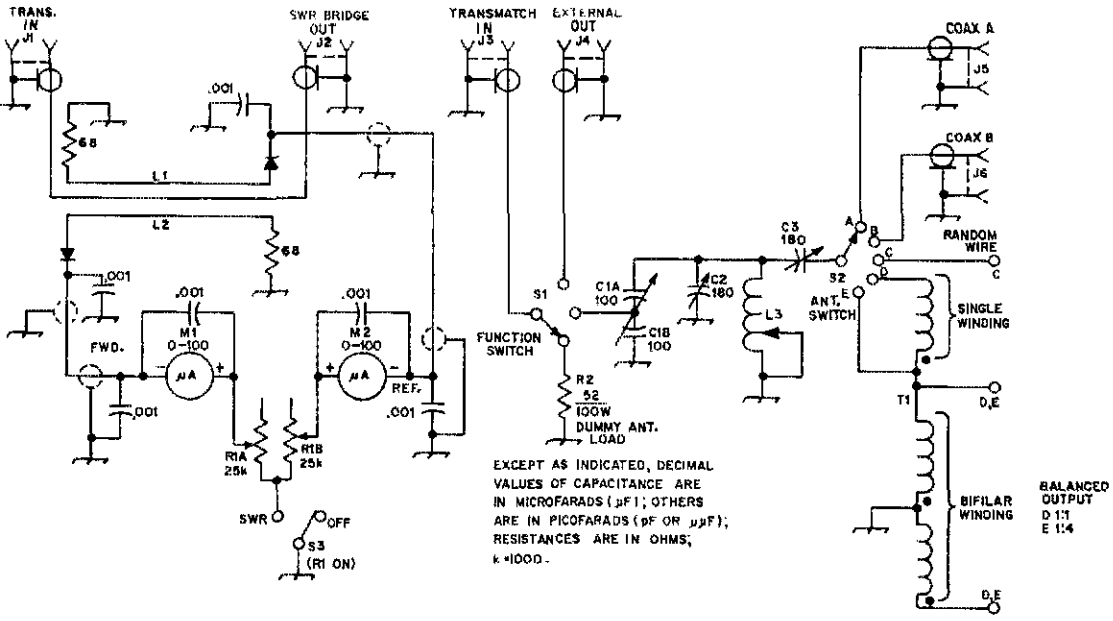


Fig. 1 — Circuit diagram of the W8CS Transmatch and antenna switching unit. For additional details on the Monimatch and Transmatch see footnotes 1 and 2.

C1 — 100-pF per section, dual variable, .050- to .070-inch plate spacing, (Millen 12100-CR or equiv.).

C2, C3 — 180-pF variable from ARC-5 transmitter, (Millen 12200-CK or equiv.).

R1 — Dual 25,000-ohm control, linear taper, ganged, with S3 mounted on rear of control (Ohmite CCU-2531 with switch).

R2 — Dummy antenna (Ohmite 52-ohm, 100-watt).

S1 — Single-pole, three-position wafer.

S2 — Single-pole, five-position wafer.

T1 — See text.

can first be tuned into the dummy antenna. All further tuning is then done with the Transmatch.

The Transmatch

The coupler portion of the unit is the "Ultimate Transmatch."[2] Since a split-stator capacitor of 100 pF per section was available, a padder of 180 pF was used as in Fig. 2 of the article.[3] This capacitor and the variable roller inductor were taken from a surplus Signal Corps BC-458-A. The series capacitor, C3, in our first version was 300 pF, with .030-inch spacing. This spacing was too close for the 100-watt output of the transmitter on 3.5 and 7 MHz when fed into 125 feet of open-wire feeder and an inverted V antenna. It almost sufficed but flashed over at some settings. The 300-pF capacitor was replaced with another of 180 pF rating and .061-inch spacing taken from the same BC-458-A. With this lower value of capacitance it was no longer possible to tune 3.5 MHz with the particular feeder length and antenna in use at this station. Apparently the same situation existed as was mentioned by Mead on page 44 of the January 1971 *QST* under the title of "Switchable-Impedance Balun." This balun is described more fully in "Application of Broad-band Balun Transformers" by Turrin in the April 1969 issue of *QST*.

The balun is a combination of two baluns. It is constructed with a toroid core using, in combination, a single winding and a bifilar winding. The single winding consists of ten turns of No. 12 wire occupying one third of the winding space; the bifilar winding is two sets of ten turns of No. 12 wire which occupy the remaining two thirds of the space. The windings are connected as shown pictorially in Fig. 2. The balun was constructed,

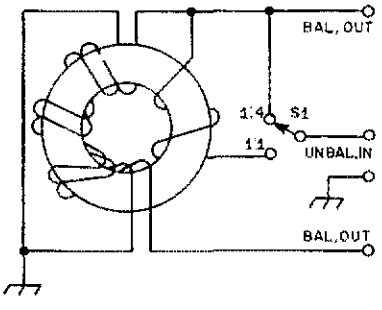
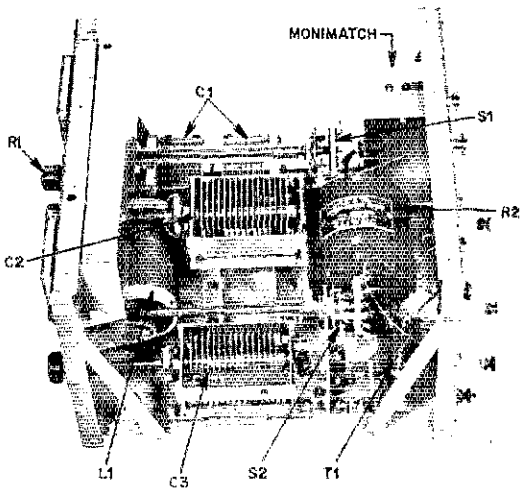


Fig. 2 — Pictorial diagram showing method of winding the switchable-impedance balun.

[2] McCoy, "The Ultimate Transmatch," *QST*, July, 1970; also Transmission Lines chapter, *The Radio Amateur's Handbook* 1972 edition.

[3] John Meshna Jr., P.O. Box 62, E. Lynn, MA 01904, has ARC-5 capacitors, inductors, and complete transmitters in stock. Catalog available.



Note the shielding around the meters for the SWR bridge. The single-section variable capacitor just to the front of the dummy load is C2. The balun is visible in the lower right-hand corner in this view.

using a single core, from the parts supplied with the Kilowatt Broadband Balun kit available from Amidon Associates as advertised in *QST*.

The final version of the unit with a switchable 1:1 and 1:4 balun matched my antenna system on 3.5-MHz perfectly with the antenna switch in position D, which is the one-to-one connection. On 7 MHz position E was used, the one-to-four connection. Positions A and B on this same switch are unbalanced coax outlets, and position C connects to a terminal for a random wire.

Getting the Parts

Some building projects can become frustrating when it comes to finding the parts. The following list may be of help:

Balun kits and toroid cores:

Excelsior Springs Electronic Labs, P.O. Box 434, Excelsior Springs, MO 64024 (Catalog available).

Amidon Associates, 12033 Otsego St., N. Hollywood, CA 91607; Elna Ferrite Labs (Ferroxcube Products), 9 Pine Grove St., Woodstock, NY 12498.

Variable capacitors and roller inductors (surplus),

John Meshna Surplus. See footnote 3.

Ohmite dummy load and R1:

Arrow Electronics, Inc., 900 Route 110, Farmingdale, NY 11735. Newark Electronics, 500 N. Pulaski Rd., Chicago, IL 60624.

R.V. Weatherford Co., 6921 San Fernando Rd., Glendale, CA 91201.

Etched-Circuit kits:

Radio Shack, Inc.

Lafayette Radio, Inc.

Also, Barry Electronics, 512 Broadway, New York, NY 10012, can furnish most parts at amateur net prices. Catalog available.

Adjustments

Adjustment of the Ultimate Transmatch takes only a few minutes for any antenna system. Feed just enough power from the transmitter to obtain readings on the SWR meters. Next adjust C1, C2, L1, and C3 while looking for the lowest reflected-meter reading versus the highest reading on the forward meter. It should be possible with *any* antenna system to obtain a zero reading on reflected, which indicates a matched condition.

It is possible to find several settings of the controls that will give a matched condition. Always use the setting that provides the most capacitance with C1 and C2, and the least inductance with L1. This setting provides the best harmonic rejection for the transmitter.

This Transmatch has lived up to the name of "The Ultimate" given it by McCoy, in that it handles a greater range of impedances without plug-ins than other matching units which have been built and used. Combined with the internal dummy load, available at the flick of a switch, and the ability to switch in several different types of antennas without fiddling with coils or connections, it approaches the ultimate in convenience.

FEEDBACK

Michael J. Toia, author of "Antenna Impedance by Direct SWR Measurement" (*QST* for June 1972) and now W3TQM/9, writes to let us know that he has just moved from the Virginia address given in the article. His new address is 1750 North Good Ave., Park Ridge, IL 60068.

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The "An Inexpensive Secondary Frequency Standard" in May *QST* by A. C. Beresford has a missing ground connection on pin 7 of U2 in the drawing of Fig. 1 which is necessary for proper operation. The frequencies available at the 10- and 20-MHz outputs of Fig. 2A are the reverse of those shown in the drawing.

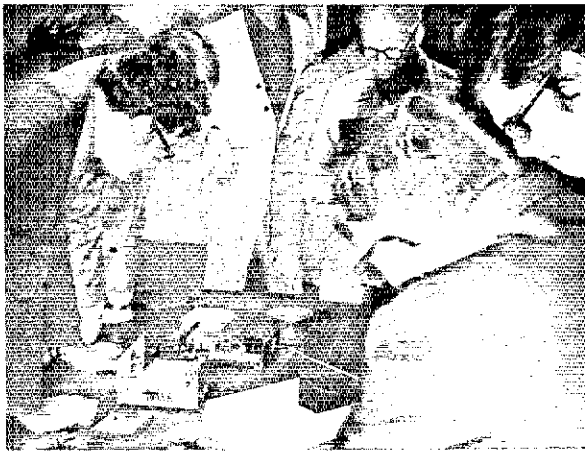
The VXO described on page 11 of May 1972 *QST* will have a tough time getting into oscillation with switch S1 of Fig. 1 wired as shown. The switch arms should, of course, connect to the same crystal in each switch position, and not to unrelated crystal terminals. We thank Bill Smith, K4RJ, for his discovery of the drafting error.

— • • —

The circuit board pattern of Fig. 2B, "Notes on the Amateur Station Counter," *QST* for June 1972, was overexposed so that a number of short circuits appear in the print that were not on the original art work. A template for this board, minus the shorts, is available from the ARRL Technical Department, no charge. U1 of Fig. 1 is an SN74H04, not SN74H00 as noted in the parts list. RFC4 is a 8.2-μH miniature rf choke, J. W. Miller 70F826AI, or equiv.

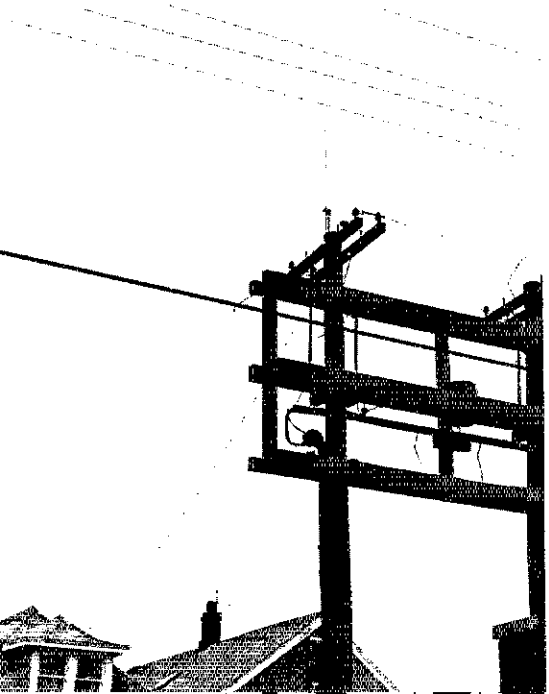
Strays

The "50 Years Ago" column in April reported the attendance of Dr. Alfred N. Goldsmith, 2XN at a second district convention in New York. W2AIM brings to our attention that the same Dr. Goldsmith (shown in the photo) was the principal speaker at a recent joint QCWA/Radio Club of America meeting, and was introduced by former ARRL president W2KH.

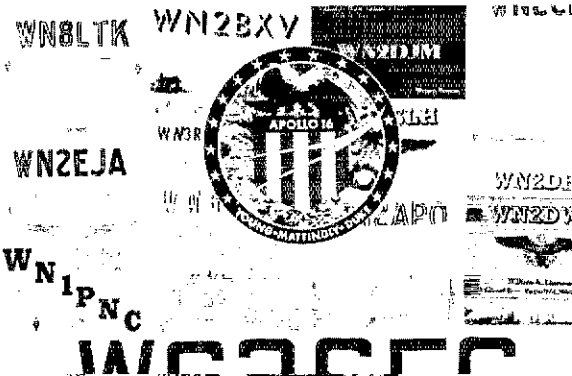


Ottawa Ontario Amateur Radio Club members pore over the latest in IC gadgets, following a talk by Jerry Hall, K1PLP, assistant technical editor of *QST*.

The Jr. OP of John Van, W9PMJ took this shot of a "peachy dandy" antenna installation in Cicero, Ill. If you look closely you'll see one of the radials practically touching a "hot" wire on the power lines. Nope, it isn't a ham installation — one guess allowed! *(Switch to safety!!!!)*



These QSLs are from a few of the more than 60 Novices worked during the Apollo 16 flight by the Goddard Amateur Radio Club special events station, WG3SFC. The station located at the Goddard Space Flight Center made a special effort to contact Novices — 63 in all were worked under the supervision of W3ROO. The group is now gearing up for the Apollo 17 mission scheduled for December 1972, and again will offer a commemorative QSL to all stations contacted.



PHASED VERTICALS in a 40-Meter Beam-Switching Array

The theory behind an antenna array consisting of a pair of phased vertical elements is not overly complicated. Building a practical working system with beam-steering capabilities, however, involves problems of impedance matching, switching, and maintaining the correct phasing. After spending a year in the development of an efficient system, the authors describe here a bit of the theoretical as well as the practical aspects of what to do and what not to do. This array can be built with all new materials for $85 or less, and yet its DX performance is equivalent to that of a $200 beam on a $400 tower-rotor combination.

BY ROBERT M. MYERS,* W1FBY, and JERRY HALL,* K1PLP

WITH SUNSPOT ACTIVITY on the decrease and expected to continue declining until 1975, the upper frequency bands of the hf spectrum will become unusable for DXing a great percentage of the time. Twenty meters will go "dead" after sunset and forty meters will become the daytime and nighttime DX band. A 40-meter antenna with forward gain and a high front-to-back ratio will help to cope with the QRM from foreign broadcast stations and the multitude of amateur stations that will be operating. With an adequate system of radials, the low-angle performance of the array described here is on a par with that obtained from a 1-λ-high 3-element horizontally polarized parasitic beam tuned for maximum front-to-back ratio, but at a much lower cost. Three elements are used in the system, but only two are active at any given time.

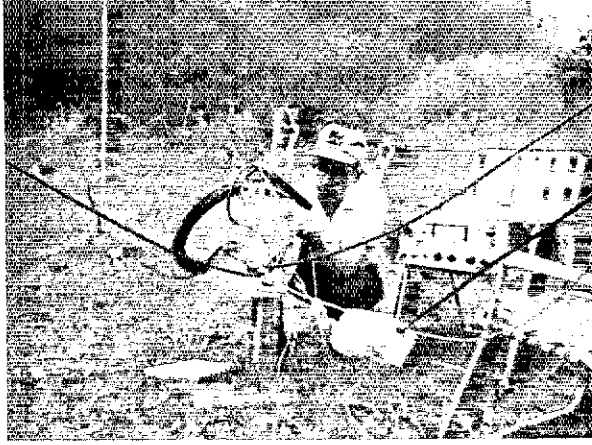
Some months ago the authors set out to construct an economical 40-meter antenna system, one having moderate gain over a single element and high front-to-back ratio. With these features in mind, we turned to a vertical array. Over the years most amateurs operating in the hf portion of the spectrum have had at least a passing interest in vertical antenna systems, but it seems most published information and construction data have been related to horizontal arrays. Within the past 25 years there has been a mere handful of *QST* articles on vertical arrays. Some used parasitic elements,[1,2,3] and some used driven or phase-fed elements.[4,5,6,7]

It has often been said that a vertical antenna is one which radiates equally poorly in all directions. Is there really a good basis for this saying? We think not. It has been the experience of the authors that vertical image-plane antennas, either with an extensive radial system or located adjacent to salt water, have *always* been good performers. Measurements indicating that the efficiency of a vertical antenna is directly related to the extent of the radial system have recently been published.[8] It seems that in reality, the old "equally poorly" axiom applies mainly to those vertical systems which rely solely on a single rod driven into lossy

* Asst. Technical Editor, *QST*.

[1] This and all other references are listed in the bibliography which appears at the end of the article.

Lifting the feed lines off the radial system increased the front-to-back ratio by nearly 15 dB.



W1FLM makes a few measurements of the actual phase angle of the delay line using a vector voltmeter. The *L* network used in this version of the antenna is mounted in an aluminum box connected in the feed line two feet from the relay box.

earth for the image plane. We forged ahead with plans for a vertical system.

After considering the two possibilities for exciting the array, either parasitic or phase-fed elements, we chose the phase-fed arrangement. The reason is that better front-to-back ratios can be obtained with phased elements. There is greater control of the current flowing in the various elements with phase feed, and therefore better cancellation of radiation in the back direction. With a pair of close-spaced elements, less than a half wavelength apart, and with the phasing properly adjusted for the element spacing, quite high front-to-back ratios can be obtained . . . up to infinity, at least in theory.

Another factor which was considered is that greater forward gains are obtained as closer spacings of the two elements are used. A common configuration for an amateur 2-element phased array is to place them 1/4 λ apart and feed them 90 degrees out of phase.[6,7] A cardioid radiation pattern results, and the theoretical forward gain, assuming equal currents are flowing in the two elements, is 3 dB over that of a single element. This pattern is shown at B in Fig. 1. However, moving the elements closer together (within limits) and changing the phase, as needed, results in greater forward gains without sacrifice of the front-to-back ratio.

After considering all these points, the authors chose to place the elements 1/8 λ apart and feed them 135 degrees out of phase. In this configuration the array has a theoretical gain of 4.4 dB over that of a single element or 1.4 dB over the 1/4-λ-spaced array. This pattern is shown at A in Fig. 1. Further, the 1/8-λ spacing requires somewhat less real estate. In addition, the forward lobe of the 1/8-λ-spaced array is somewhat narrower. The half-power beamwidth of the closer-spaced array is approximately 140 degrees, while that of the 1/4-λ-spaced array is 180 degrees.

The Unexpected

Every experienced amateur knows that the approximate feed-point impedance of a single 1/4-λ vertical element is 36 to 40 ohms, depending somewhat upon the conductivity of the image plane. Without giving the subject much further thought, one would think that two resonant elements, connected essentially in parallel, would present an impedance of approximately 18 ohms at the system feed point. Thus, if the array were fed with 50-ohm line, the SWR should be no greater than about 3 to 1.

In order to run some preliminary tests, the authors hastily put up a pair of 33-foot elements spaced 17.5 feet apart and laid out a makeshift radial system. A length of 50-ohm line was run from the shack to a T connector mounted at a box which contained a relay for switching the 50-ohm 135-degree phasing delay line in series with either element. Equal lengths of 50-ohm line connected between the relay box and each element completed this installation. This system, minus the relay-switching arrangement, is shown at A of Fig. 2.

Initial listening tests with a receiver were most encouraging. The elements had been aligned on Europe, and switching the null of the beam in that direction caused those S-9 broadcast signals to drop almost into the noise level. However, we were somewhat unprepared to observe the 8.5-to-1 SWR which existed on transmit. Where could we have gone wrong? Quickly grabbing the Macromatcher,[9] we dashed out to the relay box and discovered that the feed-point impedance of the array at the T connector was 7.5 + *j*24 ohms – a far cry from the 18 ohms mentioned above. The project went back to the drawing board.

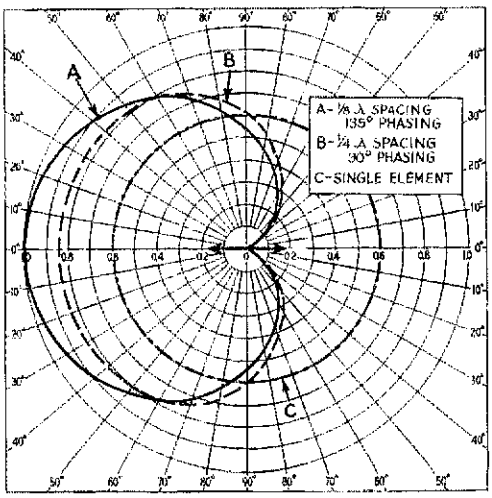


Fig. 1 – Computed relative field intensities for a pair of phased 1/4-λ vertical elements versus a single element, after G. H. Brown.[10] The arrow represents the axis of the elements, the cardioid patterns being end-fire configurations. The peak of the lobe is in the direction of the lagging element of the phased pair.

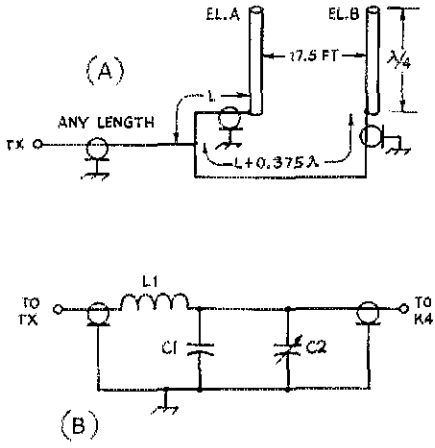


Fig. 2 — At A, the basic 2-element phased array. See text regarding length *L*. At B, a suitable *L*-network for matching the antenna-system feed point to 50-ohm line.
C1 — 500 pF transmitting mica (Sprague 20DK-T5 or equiv.).
C2 — 3-section broadcast variable, 30-365 pF per section (Miller 2113 or equiv.).
L1 — 1 μH: 3-1/2 turns of 2-in.-dia stock, 6 turns per inch (B&W 3025 or equiv.).

Mutual and Self Impedances

The above results point out quite vividly the effects of energy being coupled from one element to the other. Consider a horizontal parasitic beam for a moment. The driven element alone can be adjusted for resonance, and its impedance, depending on the height above ground, will be in the order of 70 ohms. When a close-spaced director and reflector are added, however, that feed-point impedance will become lower, perhaps as low as 12 or 15 ohms. In addition, there may be reactance present at the feed-point terminals, even though the driven element alone was tuned for zero reactance. Mutual coupling among the elements accounts for the change in impedance. The same holds true for a phased array.

We consulted several of the recently published "standard" engineering reference books on antennas and antenna design, seeking detailed information on this mutual coupling. While each contained some information, all made reference to a paper published in 1937 by Brown.[10] In that paper we found all the data we desired as to how mutual coupling affects the base feed-point impedances of the individual elements as well as how it affects the overall system gain. From mathematical relationships and graphs, we determined that for 1/4-λ elements separated by 1/8 λ and fed 135 degrees apart, the element base feed-point impedances theoretically are: leading element, 14.8 − *j*24.6 ohms; lagging element, 11.4 + *j*21.2 ohms. Taking the feeder and phasing line lengths and these impedances into account with a Smith chart, and then calculating the resultant impedance from paralleling the two lines at the T connector resulted in an answer that was quite close to that measured with the Macromatcher. Even though we hadn't yet obtained a good match to the line from the shack, at least we knew there was nothing drastically wrong with the system.

Matching the System

We decided against attempting to obtain a match at the base of each element for two reasons. First, any lumped-constant type of network would likely destroy the phasing relationship between the elements. Second, electrical beam switching would become very complicated, as it would be necessary to switch networks at the bases of the elements as well as switching the phasing line.

Three methods for matching the antenna-system input impedance to a 50-ohm line from the shack were tried by the authors, and all worked successfully: (1) an *L* network, (2) stub matching, and (3) tuning the coaxial lines between the relay box and the elements (but keeping them at equal lengths to preserve the phasing relationship). Details on each method are given later. The *L*-network and stub-matching arrangements are more economical because a substantial amount of coax is required for satisfactory line tuning. However, the *L*-network and stub-matching arrangements do not give as good a match across the entire amateur band.

Because there is no commonly available coaxial line which will match the relatively low impedances of the individual elements in the system, any type of line which is used will be operating with a rather high SWR between the elements and the matching point. This has negligible effect on the overall efficiency, but does cause the line lengths for a particular matching scheme to be somewhat critical. Changing the line lengths between the relay box and the elements from 12 to 15 feet, for

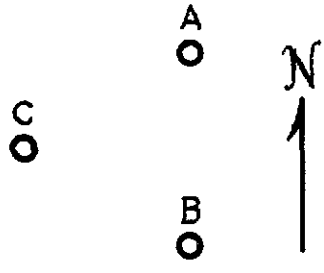


Fig. 3 — The arrangement of three elements for electrical beam switching in 60-degree increments. If oriented as shown here, elements A and B are used for 0- and 180-degree bearings, elements A and C for 60- and 240-degree bearings, and elements B and C for 120- and 300-degree bearings. A suitable control system for switching the beam in consecutive order, 0 to 60 to 120 degrees and so on, is shown in Figs. 4 and 5. The builder may, at his discretion, align any pair of elements to favor a particular direction. The authors chose to align elements A and C at a 45-degree bearing, to favor Europe.

An aluminum mounting plate for the uhf connectors provides a convenient way to attach the feedlines to each of the elements.

example, will almost necessitate a completely new design of the matching-network system, unless it has a very wide range of adjustment. The length of the phasing delay line, of course, must remain fixed at 135 electrical degress (0.375 λ). This length may be determined by formula:
For solid-dielectric coax (RG-8/U or RG-58/U),

$$l_{ft} = 243/f_{MHz}$$

For foam-dielectric coax (such as Times Wire and Cable FM-8 or T4-50),

$$l_{ft} = 299/f_{MHz}$$

If one wishes to measure the phasing-line length with a dip meter, it may be checked as an electrical 1/4 λ of line at 2/3 the operating frequency, or as 1/2 λ at 1-1/3 times the operating frequency. For 7.05-MHz operation, the two checking frequencies are 4.7 MHz and 9.4 MHz. The length is 34.5 feet if RG-8 or -58/U is used, and 42.4 feet if foam-dielectric cable is used. Since coax is sold by the foot rather than by its electrical length, solid-dielectric line with its lower velocity factor is certainly worth considering, especially if the tuned-line matching arrangement is to be used.

AN L NETWORK

An *L* network provides a simple means of matching the antenna system, and can include provisions for adjustment to optimize the match. The circuit shown in Fig. 2B is suggested. With this arrangement, a portion of the combined capacitance of C1 and C2 will cancel the inductive reactance which is present at the feed point. The remaining portion, along with the coil, is used to obtain the impedance transformation to 50 ohms.†

In our installation, 12 feet of T4-50 foam-dielectric coax were used between the relay box and each of the elements. For mechanical convenience, two feet of line were placed between the *L*-network output and the T-connector input to the system. These dimensions should be followed closely if the component values shown in Fig. 2B are used. With the *L* network adjusted for a match at 7.05 MHz, the SWR in the center of the phone portion of the band was 3.5 to 1.

STUB MATCHING

The use of matching stubs is not seen much these days, but the technique is simple and effective. As those familiar with transmission-line theory know, a mismatched line will have varying impedances present at different points along its length. Over a half wavelength of line, the value of the resistive component of these impedances will range from R at one extreme to Z_0^2/R at the other extreme, where R represents a resistive line termination and Z_0 represents the characteristic impedance of the line. Thus, a 50-ohm line terminated in 10 ohms will have impedances along its length varying between 10 ohms and 250 ohms. Stub matching involves locating the point at which the resistive component of the impedance is 50 ohms, and inserting a T connector (or making a T splice). A shorted or opened stub of the length necessary to cancel the reactance present in the line at that point is then connected. From this point back to the transmitter, the line is matched with what it sees as a 50-ohm resistive termination.

Determining the line lengths for this type of matching arrangement is described in any recent edition of *The ARRL Antenna Book* in the chapter on transmission lines. For our case, still using the 12-foot line lengths to the elements, the 50-ohm parallel-equivalent impedance point appears .022 λ from the relay box and T connector. This is approximately two feet of either RG-8/U or T4-50 line. The open-circuit-terminated stub is 0.193 λ long. This length, at 7.050 MHz, is 17-3/4 feet of RG-8/U or 22 feet of T4-50 line. With the matching optimized at 7.05 MHz, the SWR in the center of the phone portion of the band was 3.5 to 1 with this arrangement, too.

TUNING THE LINES

The drawing of Fig. 2A shows the feed-line arrangement for a simple two-element antenna system. As was mentioned earlier, the two elements are of unequal impedances, and the drawing shows that the line lengths between the T connector and the elements are different (by the length of the phasing line). Thus, the two impedances which are connected in parallel at the T connector will most likely be unequal. In fact, depending on the length of line shown as *L* in the

† When calculating the values of *L*-network components, the series-equivalent impedance of the antenna system, 7.5 + *j*24 ohms in this case, must first be converted to its parallel equivalent, 84.4 ohms of resistance and 26.4 ohms of inductive reactance. Thus, 26.4 ohms of parallel capacitive reactance are required to cancel the inductance of the antenna system. The resultant impedance is resistive, 84.4 ohms. This is the value which must be matched by the *L* network. The procedure for such conversions and computations is described by Grammer in "Simplified Design of Impedance-Matching Networks, Part 1 — Basic Principles and the *L* Network," *QST*, March, 1957.

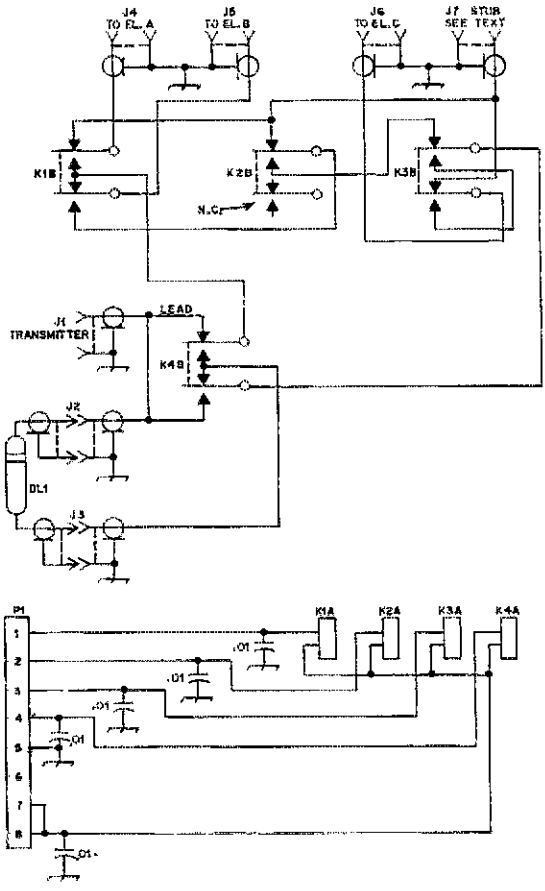


Fig. — Relay-switching system for steering antenna beam. J1 is shown as connecting directly to the transmitter. If an *L* matching network is used, however, it must be connected between J1 and K4, as shown in Fig. 6.
DL1 — 135-degree coaxial phasing line. See text.
J1-J7, incl. — Coaxial chassis connector, uhf type.
K1-K4, incl. — Dpdt contacts, 120-V ac coil; Potter and Brumfeld MR11A. (Although only one pole of K2 is used, mechanical differences make a spdt relay of this type unsuitable for rf switching.)
P1 — Chassis-mounted octal plug (Amphenol 86-CP8 or equiv.).

drawing, one impedance could contain inductive reactance and the other capacitive. Would it be possible to find a length for *L* whereby the reactances could be of equal value, but of opposite sign? If so, combining them in parallel would result in a nonreactive termination for the transmitter line. With the aid of a Smith chart, it was determined that this certainly was feasible. If 50-ohm line was used throughout the system, and if *L* were made 0.318 λ, the combined impedance would be 117 ohms. . . for an SWR of 2.34 to 1 in the transmitter line. The length required for *L* would be 29.2 feet of RG-8/U or 36 feet of T4-50. We measured off some RG-58/U line and tried this idea with low power. It worked, but there had to be a way to obtain a lower SWR than we were reading.

Back to the Smith charts we went. On paper we tried all the possible combinations of impedances we could think of for both the phasing line and the lines to the elements. RG-83/U, a 35-ohm line, looked like a good possibility. Using 29.3 feet for length *L* and also using this type for the phasing line would yield a 66.6-ohm impedance at the T connector. Twould be a good match for 50-ohm line to the transmitter. There was only one drawback. Have you tried to buy RG-83/U lately? We were unable to locate a supplier.

Then we were struck with the idea of using 25-ohm line, made by connecting two lengths of 50-ohm line in parallel. First we proved the feasibility of constructing a 25-ohm line by making some laboratory measurements. (Yes, it really works.) Subsequent Smith-chart calculations told us that the best match could be obtained by using 0.328-λ 25-ohm lines for length *L*, and 50-ohm line for the phasing delay line. The combined impedance would be 60.0 ohms, for an SWR of 1.2 to 1 for the transmitter line. The 0.328-λ lines can be either 30.2 feet in length if constructed from RG-8 or -58/U, or 37 feet of T4-50 line. We constructed two lines from four lengths of RG-58/U, and found the SWR across the band to be less than 2.3 to 1 with these installed. Because of changes in element impedances and electrical line lengths with frequency, we found the SWR to be lowest at frequencies below that for which the matching system was designed. This is normal, and should not be taken as an indication that the line lengths need to be altered. For our purposes, the expense of nearly 200 feet of RG-8/U line for a high-power 3-element antenna-matching system did not seem justified. We returned to the original *L* matching network and the 12-ft lengths of line.

A Switchable Array

Initial tests, while providing interesting performance characteristics, left a hole in the radiation pattern when it came to working South American and Asiatic stations. A simple cure was possible: The addition of a third element to form an equilateral triangle, along with a modified switching relay box, could provide a steerable array for six compass directions. See Fig. 3. The "nose" of the antenna pattern is 140 degrees wide, allowing generous overlap between adjacent headings.

With the above criteria in mind, the two-element system was replaced with a three-element array. The original 2-element design contained an *L* network to match the feed line to the parallel-connected elements. This *L* network was retained in the 3-element array. The presence of the third unused vertical radiator, as expected, upset the base impedance of the two driven elements and consequently that *L* network would not provide a match for the transmission line. Simply redesigning the network would have masked the overall problem: The third element was also modifying the

antenna's radiation pattern since it was accepting induced power. Receiving tests revealed the front-to-back ratio to be somewhere between 5 and 15 dB, depending on the distance and direction of the received signal. The third element had to be removed from the array, electrically at least. In theory, a shorted 1/4-λ line or an open 1/2-λ line connected to the base of the unused element would present a high impedance from that element to ground. This high-impedance path should reduce or eliminate the current flow in that element. The relay box was modified to assure that a shorted quarter-wave piece of transmission line was connected to the unused element. Success! The *L* network provided a good match for the transmission line. But again, the unexpected! The front-to-back ratio did not improve. Where did we go wrong this time?

W1FLM, a local research engineer, offered some advice: Perhaps a ground loop existed between the base of the vertical system and the transmitter. In effect, it is possible for some of the transmitted power to follow a return path to the transmitter via some other conductor than the shield of the coaxial feed line. Opposite but *unequal* currents defeat the shielding properties of the transmission line. But how could this current unbalance occur? A glance at the installation revealed that the transmission line, relay box, and phasing line were actually lying on the ground radial system. Perhaps a portion of the current which should be flowing in the shield of the coaxial cable was following a path from the base of the vertical elements along the radials, returning to the shield braid via capacitive coupling. Effectively, unequal currents would be flowing in the feed-line cable, the phasing line, and the relay box. If the coaxial feed line were radiating, then the poor front-to-back ratio would result. A simple experiment was performed to check the validity of the hypothesis: The cables, relay box, and phasing line were raised *above* the ground system by supporting them on the guy lines used with the vertical elements. This procedure reduced any capacitive coupling between the image plane and the feed line to nearly zero. Eureka! The front-to-back ratio improved by at least 10 dB providing nearly 30 dB difference in some signals when switching from the front to the rear of the array.

Peak or Null?

The prospective builder would do well to consider carefully how the performance characteristics could be best used. Two features are noteworthy: extremely high front-to-back ratio over a small percentage of the back null, and 4.4 dB of gain in the forward direction. If QRM from other amateur stations or from foreign broadcast stations is bothersome, correct positioning of the elements to steer a null at the offender is certainly in order. Our antenna can be switched for a null on Europe, to combat broadcast-station QRM. With this particular alignment, beam-switch position number one points the beam at 345 degrees and the succeeding positions head the beam clockwise in 60-degree increments.

Table I

Cable	*RG-8/U*	*T4-50*
Coax cable to Element A	–	12' 11"
Coax cable to Element B	–	12' 2"
Coax cable to Element C	–	13' 2"
Stub	8' 5"	10' 8"
Phasing line	33' 5"	41' 1"

Although the "nose" of the pattern is almost 140 degrees wide, we noticed that rarely, if ever, was a DX station equally strong on two positions of the switch. In almost every case, a reduction in signal strength can be noticed when the beam heading is changed by one 60-degree increment. Close-in stations (less than 300 miles, for instance) do not exhibit this characteristic. As expected, the very high front-to-back ratios exist only at low radiation angles. If the operator is listening for a null, however, there is never any doubt as to the correct switch position for the optimum bearing. One step in either direction from the null causes a change of as much as 15 or 20 dB. When an extensive ground system is installed (such as described later), it is quite difficult to reposition the array, should the peak or null be initially oriented incorrectly. Therefore, much forethought should be given before the system is "staked out."

The Relay Box

A one-foot-square aluminum box was constructed to house all of the relays and the *L*

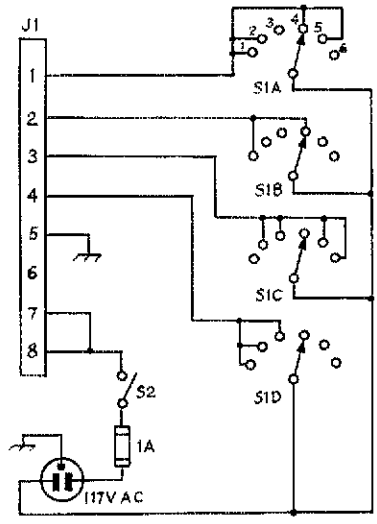


Fig. 5 — Wiring diagram of control box for steering antenna beam.
J1 — Chassis-mounted octal socket (Amphenol 78-RS8 or equiv.).
S1 — 4-pole, 6-position rotary (Centralab 1427 or equiv.).
S2 — Toggle, spst.

network in their final configuration. Fig. 4 shows the wiring diagram of the relays, and the layout is pictured in Fig. 6. If the builder wishes to use an *L* network and does not have a phase-angle voltmeter available to check the delay line (and what amateur does?), it would be best to follow the layout shown,†† as well as to duplicate precisely the length of each cable listed in Table I. Since the total lead length through the relay contacts actually adds to (or subtracts from) the phasing-line length, it is necessary to include some compensation in the cable lengths to assure that each of the relay positions creates the same effective phase angle between elements. This compensation is included in the lengths from the relay box to each of the elements. The dimensions shown will provide a phase angle which does not vary by more than one degree from the 135-degree optimum value. Performance degradation by a change of this amount is almost unmeasurable, certainly unnoticeable. Exactly equal lengths of interconnecting cables, on the other hand, cause a change in phase angle from 132 to as much as 140 degrees among the various headings, because different relay positions and interconnecting wire lengths are used. Phase angles of these orders deteriorate the front-to-back ratio by several dB, as well as change the feed-point impedance and consequently the SWR by a noticeable amount.

An eight-conductor cable provides interconnections between the relay box and the control box, Fig. 5. Rotor control cable (Belden type 8448) is a good choice since it contains six No. 22 conductors (four of which should be used for individual relays) and two No. 18 wires (to be used for relay common and ground).

†† A scale template of the relay layout and the interconnecting-wire arrangement is available free upon request. Send a stamped return envelope or the equivalent in coin or IRCs to Robert Myers, W1FBY, 221 Long Swamp Rd., Wolcott, CT 06716.

The Ground Radial System

There is no question about the relationship between the ground system conductivity and antenna efficiency. The only question which arises is "What constitutes a good ground?" If the soil beneath a vertical system is highly conductive, such as might be found along sea coasts, then a few radials may be sufficient to provide adequate performance. But if this beam is mounted on a rocky hill top or over sandy earth, precautions must be taken to reduce the ground losses.

The particular system described here was tested under many different image-plane configurations. During the development phase, radials were added, 15 or 20 at a time, to each element. Each time a

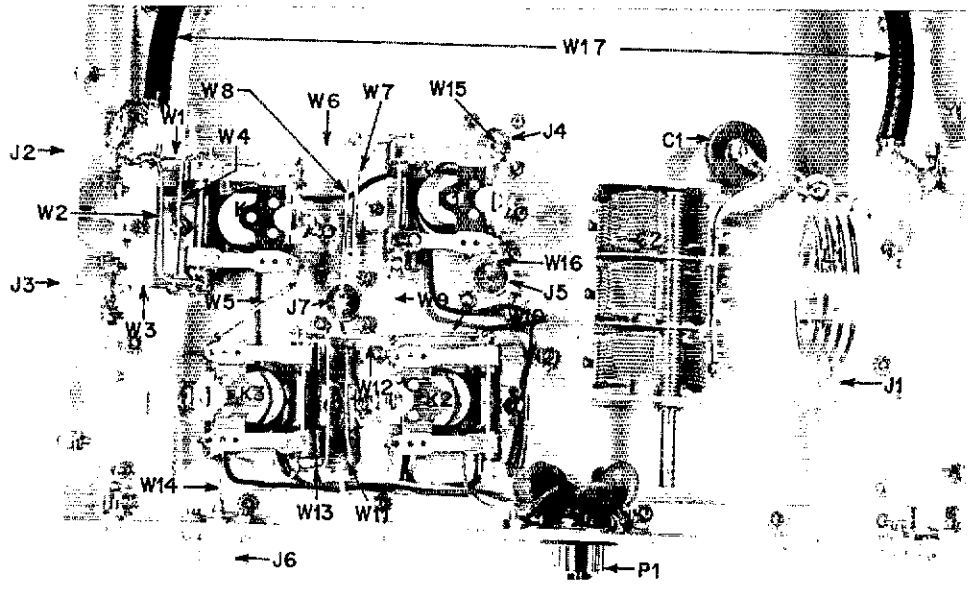
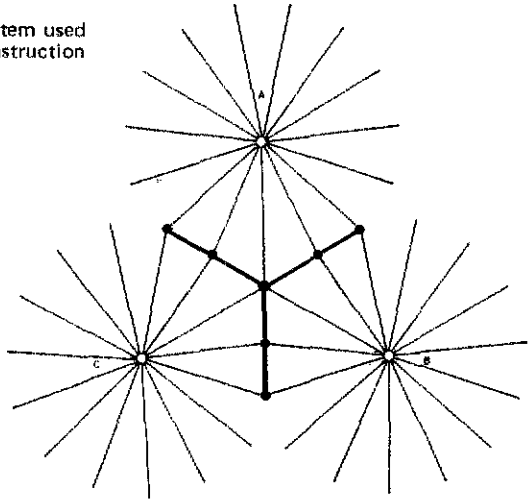


Fig. 6 — The 12 × 12 × 4-inch relay box also houses the *L* network used by the authors, with room to spare. If the *L* network is not used, W17 may be omitted and J1 located adjacent to J2. All wires except W17 are No. 12 tinned copper. See Figs. 2 and 4 for description of parts not listed below. The wire and cable lengths given below and in Table I will permit the builder to obtain best antenna performance without the need for a phase-angle measuring device.

W1 — 1-1/4 inches.
W2, W10, W13 — 2-1/2 inches.
W3, W9 — 1-1/8 inches.
W4, W7, W12 — 2-1/4 inches.
W5 — 1-1/2 inches.
W6 — 1-3/4 inches.
W8 — 2-3/4 inches.
W11 — 3 inches.
W14, W15, W16 — 3/4 inch. (W15 and W16 are viewed from their ends in this photograph.)
W17 — 24 inches RG-8 or -58/U or T4-50.

Fig. 7 — Image-plane radial system used by the authors. See text for construction information.



new set of radials was added, it *seemed* as though system performance improved. At this writing, a total of 90 radials connected to the base of each vertical radiator provides what might be called an adequate ground. Nevertheless, we are considering adding another 20 or so per pole. Realistically, and quite subjectively, eight or ten radials for each element will provide adequate efficiency. Certainly, more wire can be added to almost any array in small installments.

Of particular importance is the image plane which is interlaced between the elements. With 1/8-λ spacing between radiators, the wires overlap. Almost any broadcast engineering book will show how to handle this problem, but none reviewed by the authors defines "why." The technique described in most literature is to make connections at each point where the wires cross. Fig. 7 shows a diagram of the basic pattern. The heavy lines running between each pair of elements in the form of a "Y" are heavy bus wires which are connected at the center of the array. Each radial that reaches the bus is cut and then soldered to it.

The amount of wire used in this system is considerable. A commonly asked question is, "How heavy a wire must be used to provide an adequate ground?" Since the current is divided about equally in each of the radials, the size of the conductor depends on the quantity. All of the radials used in the system described here are made of No. 24 insulated hookup wire.

Operational Results

Stating how an antenna performs in specific terms is a rather difficult thing to do, indeed! As one local chap said, "Not bad for a ground-mounted antenna!" The front-to-back ratio is typically better than 25 dB on most DX stations, and as much as 20 dB on domestic stations. In many cases, the geographical position of the received station is not *exactly* in the null and of course the signal does not "drop into the noise." When listening from New England in the 40-meter phone band, it is possible to replace a European broadcast station with a U.S. amateur station simply by changing the heading of the antenna from northeast to southwest.

In terms of "pile-up crackability" (which effectively means forward gain and low angle of radiation), this antenna will hold its own against some of the Yagis being used on the band these days. An entire season of DXing and contest operating is necessary to really determine the effectiveness of the array, however. One thing for sure, if it blows down next winter, it can be straightened up in short order . . . and no one has to climb the icy tower to do it!

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Why Not USE the Standard Values?

Meet the Ohm, the Joule, and the Decibel on Their Own Ground

BY GUNNAR LIND,* SM7DZW

IN A COMMON yardstick the scale marks all appear at equal intervals. The associated figures tell us that the basic arithmetic behind the device is addition and subtraction. If you take two yardsticks you have a device which can be used as a kind of slide rule for addition and subtraction. If you start at, say, three inches and measure off a further five inches you would reach eight inches, and so on. This is really very simple reasoning, but don't scorn it. The same principle lies behind the common slide rule, with the important difference that the interval on the slide rule is related not to the addition of a certain number but to the multiplication by a certain number. If you start at the figure one on a slide rule and pass on to two, you have covered a space along the scale which is equivalent to a multiplication by two. Another step of equal length brings you to four, then from four to eight, and so on. Such a scale is called a logarithmic scale.[1] *Logarithm* is a compound Greek word meaning something like "a thinking number."

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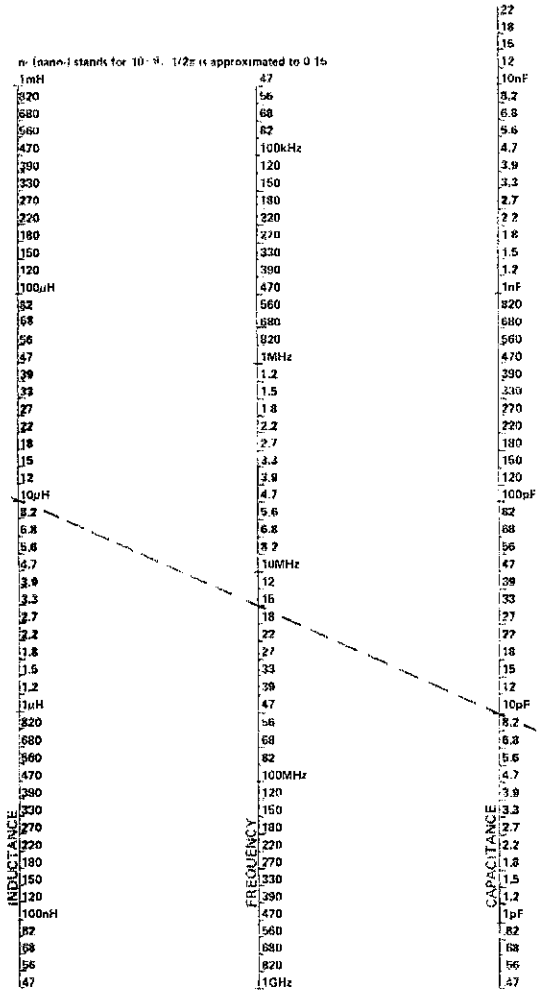
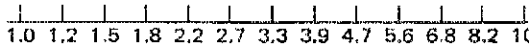


Fig. 1 — A standard-value nomogram for inductance, capacitance, and frequency, for use with a straightedge. As shown by the dashed line, a 10-pF capacitor and a 10-μH inductor will resonate at approximately 15 MHz.

On a logarithmic scale, longer distances correspond to multiplications by larger numbers, shorter distances correspond to multiplications by smaller numbers, and no distance at all corresponds to a multiplication by the figure one. Multiplications by fractions smaller than unity correspond to distances in the opposite direction to those which represent multiplications by numbers greater than unity.

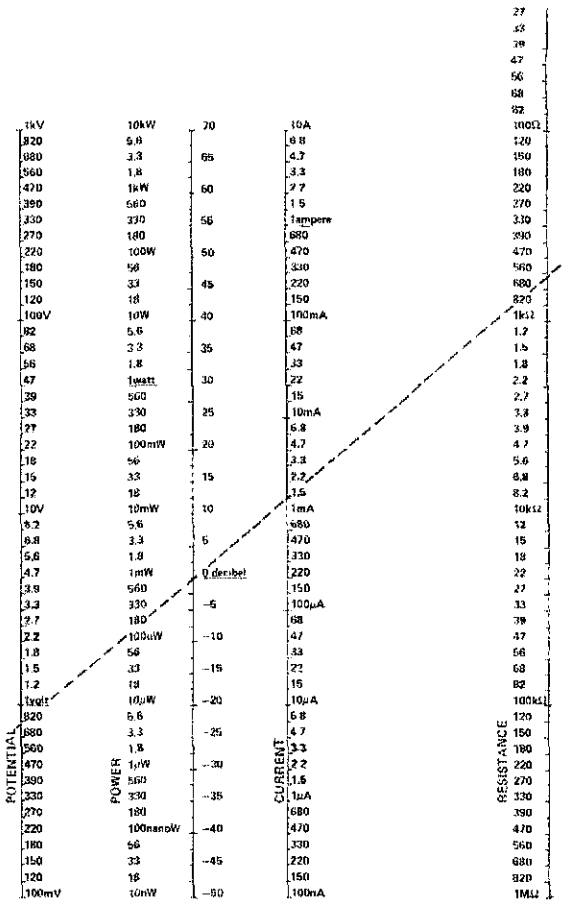
What do we get if we start at number one and go towards greater numbers by steps of equal length, each representing a multiplication by 1.2 (or to be more exact, representing the twelfth root of ten, approximately 1.2115)? The result will look something like this:



These figures seem familiar, and indeed they are. Everybody with even the slightest concern for electronics has met the ten-percent series of standard values. The reasons for why and how they were chosen are sketched above. The term, ten percent, tells us that for any value between one and ten we may ever need, there will always be a value which is less than ten percent bigger or smaller than the one we wanted. In most cases any

[1] [EDITOR'S NOTE: In essence, the ordinary slide rule operates on the principle of the addition and subtraction of numeric values, as in the author's example with yardsticks. On the slide rule the added or subtracted numbers do not appear directly, but are the logarithms of the values shown on the scales.]

Fig. 2— A standard-value nomogram for Ohm's Law, Joule's Law, and decibels. Consider the zero-dB point on the decibel scale as arbitrary. In the example shown by the dashed line, to develop one milliwatt of power in a 600-ohm resistor, approximately 1.3 mA of current must flow, and the potential across that resistor will be approximately 800 mV.



difference is insignificant for the proper function of our gadgets, and in the very few cases where it is significant we generally use trimmers or sometimes precision parts. This being so makes our hobby or trade much less expensive than it would be if all parts had to be precision ones with narrow tolerances. So much for the hardware aspect of this matter.

But the software aspect of the matter is nearly as important. It might be stated like this: There is no need to make our calculations very exact when we must choose from among the standard values when it comes time to pick the part and heat our soldering irons. An efficient designer makes the bulk of his calculations on a slide rule or on paper nomograms, or in his head, if he dares to risk it. So doing, he saves so much time that very exact calculations can be done when and where they are really needed.

The routine calculations in electronic design include a stable majority of applications of Ohm's and Joule's laws. These are good laws to abide and live under, but a bit boring. On designing a circuit with even a modest number of transistors or tubes we apply them tens and sometimes hundreds of

(Continued on page 47)

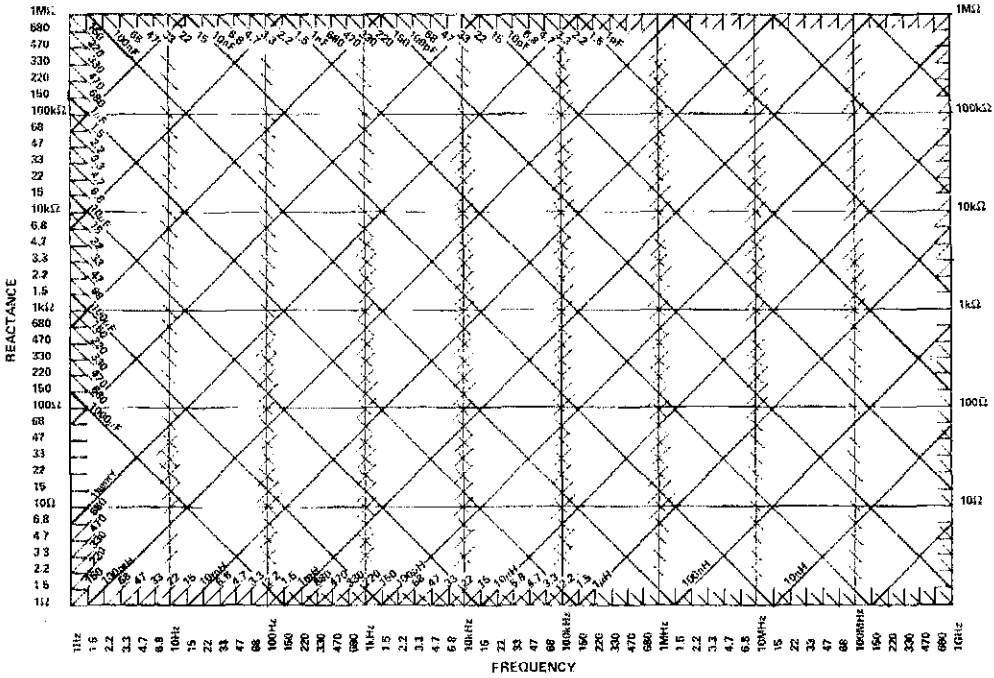


Fig. 3 — A standard-value nomogram for inductive and capacitive reactance; $1/2\pi$ is approximated to 0.15. As an example of use of the nomogram, the reactance of a 10-pF capacitor at 15 MHz is approximately 1000 ohms.

The Vest-Pocket Logic Probe†

BY E. H. ROGERS,* KØGKB

I WORK AT THE National Bureau of Standards Institute for Basic Standards, where we design, build, and troubleshoot all instrumentation requested by the Cryogenics Division. The equipment is located in different buildings on our large grounds. In the past, we either had to tote an oscilloscope to these places or take the faulty equipment to our lab for troubleshooting. We developed this probe tester in July of 1969 to check out logic circuits and replace defective chips right in the operating area. It is very easy to use, and no more do we have to drag a scope with us to a test site.

This probe is a small, handy, and convenient instrument to troubleshoot circuits that operate in either the logic "one" (1) or "zero" (0) state. By attaching the power leads in the proper polarity to the logic 5-V power supply and touching the probe to an input, output, or intermediate pins of integrated circuits, the "one" indicator lamp or "zero" indicator lamp will glow showing a "high" or "low" logic level respectively. An open circuit will not show any indication on either lamp. This probe is an indicator only and does not indicate a certain voltage at the probe. Fig. 1 shows the schematic diagram, and Fig. 2 shows the etching pattern for the circuit board. The photographs show how the probe is constructed. The probe should only be used with a 5-V power supply and is compatible only with TTL logic levels. A high voltage will harm or destroy the unit.

† Developed at the National Bureau of Standards, Cryogenics Div., Metrology Section, Boulder, Colo.

* Tall Timbers, Sugar Loaf Star Route, Boulder, CO 80302.

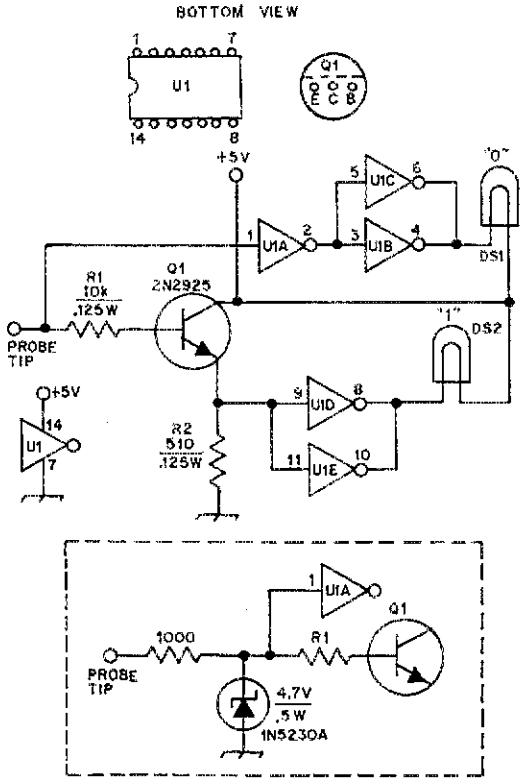


Fig. 1 — Schematic diagram of the vest-pocket logic probe. Resistances are in ohms, k = 1000. The probe must not be connected to a power supply yielding more than 5 volts or damage to the IC will result. However, an alternative input circuit, shown inside the dashed lines, may be used to *probe* voltages somewhat greater than +5 V. See Fig. 3 for mechanical information on parts.

DS1, DS2 — Incandescent, 3 V, 15 mA (Chicago Miniature No. 2158 or equiv.).

Q1 — Silicon npn audio transistor; 25 V, 200mW.

R1, R2 — 1/8-watt composition.

U1 — TTL hex inverter, dual in-line package, SN7404 or equiv.

Fig. 2 — Circuit-board etching pattern and parts layout for the vest-pocket logic probe, actual size.

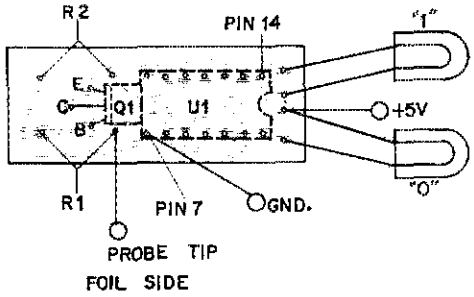


Fig. 3 — The parts used in making the probe assembly.

A1 — Assembly of probe tip and end disk. Probe tip is standard phone tip (E.F. Johnson, H. H. Smith, or Keystone). End disk is 1/8-inch-thick piece of 1/2-inch-dia polystyrene rod, sanded, drilled and tapped to accept probe tip.

DS1 DS2 — See Fig. 1.

H1 — Power-connecting clips. The clips shown carry the designation X-100 and are manufactured by E-Z Hook, Division of Tektest, Inc., P. O. Box 1405, Arcadia, CA 91006. Small insulated alligator clips and flexible wire may be used instead.

H2 — 1/2-inch-ID polystyrene tubing, 2-1/2 inches long, used for body of probe.

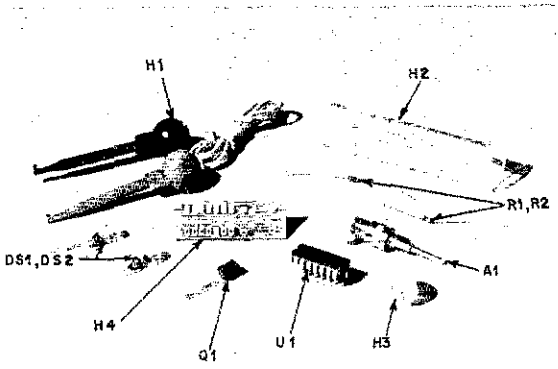
H3 — End disk, 1/8-inch-thick piece of 1/2-inch-dia polystyrene rod, sanded, notched to pass power-connecting leads, and marked with "0" and "1" lamp identifications.

H4 — Etched circuit board, trimmed to dimensions 1/2 × 1-1/2 inches. See Fig. 2.

Q1 — See Fig. 1.

R1, R2 — See Fig. 1.

U1 — See Fig. 1.



QST

Why Not Use the Standard Values

(Continued from page 45)

times. In the school in Sweden where I teach physics, it was noticed several years ago that the students' slide rules had some tendency to slide erroneously when these laws were applied. As a remedy, we prepared a set of nomograms, Figs. 1 through 3. These nomograms were placed under the school's copyright, and we are proud to permit them to be published in *QST*. The reader may, of course, take them or leave them, but we have heard that there is a tribe called electronic designers, noted among anthropologists for their reverence for color-code dots and rings. We hope that our voodoo may help somebody in this tribe's surroundings to observe proper tribal customs.

As for how to use the nomograms, this matter is straightforward. It is practical to use them with a strip of transparent plastic. Scratch a line along the strip with a needle and rub a drop of india ink into the line.

Logarithmic scales are used in a wide spectrum of graphical representation. Atomic decay, the vanishing of fluorescence on a TV screen, economic growth,h, biological growth of nations, bacterial cultures (and even mankind itself) are just samples of subjects they can represent very efficiently. Next time you need a logarithmic scale on a paper, you can improvise one if you know the standard values. It will not be the most exact one you can get, but unless you need precision it will usually be close enough for your purpose. QST

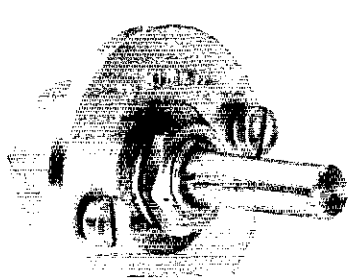
• *New Apparatus*

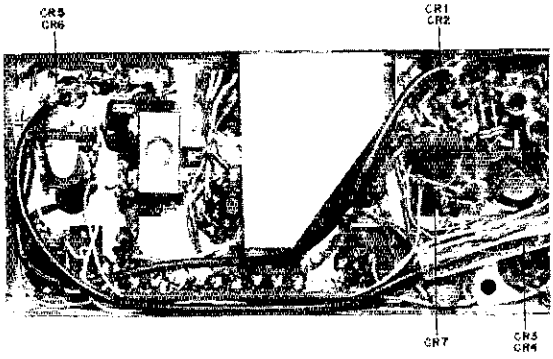
JACKSON BROTHERS DRIVE

Equipment designers often desire to "spread-out" the band and make the tuning range appear larger. For years, one of the ways that this was done was with a 3:1 or a 6:1 planetary-type dial drive. For some amateurs this did not provide enough of the desired spreading effect. Therefore, two such units were sometimes connected in series to obtain the desired ratio. Extra units begin to take valuable chassis space, especially if the interest is in making electronic items as small and compact as possible.

Jackson Brothers, Ltd., of Kingsway, Waddon, Croydon, England has recently introduced a 10:1 epicyclic drive which will give a larger reduction ratio in one package than was generally available before, and at a lower price. Five turns of the dial cover the range of a variable capacitor. The drive unit is only 2-1/8 inches long and requires 1-1/8 inch of chassis space behind the panel. The vernier assembly is 1-7/16 inches in diameter.

The epicyclic drive is sold in the United States by M. Swedgal, 258 Broadway, New York, NY 10007. Catalog number is 5857. — *WINTH.*





One diode pair is mounted at the coaxial connector in the upper left of the transmitter strip. Another pair is connected to the socket for the driver tube at the upper right. The third pair of diodes is inside the protective plastic tube at the bottom right. RG-58/U coaxial cable is used to make the connections. CR7 is the rf sampling diode that operates the relay.

A 2-Meter Amplifier for Transceiver Users

Putting Diode Switches to Work

BY CHRIS GALFO,* WB4JMD,
and MARC PRESSMAN,** WB4DRB

WITH THE ADVENT of transistorized amateur-band fm units, the popularity of two-meter fm has greatly increased. For most amateur applications the relatively low power of these transistorized units is sufficient. However, there are many situations in which higher power is desirable, or even necessary, for good results on fm. This is especially true in fringe locations, and in areas where outdoor antennas are not feasible. This article is a product of the author's experience with such problems.

The unit described is a Motorola 30-watt high-band transmitter strip which was modified for use as an amplifier. It can be activated and driven by as little as 0.75 watt, and will give an output of more than 25 watts. The unit is controlled by an rf-actuated relay in combination with diode switching. The diode circuit is used to switch the amplifier in and out of the circuit with a minimum of noise and a maximum of speed.

Diode Switching System

In order to minimize the use of relays, a diode switching system was devised. This circuit is a type of electronic T-R switch which places the amplifier in the circuit during the transmit mode, and isolates it while receiving.

In Fig. 1, the coaxial lines W1 and W2 are each one-quarter wavelength (12.7 inches for 146 MHz, including the velocity factor). When there is no signal from the exciter, the three diode pairs do not conduct, thus allowing the signal from the antenna to reach the receiver input with a minimum of insertion loss. When there is rf input to the amplifier, diode pairs A, B, and C conduct. The quarter-wave line, W1, presents a high impedance to incoming rf since it is shorted at one end by diode pair B. Therefore, the rf travels through diode pair A and into the amplifier. The output of the amplifier is fed through diode pair C to the output connector. The quarter-wave line, W2, also presents a high impedance during the time there is rf output from the amplifier. This prevents the rf from returning to the input of the amplifier and causing feedback.

Drive System

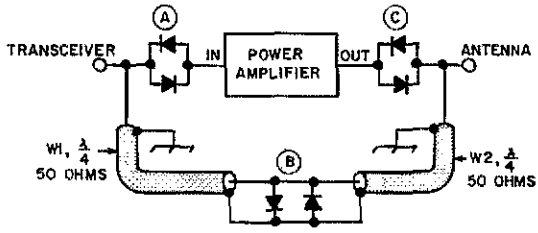
In order to provide a proper load to the transmitter that drives this unit, a broad-band input system was devised. The circuit, shown in Fig. 2, consists of R1, R2, and C10. The resistor and capacitor combination should provide close to a 50-ohm load to the exciter. However, since the grid circuits may vary with the age and design of the equipment used, some experimenting with *RC* values may be necessary to obtain a proper match. The input circuit should be checked by placing an SWR bridge between the driving transmitter and the drive network input. Adjust the values in the circuit for lowest SWR.

Rf-Actuated Relay

When there is excitation at the input of the amplifier, the rf-actuated relay is activated. This relay switches B+ to the driver and final amplifier

* 108 Overlook Dr., Williamsburg, VA 23185.
** 4519 N. 35th St., Arlington, VA 22207.

Fig. 1 — A method of connecting an amplifier in the output line from a transceiver without using coax relays. The diode pairs conduct upon application of drive, thereby switching the amplifier in and out of the circuit.



tubes. The relay operates in the following manner: The rf input at the grid of the driver tube is sampled by a diode rectifier which converts some of it into dc (See Fig. 2: C2, C3, CR7, R3, and K1). This voltage is used to drive a relay that applies high voltage to the amplifiers. When rf is absent, the relay is not driven and there is no plate voltage on the tubes.

The drive requirements are mainly dependent on the sensitivity of the relay. The authors chose to use the antenna relay already in the transmitter before conversion. It was found that this relay required about 5 watts of rf input for proper activation. If a more sensitive relay is used, the drive requirements can be reduced to less than one watt, depending on the relay chosen. The driver tube can be excited by 0.5 watt.

The reason that the rf-actuated system for B+ was chosen was because of diode noise. This problem occurs during the receive mode, and the noise source is the final tube in the unit. The noise is coupled to the receiver through the diodes. Even the best diodes will have some junction capacitance, so perfect rf isolation from the noise source is very difficult. The noise can cause a considerable problem since it will mask weak signals.

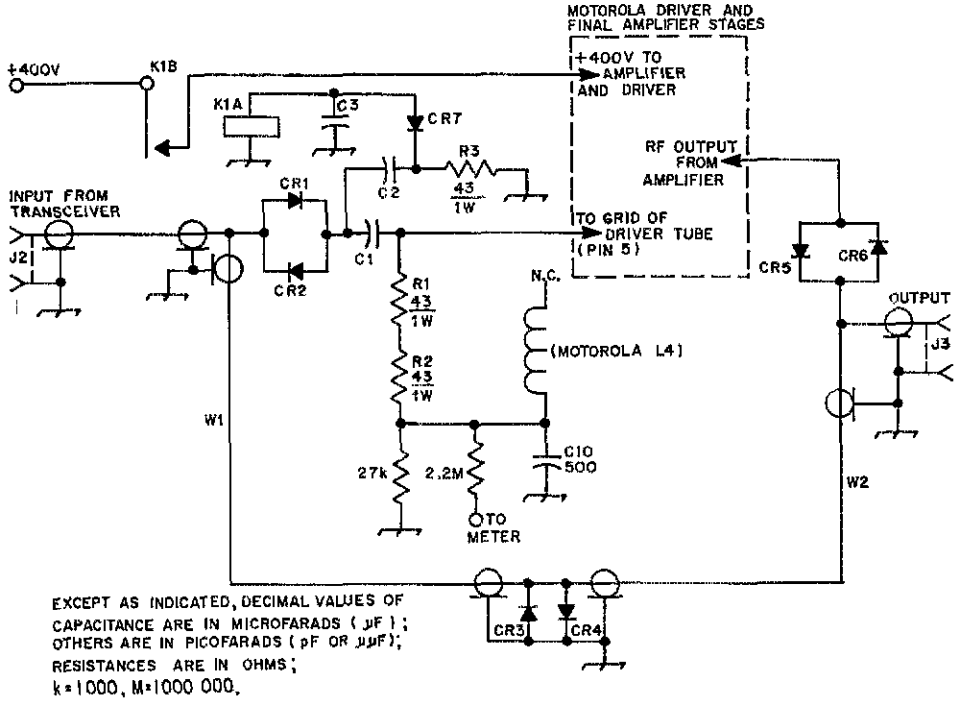
A possible way to eliminate this noise would be to bias the tubes to cutoff during receive. However, the authors found that the amount of bias required to cut off the tubes was such that it caused a considerable lowering of output power. The system shown here eliminates diode noise and allows full power output from the transmitter.

Fig. 2 — Schematic diagram of the modified transmitter. Parts that are not listed are original Motorola units.

C1, C2 — 200-pF, 1-kV disk ceramic.
C3 — .001-μF, 1 kV disk ceramic.
CR1-CR7, incl. — Germanium diode (1N60 or equiv.).
K1 — Spst relay, 100-ohm coil (original relay in transmitter strip may be used).
R1, R2, R3 — 43-ohm, 1-watt carbon resistor.
W1, W2 — Coaxial cable, RG-58/U, 1/4-wavelength (12.7 inches for 146 MHz).

Conversion

The oscillator, modulator, and multiplier tubes are not used after the transmitter strip is converted to an amplifier. If the transmitter is intended for 6-volt operation, all the tubes except the driver and



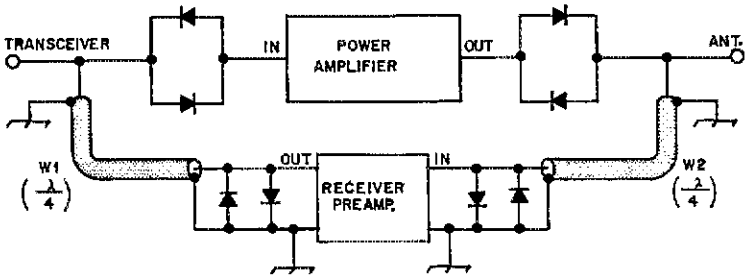


Fig. 3 — A preamplifier can be added for improved reception. Diode pairs must be placed at the input and output of the preamplifier to protect it from energy developed in the transceiver and amplifier.

final amplifier may be removed. To determine if your unit is wired for a heater voltage of 6, you should check the final amplifier. The final tubes (V8 and V9) will have their heater (pins 2 and 7) connected in parallel if the transmitter was intended for 6-volt operation. A series circuit indicates that the unit is set up for 12-volt operation. In this case, the clipper tube, V7, and the oscillator tube, V101, must not be removed. These tubes plus resistors R50, R51, and R52 complete the heater circuit for the driver tube, V5.

The circuit changes necessary for conversion of the transmitter are shown in Fig. 1. For the amplifier to operate properly at 146 MHz it is necessary to retune the final amplifier. This can be accomplished by use of a 146-Mhz input signal. However, before this is tried, the plate tuning capacitor, C24, should be set properly. This capacitor consists of two round plates very close to one another. If the spacing is adjusted so that three sheets of ARRL log paper will fit between the two plates, then the spacing is approximately correct for 146 MHz.

Final Tune-up

When all the modification work has been done, recheck all wiring by following the schematic. Make sure all joints are properly soldered, and that all connections are solid. The wiring is not critical, except for the lengths of the quarter-wave lines. However, it is a good idea to keep all other wires as short as possible. In addition, be sure that the diodes are not overheated during soldering.

To begin the final test and tune-up, turn on the power supply, and check to be sure the heaters are lit. Check, also, that the rf-actuated relay is open.

Connect the amplifier to a dummy antenna and also connect a suitable exciter or transceiver to the amplifier input. The authors used a Simpson Model A. After all connections are made, key the exciter and check for output from the amplifier using an SWR bridge or a wavemeter. First peak the driver tuning for maximum output. Then peak the PA grid circuits of the two finals by alternating between the two. Since they interact, Motorola suggests balancing the plate current. However, the authors found that peaking the amplifier for maximum output results in adequate balancing. After these controls have been adjusted, peak the plate tuning and coupling for maximum output. Now repeat the above sequence at least one more time to assure maximum efficiency and output. When the tune-up has been accomplished into a dummy load, the antenna tuning and coupling should be peaked with the antenna connected for best results.

Conclusion

This unit has been operational at WB4DRB/4 over several months and has performed well. The amplifier could be operated remotely, possibly mounted on a tower to minimize feed-line loss. Other applications include operation in the trunk of a car, eliminating the need for a multiwire control cable. In this case, only a power cable and a single coaxial cable would be needed between the under-dash exciter and the amplifier. In addition, the transmitter could be used in conjunction with a receiver preamplifier if another diode pair was used to protect it as shown in Fig. 3. In conclusion, this unit is an excellent low-cost way to get higher power from your transistorized fm transceiver. QST

The Flashlight Sidebander

(Continued from page 31)

span and to estimate the desired frequency with reasonable accuracy.

Conclusion

Operating experience over the last several months from my home station on Long Island with a "good" antenna (a dipole, 40 feet up) during morning hours shows good communication with Hartford (70 miles), satisfactory communication with Worcester, Boston and southern New Hampshire (170 miles), and marginal communication with central Maine (330 miles). From the Maine coast with an inverted V on a 30-foot high pole, the transmitter usually "runs out of gas" over distances beyond 250 miles. Since my original hope was to work a few miles, these are satisfying results. Now, a linear amplifier for fixed-station use looks like an interesting project but that's another story.[7,8,9]

7 Lowe, "A 15-Watt-Output Solid-State Linear Amplifier for 3.5 to 30 MHz," *QST*, December, 1971.

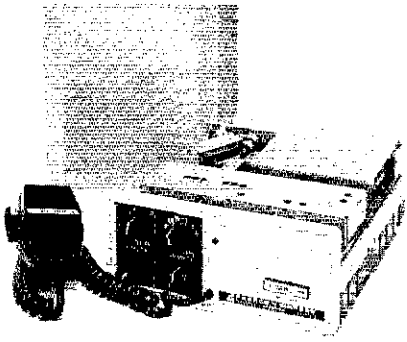
8 Hejhall, "Broadband Solid-State Power Amplifiers for Ssb Service, *QST*, March, 1972.

9 Hayward, "Increased Power for the Solid-State Transmitter," *QST*, May, 1972. QST

Hints and Kinks For the Experimenter

BETTER VENTILATION AND TUBE LIFE FOR THE GLADDING 25

The factory-supplied mobile mounting bracket, the near-solid plastic top, and a solid aluminum shield over the driver and final amplifier tubes in the Gladding 25 transceiver all contribute to an excessive heat build-up after a short operating time. Heat thus generated, coupled with either summer temperatures or automobile heaters in the winter, will eventually cause the plastic top to become cracked and greatly distorted. The cover will not fit properly in the grooves for which it was moulded to fit.



This writer and W1CER have had success in getting rid of much of this heat by manufacturing new covers made of perforated aluminum stock, as shown in the photograph. Spray painting of the small shield and the underside of the cover with flat-black paint may also help to draw off the heat.

Additionally, mounting the Gladding on an angle bracket, bolted to the floor board over the transmission, places the mounting bracket under the heat-producing section of the unit, and allows still better circulation. – *W1NTH*

TEN-TEC POWER-AMPLIFIER REPLACEMENTS

As any Ten-Tec owner who has blown the power amplifier transistor knows, the SE8010 is hard to find and costly to replace. I have found that the GE-18, an audio amplifier/oscillator, works well and the cost is less than $3 a pair. Anyone with fears about using an audio transistor at rf can relax. The pair in use at this station has been giving good output on 20 meters for over a year. – *John D. Young, WA8KNE/6*

[EDITOR'S NOTE: The HEP714 is listed as a replacement for the GE-18 and may also give good service in place of the SE8010.]

CURING THE RACE CONDITION IN AN IC KEYER

After constructing the "A Simple IC Keyer with Weight Control" in July 1971 *QST*, I found that the "race" condition described by the authors existed in my keyer, thus causing the production of false dashes even though the circuit was duplicated closely. This condition occured much too often to be ignored.

To solve this problem I connected a capacitor from pin 13 of U2D to ground. This causes a delay because of the time constant of the capacitor with R7, before pin 13 goes to logic high. This allows the flip-flop to be blocked out more surely for dot production.

I used a 0.25-μF capacitor because it was available. Since installing the capacitor I've had no more trouble and I'm very pleased with the results obtained from this fine keyer. *Ed Long, WB8IKV*

PUTTING THE HW-16 ON 20 METERS

With the declining number of sunspots and a corresponding drop in activity on 21 MHz some General licensees owning HW-16s might be interested in a simple conversion that I have done that replaces the 21-MHz band with 14 MHz. After obtaining the correct crystal, the modification takes about one hour to accomplish when performing the following steps:

1) Replace the 26.545-MHz crystal with a 19.545-MHz unit.

2) Move tap on PA tank coil to exactly half way between the 15- and 40-meter taps.

3) Install a 150-pF mica capacitor across driver coil L9.

4) Remove rf coil L1 and add 6-1/2 turns of *hookup wire to the coil.*

The transceiver is then aligned on 14 MHz by adjusting L1, L4, and L9 as stated in the instruction manual for the HW-16. – *Bud Haake, WØMSV*

PUNCH CARDS FOR TRAFFIC WORK

Traffic handlers who are swamped by the filing of messages may find relief if they can scrounge used punched cards, sometimes referred to as IBM cards, from their place of work, a school, college, or bank which uses them in quantity. Usually these cards are discarded after use and can be used to record message traffic.

They have the advantage of small size, sturdiness, and ease of handling for filing. In many cases cards of several colors can make filing simple; one color for originations, another for relays, and another for deliveries. A felt-tip pen will help to solve the writing problem with the punched holes. *T. E. Sharp, K6UYK*

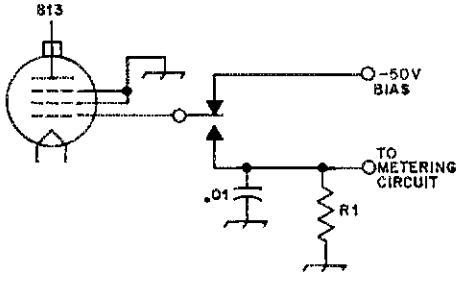
A POSSIBLE TVI CURE

Recently, while trying to track down the cause of a case of TVI for the neighbor of a local amateur, we had just about exhausted our normal check-off list that included poor antenna configuration, ungrounded circuitry, and missing shields. The amateur involved is a meticulous person in seeing that his station techniques are all correct. But one neighbor was irate because of the interference caused to his television when the amateur station was transmitting.

In the process of trying to eliminate the problem we tried high-pass filters on the TV set, ran ground wire, and checked that the TV antenna and lead-in wire were good. Still the interference persisted. Luckily, the amateur involved remembered something that he had once heard from a W4, "wrap the power cord of the television set around a piece of ferrite rod about 20 times and tape." This did the trick and resulted in the elimination of the TVI and produced a satisfied RFI committee chairman. – *Dick Ferree, W6RHI. Counterpoise Newsletter of El Cajon Radio Club*

ELIMINATION OF IDLE-CURRENT HASH IN AMPLIFIERS

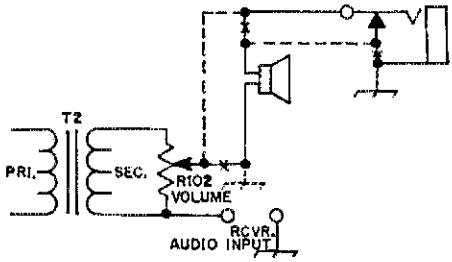
My son and I built the 813 version of the amplifier described by Lew McCoy, W1ICP, in October 1970 *QST*. We were satisfied with its performance in every way but one, the excessive amount of hash heard in our receiver when the amplifier was on, but in standby.



We cured this problem by applying a cutoff bias during the standby period of the amplifier. The antenna relay, K1A, was replaced with a relay having a third set of contacts which were used to switch the –50 volts used. The negative voltage was connected to a normally closed set of contacts and the armature was connected to the grid of the 813. Leads from the open set of contacts were routed to the metering circuit, as shown in the drawing. This circuit could be used with many types of amplifiers (with some modification) to eliminate diode hash coming from the power supply that may impair reception of signals. – *J. D. Keeling, Sr. WA5ZGN, J. D. Keeling, Jr., WA5AGM*

HEATHKIT HD-10 SPEAKER CHANGE

My Heathkit HD-10 keyer has given me a lot of good service, but it has one annoying characteristic: I use headphones exclusively and feed the receiver audio through the keyer. This works fine,



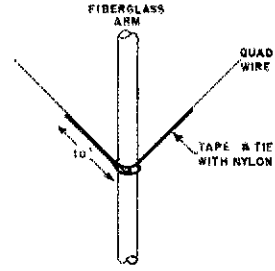
The original circuit of the HD-10 is shown with solid lines. The dashed lines indicate the circuit change required to isolate the speaker when the headphones are plugged in.

but the receiver and keyer monitor can be heard through the keyer speaker even though the headphones are plugged into the jack (especially when using low-impedance phones). As originally wired the jack simply allows inserting the headphones in series with the speaker.

A minor wiring change, requiring no new components, permits removal of the speaker from the monitor circuits whenever the headphones are connected to the jack. Now when I operate, the XYL is not disturbed by the extraneous speaker noise. – *Taylor Davidson, WA4YIC*

QUAD SAVER

One of the principal problems with the otherwise fine cubical quad antenna is that of the wire breaking where it is tied to the support arms. This is caused by a constant flexing of the wire in gusty winds, called metal fatigue. Some means of taking the strain off the point of attachment is needed and the way I have accomplished this is shown in the drawing.



A croquet wicket has been formed into a "V" with two turns around the fiber-glass arm of a Quad antenna, and secured to the wire with plastic tape and nylon ties.

A shock absorber is made from heavy, stiff wire, preferably galvanized steel. The hoops from a croquet set are ideal. Bend the wire to form two small turns in the center, with the diameter just large enough to slip over the quad-arm ends. The ends are then bent to conform to the direction of wire travel, and are bound to the quad wire with black plastic tape. Nylon cord was tied over the top of the tape and knotted securely. It has been unnecessary to fit the inner loops of a multiband quad as only the 20-meter loops have failed in the past. – *Ed Heubach, W9AO.*

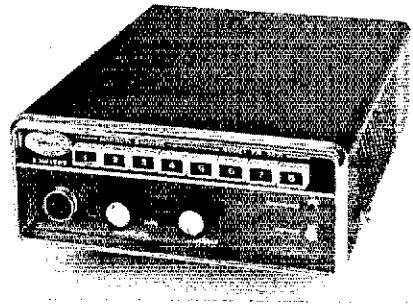
Recent Equipment

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

Sonar FM-3601

Amateur FM

Transmitter-Receiver



MOST OF THE MOBILE equipment reviewed in past years looked truly like amateur gear. A panel meter, control knobs, bold-face panel lettering, and a large microphone connector, all combine on the front panel to give a true "instrument" motif. There was never a question as to the purpose of the equipment, especially if a large base- or center-loaded antenna was attached to the car. With the emergence of 2-meter fm, however, the complexion of mobile gear has drastically changed. Sonar, with their FM-3601, has developed a device which just doesn't look like ham gear!

The fact that the '3601 could pass for entertainment equipment should not be confused with its ability to provide radio communications. Sonar has incorporated all of the features this writer finds desirable for 2-meter mobile operation. The power output is adequate to provide reliable coverage within a 40-mile radius through a repeater in Connecticut. Simplicity of operation is assured by two knobs and eight push buttons which provide complete control of the unit. No need to peer at this transceiver to make adjustments; the left knob sets the squelch sensitivity, the right control is for volume. Any one of eight combination transmit-receive frequencies may be selected by depressing the appropriate push-button switch. An operator, after acquiring a little experience, can choose the desired "channel" without even glancing at the front panel. The push buttons could be compared with the keys of a typewriter: there is no need to watch your fingers.

The Receiver

A block diagram of the receiver is given in Fig. 1. Rf amplification is followed by double conversion of the signal to 455 kHz, which provides adequate immunity to out-of-band signals. The audio-output stage delivers two watts of power to an internally mounted speaker. One of the problems in designing a compact transceiver is finding sufficient space to include a *good* speaker. Sonar has the solution: A 1-3/4 × 7-inch speaker cone used with a heavy-weight permanent magnet produces high-quality sound. Volume is adequate to overcome the background noise generated by a VW "beetle" operating at freeway speeds (even with the windows open!).

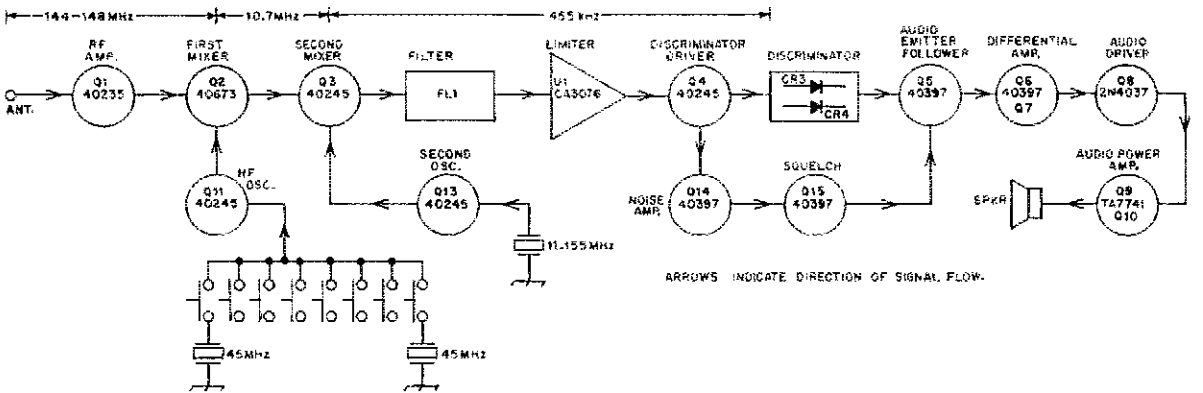
Fig. 2 is a diagram of the squelch circuit. A capacitor (C33) is used to sample noise (in the absence of a signal) at the output of the discriminator. Q14 amplifies the noise and applies it to the base of Q15. The increased base current drives Q15 into saturation, which reduces the collector voltage to nearly zero. During this condition, the first audio stage is rendered inoperative because its forward bias is reduced. R61 is the front-panel SQUELCH control; R60 is internally mounted and is used to set the range of the squelch circuit. When a signal appears at the output of the discriminator, the absence of noise allows 4.6 volts dc to appear at the collector of Q15. This voltage is used to forward bias the first audio transistor into conduction. The squelch opens at any signal level greater than 0.4μV.

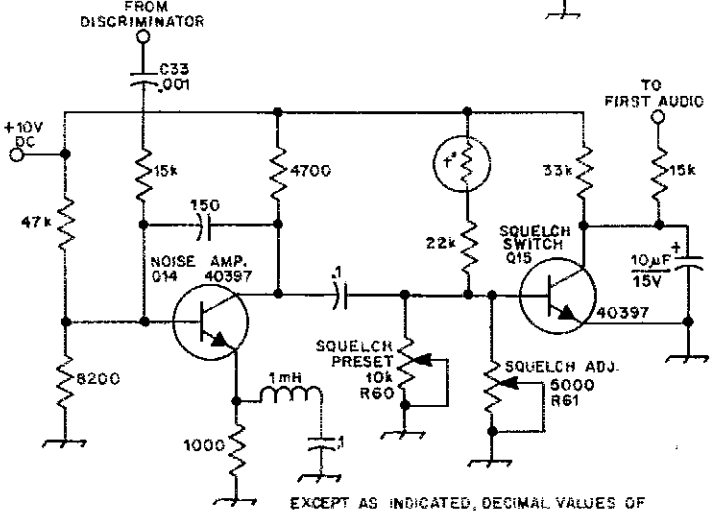
Audio amplification is accomplished by a pair of transistors which form a differential amplifier. Ouput from this stage feeds the audio driver. The speaker is driven by two transistors connected in a complementary-symmetry configuration. Terminals for an external speaker are located on the rear apron.

The Transmitter

The entire transmitter circuit, except for the crystal oscillator is built on one circuit board. A single-transistor audio amplifier easily drives the clipper circuit to full limiting. The output of the clipper is applied to a three-section audio low-pass filter which effectively reduces the harmonic energy generated by the limiter. Q108 and Q109 form a Darlington amplifier with sufficient gain to

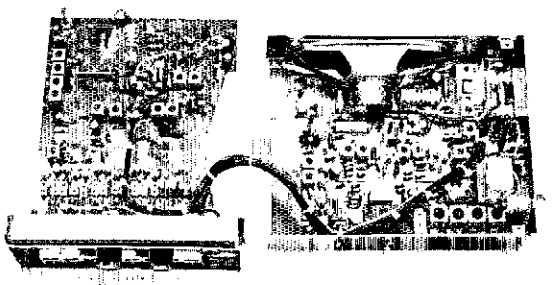
Fig. 1 — Block diagram showing the receiver portion of the Sonar FM-3601. ▶





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

Fig 2 — Circuit diagram of the receiver squelch circuit. The squelch-preset control is mounted inside the transceiver. Component designations are those listed by the manufacturer. ◀



Inside view of the Sonar FM-3601.

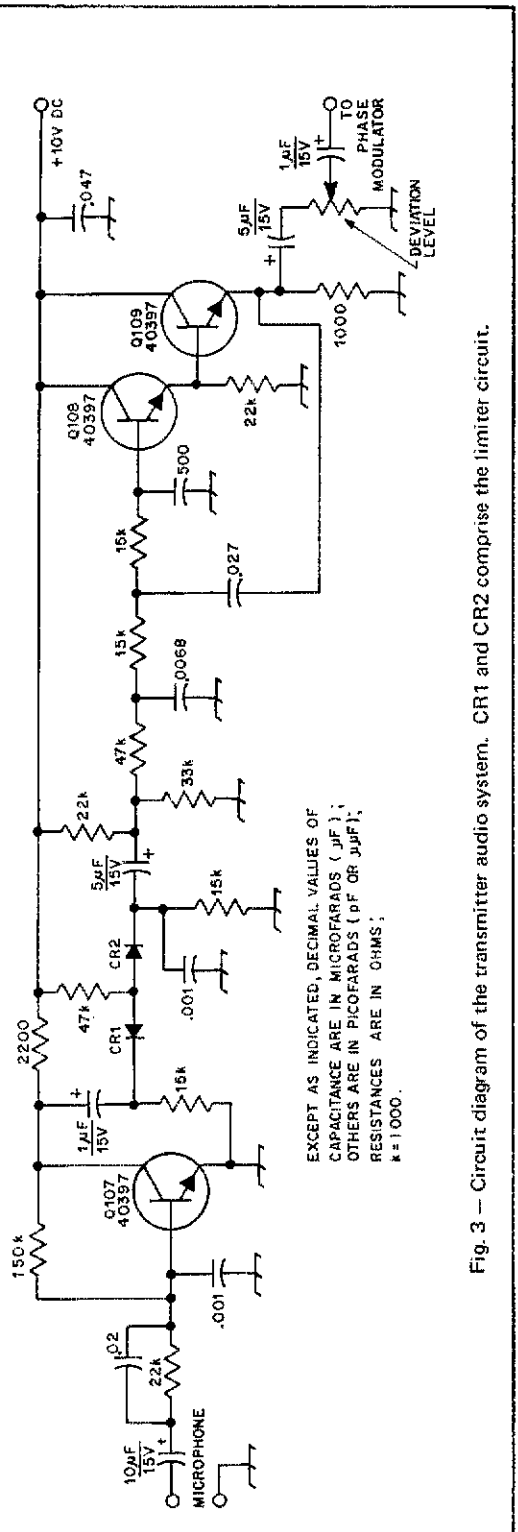


Fig. 3 — Circuit diagram of the transmitter audio system. CR1 and CR2 comprise the limiter circuit.

drive the phase modulator. Deviation is set by an internally mounted control and may be adjusted to a maximum of 10 kHz. The potentiometer is factory set to provide a 5-kHz deviation amount. Fig. 3 gives schematic details of the transmitter audio amplifier, clipper, post-limiter roll-off filter and Darlington amplifier.

The remaining circuit is conventional and provides more than 10 watts of rf output power. The final amplifier is followed by a four-section low pass filter which attenuates harmonic emissions. Since the transceiver is designed primarily for mobile operation, an ac power supply is not included. The voltage necessary for operation is 13.8 and is obtained from a vehicle electrical system.

Performance

An effort was made to confirm the validity of the manufacturer's performance claims. It is worth noting that the FM-3601 met or exceeded all of the specifications listed in the instruction manual. The signal level required for 20 dB of quieting is 0.35 microvolt.

The mechanical design combines a low profile with compactness. The vinyl-covered case withstands the rigors of mobile operation without showing scars. The equipment requires very little space under the dashboard, and for this reason a word of caution is offered: this unit can be removed from the mounting bracket and hidden under a thief's jacket in about 10 seconds flat. Furthermore, if it is mounted in a small car, and the window is open, there is no need for the burglar even to open the door! – *WIFBY*.

Sonar FM-3601 Amateur FM Transmitter-Receiver

Dimensions (HWD) and Weight: 2-5/8 × 6-3/4 × 9 inches, 5 pounds.
Power Requirements: 12 to 15 Vdc at 1.9 A during transmit periods; 0.18 A during receive, volume set to maximum, and with squelch disabled.
Transmitter Power Output: 10 watts.
Receiver Sensitivity: 0.35 microvolt for 20 dB of quieting.
Price Class: $300.
Manufacturer: Sonar Radio Corporation, 73 Wortman Avenue, Brooklyn, NY 11207

Strays

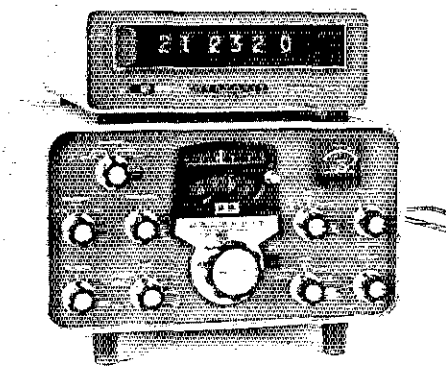
QST Congratulates, . . .

John Weedmark, VE3GGO, who has been awarded a scholarship by the Canada Research Council.

Eunice Bernon, K8ONA, on being appointed columnist for "Ham Antenna" in the Cleveland *Plain Dealer*.

Joseph Schwartz, K2VGV, who has been named "Amateur of the Year" by the New York Chapter of the National Award Hunters Club.

Heath Frequency Display Model SB-650



UNTIL YOU'VE TRIED IT and found that you like it, you have no idea how satisfying it is to be able to read your receiver (or transmitter) frequency continuously to one tenth of a kilohertz. You can come up to a band edge and *know* with a high degree of precision right where you're tuned. You can slide up to the edge of a phone-band segment and *know* whether you're getting too close. You don't have to worry whether the fiduciary on your dial is set properly, because the frequency readout is given by display tubes which are independent of the dial mechanism.

In the past couple of years there have been a number of digital frequency counters described in the literature, and most of them have been fairly noble projects. But now Heath has come along with its SB-650 Frequency Display. About six hours' work with a (very small) soldering iron will have you in business.

The Circuit

This unit is matched to the rest of the Heath line not only in decor but also electrically, of course. Basically the display requires three separate frequency inputs from a Heath receiver or transceiver, i.e., from the linear master oscillator (LMO), the high-frequency oscillator (HFO), and the beat-frequency oscillator (BFO). A small amount of energy from each of these three circuits is fed to a multiplexer-sequencer whose timing is controlled by a clock/frequency-divider unit to produce a 160-millisecond "inspection period." This is further broken down into four subperiods of 40 milliseconds each. During the first subperiod, the energy from the HFO is fed to an up/down counter which counts the HFO in an upward direction. During the next 40-millisecond period, the BFO energy is permitted to reach the up/down counter, where it is counted down and thus subtracted from the HFO count. During the third sub-period the LMO is permitted access to the up/down counter, which again counts down and subtracts the LMO frequency from the previous remainder. What we have left is the operating frequency. During the fourth subperiod, this count is then transferred from the storage registers of the up/down counter to the display tubes, where the operating frequency is displayed to a tenth of a kilohertz and to an accuracy determined by the accuracy of the 1000-kHz crystal-oscillator clock. Since each inspection period is completed in 160 milliseconds, the frequency count is updated six times a second.

The Input Circuit

In order to prevent loading of the oscillator circuits in the Heath receivers (which would degrade the overall sensitivity), a MOSFET is incorporated as a high-impedance input amplifier. Three amplifiers, each similar to the one shown in Fig. 2, are used to drive the digital-logic circuitry which counts and displays the actual resultant frequency.

The input of each amplifier is adjustable to allow sampling only as much energy as necessary to provide drive to the multiplexer portion of the counter. The model tested required less than 20 mV pk-pk for proper operation at 28 MHz. No spurious responses were noticed in the receiver as a result of the display unit, and the sensitivity was unaffected.

The Kit

The completed SB-650 consists of 35 ICs and six transistors. Remembering Art Buchwald's "How much is that in dollars?" tempts us to ask "How much is that in tubes, or transistors?" Well, in tubes it would probably be impossible, certainly from any practical standpoint. In transistors, not impossible, but rather difficult. For example, one of the simpler ICs in this unit is used to provide the

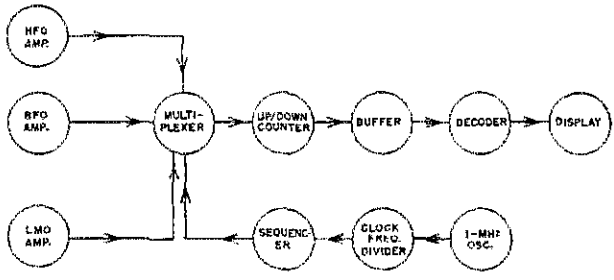
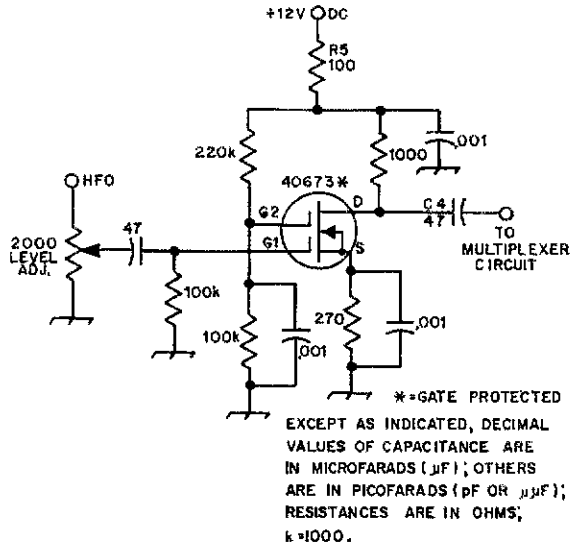


Fig. 1 — Block diagram of the SB-650.

Fig. 2 — Typical input circuit to provide isolation between the display unit and the three oscillators in the Heath SB receiver.

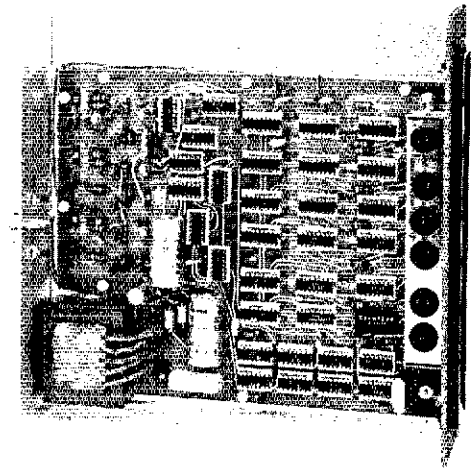


regulated five volts needed at various points in the circuit. This one IC is the equivalent of 19 transistors and four diodes. Thus, without ICs, it would take several hundred transistors and diodes to accomplish what is done here with a rather small handful of parts. And because it is such a small handful of parts, the kit goes together easily, in something like six hours from the time the package is opened until the first frequency readout is displayed.

As usual, the Heath instructions are clear and concise. We ran into only one small problem. The instructions on page 36 of the manual mustn't be overlooked. The way the booklet is laid out, it appears that the three instructions relating to the installation of a choke in the SB-400 and SB-401 exciter apply only if you have an SB-300 or '301 receiver, but this isn't true. If you have any one of the Heath SB series of receivers and are using the SB-400 or '401 to transceive, that choke (part of the kit) must be installed in the exciter.

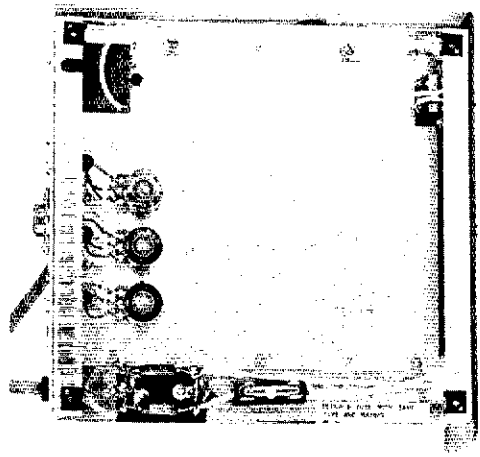
Heath emphasises that a small-tip soldering iron should be used. We repeat that admonition. If you haven't played with ICs before, you're going to find that the distance between pins is exceedingly small, and it takes care to avoid an inadvertent bridge between IC pins or across some of the circuit-board leads.

This kit may be built (as with all of the Heath products) without actually knowing a blessed thing about the theory of operation. However, Heath provides an excellent description of how the circuit operates, and supplements it with many block diagrams and equivalent circuits. Particularly intriguing are the functional block diagrams of the various ICs, truth tables for the logic in each portion of the circuit, and the pictorial presentations of the significant wave shapes that should be found at the various IC pins. If a 100-MHz bandwidth oscilloscope is available, it may be used to gain a complete understanding of what is going on in the circuit. It may take only six hours to put the kit together, but you can spend easily another six hours just puzzling out how it works. If you want more background on frequency counters, we refer you to MacLeish in *QST* for October, 1970, while a look at Hall, *QST* for November, 1971, will provide good background information on digital ICs. — *WIRU.*



Top view ▲

▼ Bottom view



Heathkit Model SB-650 Frequency Display

Dimensions (HWD) and Weight: 4 × 10 × 10-1/4 inches, 4-1/2 pounds.
Power Requirements: 105-125 or 210-250 V ac, 50-60 Hz.
Power Consumption: 15 watts.
Price Class: $180.
Manufacturer: Heath Company, Benton Harbor, Michigan.

LEARNING MORSE

An impressive amount of psychological research has been conducted on learning the radiotelegraph code but because these reports are often in a foreign language or contained in relatively obscure journals, this information is generally not available to radio amateurs — yet we are the largest group now using cw for communication. This research deals with questions pertaining to how quickly one should learn code, methods of teaching and learning cw, and contains information on code aptitude and the notorious "plateau" in achieving code proficiency. Dr. O'Keeffe was formerly W1HFZ and W3VXF.

FACT, FANCY, AND OLD WIVES' TALES

BY VINCENT O'KEEFFE,* Ed.D., WA1FKF

PERHAPS NO SINGLE aspect of learning has so intrigued psychologists as that of gaining competency in the radiotelegraph code. This is because (1) progress can be measured quite accurately as a function of instruction time and (2) learning Morse is a type of intellectual "no man's land," encompassing both the elements of skill acquisition and of cognition — but not falling wholly within either category.

For the amateur, the importance of learning code has, unfortunately, not been matched by the accessibility of important information on experiments concerning the learning of code reception. Many reports are not published in English and secondly, most are contained in somewhat obscure journals which are available in very few libraries. This lack of information has caused some amateurs to attempt to learn code by inefficient approaches and has, in some cases, led to the "discovering" of new ways to learn code — methods investigated years ago and found to have little or no significant effect upon the rate of learning. Magazine articles have appeared which have further spread inaccurate information on both the principles of learning involved and the amount of time generally required to learn Morse Code.

Questions which amateurs pose on the learning of code most often fall within one or more of the following:

1) How quickly should I be able to learn radio code?

2) Could I possibly be too old to learn?

3) Is it better to start with characters being sent rather quickly with a space between each or should the whole process be scaled down?

4) Is it true that I can expect to reach and stay on a plateau before I improve again?

5) Does practice on code groups help increase reception speed?

6) Is it more efficient to practice code in a concentrated effort or should I spread the hours over a greater number of days?

7) Is there a way of telling if I have an aptitude for code reception?

8) Is there a teaching method that is best for learning code?

Code Speed and Practice Time

In comparing different teaching-learning methods for progress in code speed as a function of practice time, the operator must be careful that the same measures are applied — that is, the test length must, in each case, be the same and the required degree of accuracy similar. For example, an amateur can usually copy faster during a two-minute run than a 15-minute test. Furthermore, a test may be "loaded" in favor of an operator's speed by the use of many letters of short duration. The word "MOP" takes 2100 milliseconds (2.1 seconds) to send at 20 wpm while the word "THE" requires but a third of the time, 720 milliseconds. For this reason, some code tests are based upon the rate at which "bauds," the basic unit of code, are received. Copy of 10 wpm is the rate at which 10 words equal to the duration of the word "PARIS" (41 bauds plus 7 more for the word space) are received. By way of historical note, if you cannot equal the speed of your father or grandfather, you might have no need to worry. At the turn of the century a word was considered in many tests to equal 4 characters in contrast to today's rate of 5 characters to one word. This was an easy way for Grandpa to boost his word count by 25 percent!

* Department of Music, Keene State College, Keene, NH.

By so modifying old reports and by noting the most important investigations of code speed, records are available which give indications of expected progress in relation to practice time. Biegel, in 1931, experimenting with a system for establishing Gestalt orientation (responding to a character as a single unit rather than as a succession of dots and dashes), trained two operators to copy 25 wpm; the first man required 153 hours, while the second needed 176 hours. Biegel considered his method successful because his standard for comparison was a similar study of 41 students in Amsterdam. The best of these Dutch students achieved 25 wpm in 297 hours; the poorest needed 405 hours. Thurstone (1919) analyzed 165 men over a 72 hour period of training during which time the average speed attained was 6 wpm. The slopes of attainment as a function of practice time are shown in Fig. 1.

Teaching methods were investigated by Keller, Seashore and other noted psychologists during World War II and through their recommendations, training periods were sharply reduced. Before 1940, eight to ten months were required for peace-time operator training and even in 1943, DeSoto reported to *QST* readers that marine radiomen were allotted 220 hours to attain 23 wpm. Tulloss (1918) reported 16 men needed an average of 160 hours instruction to achieve 13 wpm but Taylor, twenty-three years later, reported an average of only 80 hours were needed for the same proficiency. In a later refinement of his method, Taylor reduced instruction to 30 hours during which time one class attained a rate of 14 wpm.

The "champion" psychologist seems to be Koch, who, in 1936, using a 12 wpm "addition" method, coached an unspecified number of students to receive 12 wpm at the end of 13-1/2 hours! Peak, in a 1942 replication of the Koch method, reported approaching his efficiency but not matching it. Twelve words per minute in 27 half-hour training sessions seems to be the best *documented* time for class training.

Character Speed

Should a beginner receive code with relatively long dots and dashes or should units be sent quickly, the slow speed depending upon lengthy pauses between characters? If code is sent slowly, does the person copying analyze the letter or number into the constituent dots and dashes?

Experiments in psychology maintain that if a stimulus can be grasped as a single unit, learning will take place at a rapid rate. The first suggestion, sending each character quickly with rather lengthy pauses, initially appeared in two bulletins published in 1917 and 1918 by the Federal Board of Education in which a sending rate of 20 wpm was recommended. Lippman (1921) in an apparent confirmation of this method, analyzed the sending rate of expert operators and found that the average duration of the dots, dashes, and spaces was almost the same whether the text was sent at high or low speeds.

"Moving pictures" blend together at a rate below which we begin to respond to the separate projections. Biegel experimented to determine the speed at which an operator could no longer count dots and dashes and began to react to an overall Gestalt pattern. On the basis of his studies, he held that unitary patterns are formed about 16 wpm and recommended that all characters be sent at a 20 wpm rate to both beginning and intermediate operators. Koch agreed with Biegel's principle but set the dividing point at 10 wpm.

Because of the inordinate demand for radio operators at the inception of World War II, Taylor began one of the most comprehensive and thorough studies of learning the radiotelegraph code. His reports are noteworthy because they entail a more detailed research design and a more rigorous statistical analysis of material than is evident in many similar but older investigations. In his study of the high-speed-long-pause approach to code learning, Taylor acknowledged that the problem, ". . . has already received more attention than any other,"[1] and that, "Previously published studies of the problem have been unanimous in their agreement that individual characters should be transmitted at a high rate of speed from the beginning of learning."[2]

After conducting carefully controlled experiments at Harvard University in 1943, Taylor published his findings. Using rapid (18 wpm) transmission from the beginning, the experimental class achieved an average speed of 9.5 wpm at approximately the twenty-second hour and 12.5 wpm after some forty hours of instruction. The control class reached averages of 9.8 and 14.0 wpm when taught beginning at slow speed, the spacing and length of the units as per internation-

1 Donald W. Taylor, "The Learning of Radiotelegraphic Code," *The American Journal of Psychology*, LVI (July, 1943), 327.
2 Ibid., p. 328.

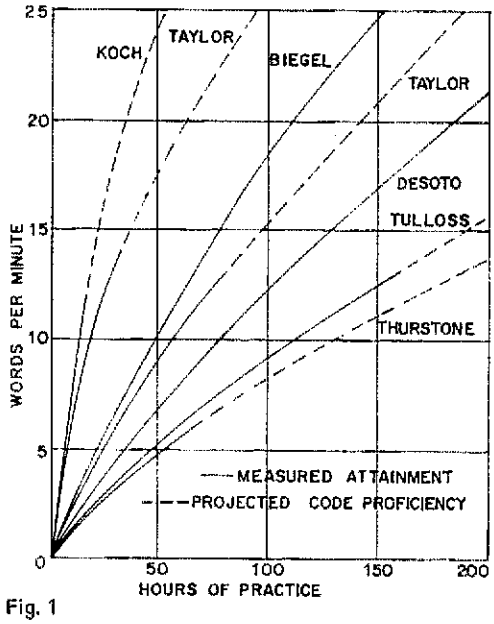
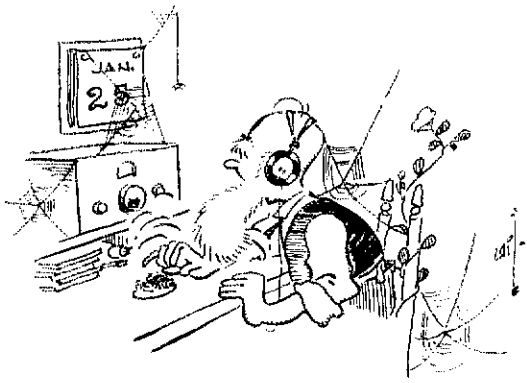


Fig. 1



"You may rest assured that the cards are not stacked against you concerning age..."

al agreement. Taylor's conclusion was that chance factors could account for the small increment between groups and that there was no significant difference in code proficiency between the classes.

Aptitude for Code Reception

Can we tell by a person's age, IQ, or scholastic achievement how well he will progress in the learning of code? Can a simple test be given which will give some indication of success in learning code? The possibility of being able to predict future success in such an endeavor has fascinated psychologists for years.

You may rest assured that the cards are not stacked against you concerning age, scholastic achievement, or occupation. As early as 1919, Thurstone found rather low correlation coefficients ranging from .08 to .42 for these items and some years later, Taylor found similar correlations between code proficiency and the Wells Revised Alpha (intelligence) Tests ranging from a low of .15 (arithmetic problems) to a "high" of .46 (directions). Harmon (1943) found a coefficient of correlation of only .20 between code learning ability and intelligence and but .09 with age.

Is musical ability an asset when learning the code?

Since code is a pattern of rhythms, many investigators sought to determine if code proficiency could be predicted by the Seashore Test of Musical Talent. Taylor found a coefficient of correlation of .56 between code achievement and the Seashore tests of pitch, rhythm, time and tonal memory, while Lahy (1935) found a similar "significant" relationship. While the connection between these elements of musicianship and code proficiency was studied to some extent, the possibility of predicting a learning rate through the use of an initial learning test quickly superseded the Seashore type investigation.

By noting the progress of students through, let us say, 40 hours, it became evident that not only were the most able students the most proficient at the end of the course but also at the end of the twentieth hour, the tenth hour, and even at the end of the first hour! The deduction followed that the results of a short period of instruction might be used to predict class standings at the end of forty, or more, hours.

Lippman was the first to state that progress could be predicted by the learning of a small number of characters. He chose to teach the letters "K M R S U" and on the basis of his test, recommended that the lowest 30 percent of all candidates be dropped. No validation of his study was published, however. Biegel used but three characters in his test which was used to select telegraphers for the Post, Telephone and Telegraph of Amsterdam. Similarly, Koch flatly concluded that students who, in the first two half-hour periods, did not learn to receive four characters at 12 wpm, would never learn code. It remained, however, for Taylor to systematically experiment with the initial learning concept. Using the characters "F C 2 9 . ? / " (selected because they were generally unknown to beginning students), Taylor taught these to his students for a half-hour period. Following this was a 20 minute test with 100 stimuli. The coefficient of reliability of the test was .97 and at the end of the twenty-second hour of code instruction, Taylor had obtained a coefficient of correlation of .73 between the ability to learn the first seven characters and ultimate code proficiency. This was a high relationship and the conclusion, which still stands today, was that those operators who learn most quickly during the first hour of instruction have, in most cases, the greatest aptitude for code reception.

The Phantom Plateau

An expression which is commonly used refers to "plateaus" in learning, that is, it describes a situation in which the rate of learning gradually slows until there is no progress for an extended period of time. When progress is recorded on a graph, the line appears as a plateau. Few people realize that the whole concept of plateaus in learning was brought into prominence by the telegraphic experiments of Bryan and Harter. Bryan, a professor of psychology at Indiana University and Harter, a graduate student and telegrapher, were interested in the learning curve in

relation to code proficiency. They found an extended plateau just before the rate of 14 wpm was reached, appearing between the twelfth and seventeenth weeks and continuing for as long as ten to twenty weeks!

Not only was this a discouraging phenomenon but its truth was accepted by code novices and also by psychologists. At Harvard, however, Tulloss conducted similar experiments and, surprisingly, could find no evidence of the notorious plateau. Later, Keller (1958) conclusively stated that the claims for a plateau are simply not verified. It was later found that the whole concept of a long and arduous plateau in telegraphy was based on the Bryan and Harter observation of but two students, a number of interviews, and virtually no real objective investigation. The plateau in learning code has been described as a "phantom plateau," appearing in selected cases but surely not a universal problem.

Practice Material

Analyses of the most common errors in telegraphy have prompted various methods of teaching code. Based on thousands of errors, Keller and Taubman (1943) found the most difficult characters to be P W J F Y G Q L and 2. The letters S N O M A I T O and E are rated easier. (See Table I) Tulloss found Z Q J and X to be the most prone to error and Spragg (1943), analyzing almost 9,000 mistakes in code copy, found the three most difficult letters to be W P and Y. About 12,000 errors investigated by Highland (1958) show that the characters H 6 5 I B and J are dangerous with the most common error being the number 6 which is copied as the letter B. Almost all studies have shown that "dotting errors" are to blame for most mistakes.

After a study of 29,000 errors, Seashore and Kurts (1946) arrived at the generalization that operators tend to hear code signals shorter than they really are.

Tullos hypothesized that the characters missed are those which appear infrequently in common language and that the reason for their being a source of error is simply because students have little opportunity to receive them during practice on plain language. To test this theory, Biegel gave equal practice on all characters until 18 wpm was reached. He found no appreciable difference in the rank order of errors. Sidmund and Keller (1945) taught code with particular emphasis upon those signals which were considered the most difficult but found that special drill on frequently confused pairs of signals does not increase proficiency.

A second effort to avoid code error revolved around the question of what type material should be presented in the early stages of learning the code. Should combinations of E I S H 5 and T M O Ø 1 (similar) be used or should dissimilar characters (W M H P X and 8 A G 7 K) be first presented? After extensive experimentation, Taylor concluded that there is no significant difference between the two approaches.

TABLE I

Order of Difficulty for 36 Morse Code Characters*

Character	*Number of Errors*
P	900
W	854
J	767
F	714
Y	663
G	657
Q	629
L	611
Z	606
3	565
U	549
B	545
2	542
C	539
D	537
X	523
6	514
K	502
1	481
R	454
7	438
4	408
8	378
H	363
9	329
5	311
V	302
S	212
N	210
O	199
M	190
A	183
I	168
T	129
0	112
E	51

*Based upon Keller (1943)

Should you swing a leaded bat before taking your FCC code test? Should you practice on code groups and nonsense material so that receiving common language messages will be easier? In a series of experiments, both Tulloss and Biegel had students practice almost exclusively with code groups and garbled material. The result was that these students ended up receiving code groups and nonsense material at a faster rate than common language!

Distribution of Practice

There has been no really valid study showing the best distribution of code practice although there are indications that the length and distribution of practice periods might be of major importance. Biegel taught for two hours each day and then reduced lessons to but one hour daily. Tulloss started with four hours each day for each class but gradually came to the view that,". . . it is not impossible that massed practice is especially inefficient in learning code and that an hour a

day is almost as effective as four hours."[3] In 1940, Keller and Estes found no difference between classes scheduled for four hours massed practice each day versus groups practicing four hours spaced per day. Five years later, however, the same two investigators determined that a schedule of four hours daily for eight weeks was superior to seven hours daily over a period of five weeks.

A Word About Koch

Because of the extremely rapid progress claimed by Koch, this approach warrants a more complete description. By Koch's method a student is first taught to distinguish between two characters sent at the rate of 12 wpm. When this is accomplished, a third letter is added with transmission always at the 12 wpm rate. Successively, additional characters appear *but in no case* is an addition made unless the previous run is copied with at least 90 percent accuracy. In this manner characters are added until the entire alphabet is known. At this point, the operator can receive 12 wpm.

The results are impressive but, unfortunately, Koch did not compare his results with a control group. Furthermore, he seems not to have recorded the distribution of practice periods, the number of students involved, ages, and other important information. Peak's replication of the study is similarly presented in but the most abbreviated form. Even with these criticisms, it is curious that the method has not been pursued to determine if it has merit. It may be noted that Koch eventually dropped the instruction time to only *twelve hours* by using dots on one frequency and dashes on a different pitch. At the end of each hour of instruction, the difference between the pitch was reduced until the frequencies were identical at the end of 12 hours.

Conclusion

Experimentation on code learning rates began about 1900 with particularly expanded activity taking place during both World Wars. Since the mid-fifties, little research has been done and whereas the *Psychological Index* at one time carried many accounts of experimentation with learning the Morse code, it is today a rarity to note such an entry even though there are many unanswered questions resulting from past investigations. The validity of Koch's approach is but one and the proper distribution of practice is another. Is it possible to copy code faster by a visual method than by ear? There is some evidence to indicate that copying via a winking light might be more effective than listening to a BFO-aural stimulus. Some operators claim they can read printed dots and dashes on a moving tape faster than they can copy by ear. Can a code pattern be devised which will circumvent the most common errors? Is there any relationship between vocabulary and code proficiency? Very young novices have difficulty in "filling in" missing letters if the words and spellings are not included in their recognition vocabulary. These are but a few areas open for study.

An important item to note in examining research into learning the radio code is that results showing code speed, learning curves, and the like are almost always based on the *average attainment* of a group. Because people are different and learn in different ways, what works for most people may not necessarily work for you. Do not allow yourself to be discouraged. Fumbling, fooling, and failing are all part of the learning process and are essential to discovering the method which works for you.

An important part of learning – and which was integral in every successful endeavor mentioned above – is that you must test yourself at frequent intervals. Taylor, Biegel, Tulloss all had their students keep accurate charts of progress. It has been shown again and again that knowledge of the results of your efforts defines what has been accomplished and points the way toward further achievement. Learning rates may differ between two individuals but seldom is a goal unattainable if enough time and effort are expended. Fortunately, for many of us, the FCC is interested in *results*, not learning rates.

[3] Donald W. Taylor, "The Learning of Radiotelegraphic Code," *The American Journal of Psychology*, LVI (July, 1943), 327.

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(Continued on page 70)

Knock Off the Bootlegging, Boys!

or

Will the Real W6TB Step Forward ?

BY JOHN H. DELL,* W6TB (or SOMETHING)

Editor, QST,
Newington, Connecticut.

Dear Sir:

"Who the Devil is Who?" is right. You highbinders certainly went overboard in August QST *by assigning W6TB to former WØAXQ! I know for certain W6TB is Elmer H. Burgman who was 6CTO and Section Communications Manager for the A.R.R.L., when I came on the air as 6CHT in 1925.*

Come to think of it this is not the first time Elmer has been the victim of a headquarters plot. Back in '26 or so the South Africans had the 'Springbok Competition' to ascertain which Yank could work the greatest number of South Africans and QST *announced that the contest was won by 6CTO. A month later, if memory serves,* QST *cavalierly announced that a "re-count" showed the trophy was won by someone back in Massachusetts or Connecticut and I suppose some League hanger-on is still claiming to have won the pretty little gazelle fairly and squarely!*

For the 46th time am considering cancelling my subscription to QST *so if you want the revenue you had better admit that the real W6TB is Elmer H. Burgman, Ex-W6CTO and Ex-W5AAX. Don't try to concoct some story that the F.C.C. 'goofed' and assigned the call sign to two individuals either.*

Sincerely, but not yours,
George P. Dery, W6HG

It all began, I suppose, back in Colorado Springs on February 1, 1970, when I retired from the US Air Force and decided to move to California to again take up gainful employment with the Pacific Telephone Company in San Francisco. During my 10 years of Air Force duty in Colorado Springs I had the licensed call of WØAXQ. Before that I was KH6COP in Hawaii and I have been a licensed operator and ARRL member since 1936.

Moving to California required that I apply for a W6 license if I expected to continue with my unbroken strings as a licensed amateur. After I adjusted to the new environment, I applied for an operator and station license enclosing the $4 plus $20 required fees for a two-letter call.

The first indication I received that the new two-letter was to be issued was a QSL advertisement from the "Little QSL Print Shop" in Dallas, Texas, addressed to W6TB. I ordered a hundred cards and rubber stamp for $6.50 in October or November. I proceeded to operate at moderate activity on 40-10 with about 100 watts with a roof-mounted trap vertical.

One day in May, Stu Purcell, W6ENA, and a fellow office worker, asked me what my call letters were. I told him W6TB and asked why he wanted to know. He explained he was sure that he had heard the call on 40-meter cw and wondered if it was me. It wasn't, as I limit my operating now to phone. I forgot the incident, thinking that Stu had misunderstood the call or that someone was bootlegging. About 2 weeks later Stu asked me again if I had been operating on 40 cw as he had heard the W6TB call again and it was being signed by a fellow using the handle of Elmer from L.A.

I became curious as Stu didn't feel that the Elmer operator was a bootleg operation – he just *sounded* like a legitimate operator. I picked up the phone and called the San Francisco FCC Engineer-in-Charge and explained the situation. He looked through his microfilm listing of calls and verified that the W6TB call was assigned to me at the San Carlos address. He further rationalized that "Somebody must be bootlegging your call, John." I thanked him and pledged to keep an ear peeled for the culprit. I asked Stu to continue to listen for the "bogus" L.A. W6TB and to set up a schedule with him if he could.

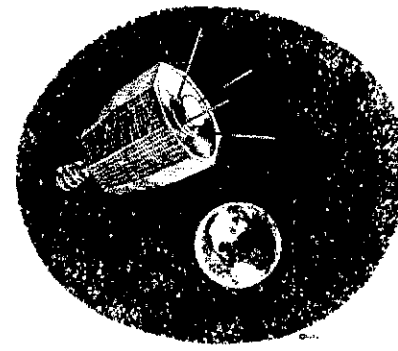
Sure enough, the next Saturday Elmer was on 7005 busting away. Stu contacted him and we set up a triangle QSO on Saturday June 19. There we were on 40-meter phone the three of us, W6TB in L.A., W6ENA in Inverness, and W6TB in San Carlos. It seemed kind of funny to hear W6TB calling W6TB. To liven up things Dell, W6TC, in Pamona had just gotten up, turned up the rig and was having a cup of coffee to shake out the cobwebs. Imagine his surprise when he heard the W6TB routine. He broke the conversation to ask who was kidding whom and which caller was the bootleg. I don't think he was ever convinced that we were both honest calls, even after he received copies of our QSLs.

It turns out that Elmer H. Burgman, ex-6CTO, had indeed been issued W6TB back in February, 1968. Becoming concerned, Elmer called the FCC in Gettysburg. It didn't take long to get a response. On June 23, I received a letter from Dick Zeigler, Chief of the Gettysburg Processing Section, which

(Continued on page 67)

John W. Dell, K6TB, and Elmer H. Burgman, W6TB.

Just as the 1960s saw the radio amateur take a giant figurative leap into space via the OSCAR and AMSAT programs, the 1970s offer a new opportunity for amateur radio to direct some of its energy to solving the problem of the Earth's rapidly diminishing store-house of fossil-fuel power.



CLEAN POWER

Amateur Radio's Challenge for the Future

BY JOSEPH M. BUCH*, W6FRW

THE INGENUITY of the ham for using surplus and junk materials to accomplish his objectives is legend. One objective could be developing a simple, low-cost means of generating electricity from solar energy. Solar power is presently too expensive. New, clever techniques are required to make clean solar power an economical reality.

There are in the universe two basic sources of energy, the sun and nuclear power. Nuclear power is by nature the domain of government requiring the expenditure of huge sums. But, the sun shines everywhere and governments haven't found a way to tax, ration, or otherwise regulate its use – yet. Hopefully, there are no amateur nuclear energy projects under construction, but the nature of solar energy is such as to make it available in useful quantities to every experimenter who has a back yard or a roof.

Many means of converting solar energy into useful power have been devised over the years. They fall into two general categories, the indirect and the direct methods.

Indirect Conversion

Included in the indirect processes are fossil fuels, water power, and wind power. Our oil, coal, and natural gas deposits are a result of prehistoric life which was nurtured over the eons by the warmth and light of the sun. Presently 98 percent of the world's energy requirements are being supplied by this source and experts have estimated that this reserve will be depleted within the next two hundred years. But the real problem with fossil fuels is in converting this fuel to useful power without upsetting the Earth's delicate ecological balance.

The hydroelectric generating stations are presently providing only about 5.3 percent of the electrical energy requirements in the USA.[1] When water falls as rain on higher elevations, some of its energy is captured by hydroelectric stations as the water runs off to the sea. Unfortunately, most people have elected to live in areas far from where cheap hydroelectric power is available. To get this power to the points of use requires hundreds of miles of transmission line. The vast dams, generating plants, and transmission lines all cost money. Hydroelectric power is almost as expensive as that generated by burning fossil fuels. Water power does not appear to be a very fruitful area for amateur experimentation simply because most hams don't live next to a fast-flowing river or waterfall.

Harnessing the Wind

The third form of indirect solar energy has some definite appeal to the amateur experimenter. The wind is not quite as reliable or universal as direct sunlight, but then the wind often blows long after the sun has gone down. Experts have estimated that the wind could provide approximately 5 to 15 percent of the world's energy needs – depending upon which expert you believe. For many years wind power was the only source of electricity in hundreds of thousands of farms in the United States. The rural electrification program has caused most of these units to fall into various degrees of obsolescence and disrepair. Federally-subsidized power was actually cheaper than maintaining a windmill and the necessary storage batteries.

Of course this happened between 30 and 40 years ago. It is conceivable that modern materials could be used for propellers and junk automobile alternators could provide the necessary conversion of the mechanical energy of the spinning propeller and less costly storage batteries, wind power could provide the necessary power for that mountain-top repeater project that your club gave up because there was no electric power available.

Commercial wind-driven generators have been available for many years. A typical design uses a two blade, 8 foot diameter propeller. Reaching 1150 rpm in a 40 mile per hour wind, the specially-designed generator is capable of charging a 12 volt battery at an 18-ampere rate.

* 29736 San Bruno, Barstow, CA 92311.

1 The Crisis of Converting Fuel Into Power, *Business Week*, January 8, 1972.

U. S. Weather Bureau wind velocity records at Mt. Washington, New Hampshire show an average velocity of 36.9 mph with gusts up to 155 mph. While most mountain tops are not as windy as Mt. Washington, good breezes and good repeater locations generally go together. Although the $1000 required to purchase a commercial wind driven battery charger is more than the average repeater owner could afford, it is possible that use of home-made propellers and junk automobile alternators could bring the cost down to under $100. Worth thinking about, isn't it?

Other forms of indirect solar power have been suggested over the years. The solar energy trapped within the Earth's interior can be used to heat water into steam to drive conventional generators. Geothermal power plants have been built in California and there are a few other places in the world such as Italy and New Zealand where the economic feasibility of geothermal power has been demonstrated. Hawaii would seem to be a likely area for development. Unfortunately geothermal power is only available in a few areas of the world and, therefore, does not seem to be a good candidate for amateur experimentation.

Direct Conversion

It has been estimated that the solar energy beating wastefully down on the roof of a house amounts to perhaps a hundred times that which comes in through conventional utility wires. Naturally this would not hold for the smog-shrouded home of the typical Los Angeles, California kilowatt where the glow from the filaments of the 4-1000As often exceeds the glow of Ol' Sol. In most areas of the South and Western U.S. the sun shines in abundant quantities. The conversion of this energy into useful power at economic prices is a challenging and difficult problem. But all power generated today (except for that infinitesimal amount which is radiated into space), eventually finds its way into heat which raises the Earth's temperature; so, since the sun already heats the Earth, the use of solar energy is the only power source which will not disturb our delicate heat balance.

David Freeman, former head of energy policy at the U. S. Office of Science and Technology, was recently quoted as saying, "Solar power has got to be one of the most neglected technologies of all. We're putting considerable money into fusion, but hardly a plugged nickel into solar power. Ideas have been put forth that deserve to be pushed until they either reach a dead end or pay off."[2]

Let's look at some of these ideas to see what contribution amateurs can make.

Solar Cells

In 1954, D. M. Chapin, C. S. Fuller, and G. L. Pearson of the Bell Telephone Laboratories announced the development of the silicon p-n junction solar battery. The principle had been developed in 1839 but the selenium photocells of 1954 had an efficiency of only 0.5 percent. The efficiency of the first silicon cell was about 6 percent and this has since been improved to a maximum near 14 percent.* These devices are being used to power most of the spacecraft launched to date and considerable research is being conducted in the U.S. and the U.S.S.R. to improve the efficiency of these devices in space applications. The construction is shown in Fig. 1.

The cost of enough cells to cover the roof of the average home would run in the hundreds of thousands of dollars. The challenge for amateurs is to reduce the cost of the solar battery to the point where it would be economically attractive. The use of some material other than silicon may produce a lower efficiency cell in terms of watts out for watts in, but a higher efficiency cell in terms of watts per dollar. Space research is directed at getting the maximum power from a given cell area. Amateur research should strive to obtain the maximum power per peso.

Thermoelectricity

In 1821 the German physicist, Seebeck, discovered that when the junctions of two dissimilar metals are maintained at different temperatures, a current will flow. The "Seebeck effect" works best with materials like lead-telluride and zinc-antimony which have produced power at 4 to 9 percent efficiency.

[2] Ibid

* 18 percent for gallium arsenide cells.

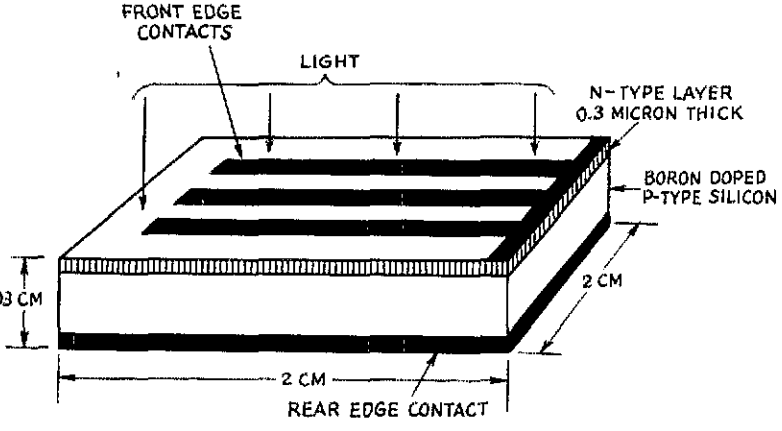


Fig. 1 — Construction of a typical solar cell for space use. N-tape layer is formed by diffusing phosphorus into the silicon. Output of 450 millivolts at 125 mA is taken between the front and rear edge contacts.

Fig. 2 shows the basic construction of a thermoelectric generator. In some types of thermoelectric materials, the temperature difference between hot and cold junctions results in the flow of electrons such that the cold junction will be negative. This is called an "n" type material. In a "p" type material the cold junction will be positive and the hot junction negative. P and n type material make it possible to construct a generator where the individual cells are in series electrically but in parallel thermally. Because the generator output depends on the material used, the hot junction temperature, and the temperature difference between the hot and cold junctions, it is desirable that the thermoelectric material have a low electrical and a high thermal resistivity. Since both of these properties are dependent on the number of free electrons in the atomic structure, low electrical and high thermal resistivity do not usually go hand in hand.

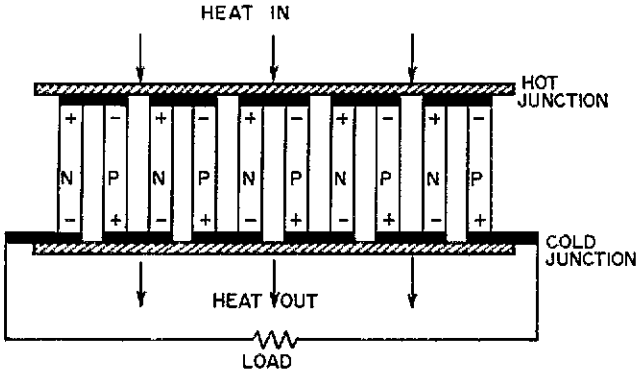


Fig. 2 -- Schematic diagram of a thermoelectric generator. Individual junctions are in series electrically but in parallel thermally.

Present work with thermoelectricity was sparked in the U.S.S.R. in the early 1930s by Dr. Abram Ioffe. The Chinese have developed thermoelectric generators for powering broadcast receivers which operate from kerosene. In 1956 Ioffe developed solar-powered thermoelectric converters with outputs of up to 100 watts.

The solar cell can be operated with some concentration of the solar energy on the cell, but the cell tends to degrade rapidly when operated at elevated temperatures. The big advantages of thermoelectric converters over solar cells is that they work best at much higher temperatures. The 1000-degree temperatures that thermoelectric converters have been operated at can be obtained by placing the converter at the focus of a parabolic mirror or a lens. In terms of cost a mirror can collect the energy of the sun which falls on a certain area much more cheaply than an equal area of solar cells. The cost of commercially-produced thermoelectric generators is presently about $40 per watt. There is ample room for experimenters to work to reduce this cost.[3]

Thermionic Conversion

The thermionic converter, invented by Schlicter in 1915, is the vacuum tube equivalent of the solid state thermoelectric converter. Thermionic conversion involves the heating of a cathode in a gas-tight enclosure with provision for cooling the anode. A space charge effect, similar to that which occurs in ordinary vacuum tubes, tends to limit the current. This effect can be minimized by using a gas vapor at low pressure in the tube and using minimum spacing between cathode and anode. Efficiencies as high as 17 percent have been obtained with cesium vapor-filled converters operating at cathode temperatures of 1900 degrees C. The output voltage per tube was reported to be 1 to 2 volts, requiring series connection of a number of tubes to achieve useful voltages.

Wouldn't it be interesting to blow the dust off of that old mercury vapor rectifier tube and place the cathode at the focus of a parabolic mirror? You won't have a device which will set any efficiency records but there might be just enough output to whet your appetite for further tests. If there is any output at all, it will be the most efficient generator yet developed in terms of watts per dollar.

[3] Bird, Yamamura, *Thermoelectric Handbook*, Cambridge Thermionic Corp., Cambridge, MA 02138.

Magnetohydrodynamics

Magnetohydrodynamics (MHD) is a technique where a gas is ionized by raising its temperature to near 5000 degrees F and then passing it through a strong magnetic field. The moving ions are separated into positive and negative components by the fact that they are moving through the magnetic field. Strategically placed electrodes will have a potential difference which can cause a current to flow in an external load. The U.S.S.R. has an experimental plant which produces about 25 megawatts by MHD conversion. The U.S.A. is currently spending only $1.5 million on MHD research each year and plans developed in 1965 for a 30 megawatt experimental plant in the U.S.A. have not been acted upon. Although MHD could theoretically provide efficient conversion of heat energy into electricity, the high temperatures involved would tend to make the technology more complex than what the average amateur could handle. The temperatures required are approximately one half the temperature on the surface of the sun.

Photo-Chemical Converters

Ultraviolet light has been demonstrated to cause water to break down into hydrogen and oxygen. When these two gases are passed through a fuel cell of the type developed to power Apollo space missions, electricity and water are produced. The electricity can be used for useful work and the pure water can be used for drinking purposes or

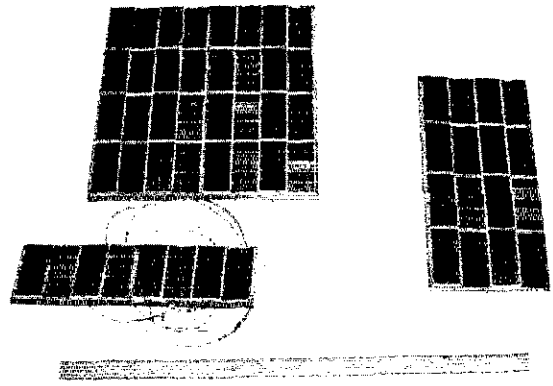
returned to the main tank to be available for breaking down again.

In 1961, Dr. Frederick Sisler of the U. S. Geological Survey demonstrated a biochemical fuel cell in which decomposing organic material produced electricity. His "bug battery" later powered a radio transmitter with a 15-mile range. Algae, single cell plant organisms grown by sunlight, could form the basis of a "bug battery" that could be competitive with conventional power plants. The maximum efficiency obtainable has been predicted to be greater than that of heat engines and this technique appears to offer great possibilities.

Conclusion

These are some of the techniques which have been proposed over the years to harness the power of the sun. The most obvious technique would be to generate steam and then turn a turbine. Some of these other techniques have a theoretically higher efficiency and are worthy of investigation.

The amateur radio service is granted use of the precious radio spectrum because of the public service which it provides. What greater service could amateur radio provide than the harnessing of cheap, pollution-free energy from the sun for the benefit of all mankind? During the recent World Administrative Radio Conference in Geneva in June 1971, much opposition to expansion of amateur privileges came from the delegations of the developing nations of Africa and Asia. A main objection to providing spectrum space for the use of radio amateurs was that we had essentially become a group of appliance operators. That old innovative spirit, which once resulted in significant achievements in the development of the radio art, has faded in recent years – or so they said, anyway. Arguments can certainly be put forth to refute that claim, but the real problem is that these governments will not be convinced by rhetoric. Luckily, however, it is these same developing nations of Africa, Asia, and Latin America which could really make immediate use of a cheap source of clean power. The amateur radio fraternity is probably larger than the group which worked together to put Neil Armstrong on the moon. Working together, sharing our ideas, amateurs can possibly provide that cheap source of solar electric power which is so needed. What country could object to amateur radio, knowing that the living standard of its people had been raised as a direct result of amateur experimentation?



These solar panels are to be used in a future amateur satellite.

Bibliography

Amateurs who wish to investigate the possibility of clean power further, may wish to review some of the following books and articles which provide greater detail on much of the information contained in this article:

Mark's, *Standard Handbook for Mechanical Engineers*, Seventh Edition, McGraw-Hill.

Kaye and Welsh, *Direct Conversion of Heat to Electricity*, Wiley.

Chang, *Energy Conversion*, Prentice-Hall.

Wilson, "Conversion of Heat to Electricity by Thermionic Conversion," *Journal of Applied Physics*, April, 1959.

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Steg-Sutton, The Prospects of MHD Power Generation, *Astronautics*, August 1960.

Mitchell, *Fuel Cells*, Academic.

QST

Knock off the Bootlegging, Boys!

(Continued from page 63)

contained a new ticket with the call K6TB. The letter explained that an error had been made when my call was processed into the computer. Dick apologized for the mistake and requested that I destroy the invalid W6TB license. The same Little Print Shop in Dallas, Texas, sent another QSL query, only this time *after* I had received the new FCC ticket. I ordered another 100 QSLs and a stamp to the tune of $6.50. He evidently felt sorry for me this time as he sent 500 cards instead of the 100 I had ordered.

I got to thinking it would be nice to meet the other W6TB: so the next time I visited L.A. I stopped by to see Elmer. We had a nice discussion about the events leading up to our meeting and his wife took a picture of each of us holding the QSL card we exchanged. We discussed the probability of the following chain of events ever happening again: (1) a duplicate licensing error going undetected by the FCC, (2) a fellow ham office employee just happens to hear a W6TB cw call, (3) a bona fide QSO between duplicate licensees, and (4) an eyeball QSO. The FCC could wrap it up with a real miracle by refunding my $6.50 for the W6TB QSLs!

QST

September

VHF QSO Party

Announcement

All set for the September VHF QSO Party? If band openings are even half as good as we had in June, this is one contest you can't afford to miss!

Remember you may pick any two 14-hour periods out of the 35 hours available. All you do is exchange sections for QSO credit, add up your contact points and multiply that sum by the sum of your band-section-multipliers.

Read the rules carefully, then send right away for your free party log forms; a sample is shown below.

Mail your entry to us no later than October 5, 1972. C U then. —*WA1KQM.*

STARTS	ENDS
1900 GMT Sep. 9	0600 GMT Sep. 11

Operate any two 14-consecutive-hour periods

Rules

1) The September 1972 V.H.F. QSO Party begins at 1900 GMT, Saturday, Sept. 9, and ends at 0600 GMT, Monday, Sept. 11. Entrants may operate any two 14-consecutive-hour periods beginning no earlier than 1900 GMT Saturday (starting on the hour) and ending no later than 0600 Monday. All claimed contacts must be within the two chosen periods and must be made on amateur frequencies above 50 MHz., using authorized modes of operation.

2) Name-of-section exchanges must be acknowledged by both operators before either may claim contact point(s). A one-way exchange, confirmed, does not count; there is no fractional breakdown of the 1-, 2-, or 3-point units.

3) Fixed, portable or mobile operation under one call, from one location only, is permitted. A transmitter used to contact one or more stations may not be used subsequently 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).

While no minimum distance is specified for contacts, equipment in use should be capable of real communications (i.e. able to communicate over at least a mile).

Contacts made by retransmitting either or both stations do not count for contest purposes.

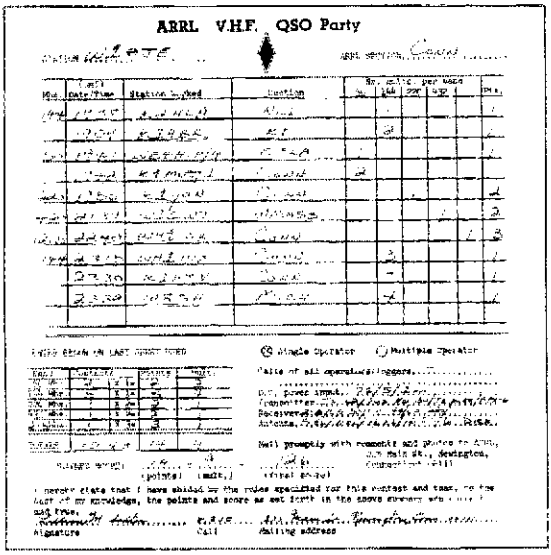
4) Scoring: 1 point for completed two-way exchanges on 50 or 144 MHz.; 2 points for such exchanges on 220 or 420 MHz.; 3 points for such exchanges on the higher v.h.f. bands. The sum of these points will be multiplied by the number of different ARRL sections worked per band; i.e., those with which at least one point has been earned. Reworking sections on additional bands for extra section credits is permitted. Cross-band work does not count. Aircraft mobile stations cannot be counted for section multipliers.

5) Foreign entries: all contacts with foreign countries (such as Mexico and the Bahamas) count for score. All foreign countries are grouped together, and a multiplier of no more than one (per band) may be claimed for contacts with all foreign stations worked. Foreign stations may only work stations in ARRL sections for contest credit and will give their country name.

6) A contact per band may be counted for each station worked. Ex.: W2EIF (S.N.J.) works K1YON (Conn.) on 50, 144 and 220 MHz. for complete exchanges. This gives W2EIF 4 points (1 + 1 + 2) and also 3 section-multiplier credits. (If W2EIF contacts other Conn. stations on these bands, they do not add to his section multiplier but they do pay off in additional contact points.)

7) Each section multiplier requires a complete exchange with at least one station. The same section can provide another multiplier point only when contacted on a new v.h.f. band.

8) Awards: Entries must be postmarked no later than October 5, 1972. A certificate will be awarded to the high-scoring single-operator station in each ARRL section. In addition, the high-scoring multi-operator station will receive a certificate in each section from which three or more valid multiple-operator entries are received. Certificates will also be given to the top Novice in each section where three or more such licensees submit logs and to Novices in sections of less than 3 entries, who in the opinion of the Awards Committee, displayed exceptional effort. Awards Committee decisions will be final. QST



ARRL V.H.F. QSO Party

1972 VE/W Contest Announcement

September 23-24, 1972

THE MONTREAL Amateur Radio Club Inc., invites all W and VE amateurs to participate in the 1972 VE/W Contest. The contest period this year is the weekend of Sept. 23-24.

Rules are similar to those of last year's event. Log sheets and check logs for both Canadian and American entrants are available from the VE/W Committee at the address shown below. (Do not write ARRL for these) upon receipt of SAE with IRC's or sufficient Canadian postage.

Stations should look for each other in the "General" part of the phone and cw bands, and are reminded to check all bands for openings.

Be sure to send in your log regardless of score. It will be of definite interest in preparing the contest summary. Soapbox comments (unusual occurrences, exceptional QSOs, etc.) and station photos will be of great interest.

1) *Eligibility*: The contest is open to all amateurs located in the ARRL sections listed on page 6 of any *QST*.

2) *Contest Period*: All contacts must be made during the period shown above. Only 20 hours total operating time may be used in this period. Times on and off the air must be shown in the log. Minimum time off period allowed is 15 minutes. Listening time must count as operating time.

3) *Bands*: All bands and modes for which the participant is licensed may be used. A station may be worked once on cw and once on ssb on each band.

4) *Classes of Entry*: The contest is divided into parts, phone and cw. These scores must be tabulated separately and not combined. There are two classes of entry, single operator and multioperator.

A single operator station is one manned by an individual amateur who receives no assistance from other persons during the contest period. He may not have assistance in any manner in keeping the station log and records, or in spotting stations during the contest period. Such entries must be placed in the multioperator category.

5) *Exchange*: W/Ks will work VE/VO stations and vice-versa. W-to-W and VE-to-VE QSOs don't count. Valid points can be scored by contacting stations not working the contest if complete exchanges are made. The exchange consists of QSO number, RS or RST report, and ARRL section for W/Ks, geographical areas listed below for VE/VOs.

Contest Period

Starts 2300 GMT Sat., Sept. 23.
Ends 0200 GMT Mon., Sept. 25.

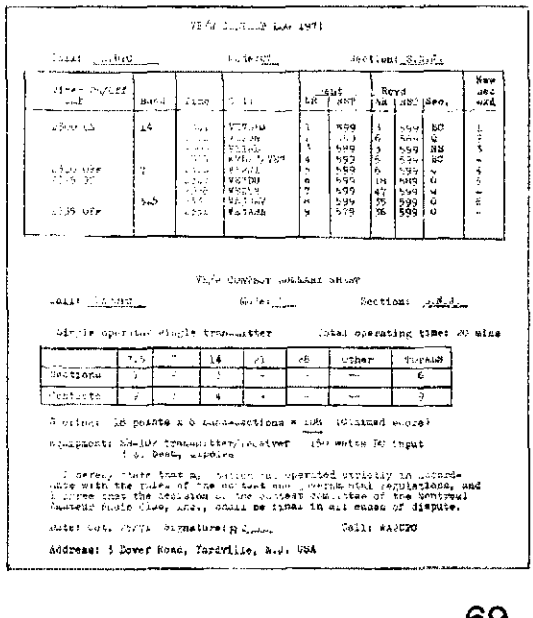
GEOGRAPHICAL AREAS:

Area	*Prefix*	*Abbr.*
Newfoundland	VO1	NFLD or NF
Labrador	VO2	LAB or L
Prince Edward Island	VE1	PEI or P
Nova Scotia	VE1	NS
New Brunswick	VE1	NB
Quebec	VE2	QUE or Q
Ontario	VE3	ONT or O
Manitoba	VE4	MAN or M
Saskatchewan	VE5	SASK or S
Alberta	VE6	ALTA or A
British Columbia	VE7	BC or B
Yukon	VE8	YUK or Y
Northwest Territories	VE8	NWT or NW

6) *Scoring*: Each completed contact is 2 points times the number of sections worked on each other band.

Example: 22 contacts in 9 sections on 21 MHz, 16 contacts in 4 sections on 14 MHz, and 12 contacts in 7 sections on 7 MHz = 22 + 16 + 12 = 50 contacts × 2 = 100 points × 20 sections = 2000 points.

(Continued on page 70)



COMING ARRL CONVENTIONS

August 5-6 – Michigan State, Sault Ste. Marie, Michigan
October 14-15 – Pacific Division, San Mateo, California
October 20-22 – 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.

MICHIGAN STATE CONVENTION

Sault Ste. Marie **August 5-6, 1972**

The 1972 ARRL Michigan State Convention, sponsored by the Twin Sault Radio Club, will be held Saturday and Sunday, August 5 and 6, at the new Sault High School in Sault Ste. Marie. Early arrivals will enjoy a Friday evening fish fry at the Moose Lodge on Riverside Drive. The formal program begins Saturday morning with meetings for the Great Lakes Emergency Net, Wolverine Net, B.R. Net, MARS and QCWA. There will also be a meeting on electrical safety. Two technical sessions on 2-meter fm are planned. The ARRL Forum will be conducted by Great Lakes Division Director Al Michel, W8WC, and Michigan SEC W8ZBT. Hq. staffer Lew McCoy, W1ICP, will give his popular presentation on antennas. Sunday's events include a technical session on transistors, transmitter hunts on 75 and 2-meter fm, meetings for the U.P.Y.L. and U.P. Evening Nets and much more. A giant swap-shop will be in operation both days. The program for the ladies will include a fashion show, cosmetics demonstration and an arts and crafts display. A snack bar will be open all day, both days. There will be a family style banquet Saturday evening, followed by an "afterglow" at another location with dancing to live music.

A number of motels are located in the immediate vicinity of the convention site with rates from $9 single to $36 for suites. Registration is $2 in advance or $2.50 at the convention. Registrations for the banquet are $3.25 and limited to 300, so hurry if you wish to join the fun on Saturday evening. Advance registration/reservations are available from the Twin Sault Radio Club, 2700 Minneapolis Street, Sault Ste. Marie, Michigan 49783 QST

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

1972 VE/W Contest Announcement

(Continued from page 69)

7) *Reporting:* Follow the sample log shown. Check sheets (or ARRL Op. Aid 6) are required for every entry consisting of 200 or more QSOs. *ANY LOG OMITTING CROSS-CHECK SHEETS OR A SUMMARY SHEET WILL NOT BE CONSIDERED FOR COMPETITIVE QST LISTING OR AWARDS.* Such logs will be counted as check logs and processed accordingly. Entries must be postmarked no later than October 31. All entries become the property of the committee and none can be returned. Participants are encouraged to submit station photos and comments.

Log sheets will be available from the address shown, upon receipt of self-addressed legal-size envelopes and IRCs, or Canadian stamps.

8) *Awards:* Certificates will be awarded to the highest scoring cw and phone entry in each section. A minimum score of 25 QSOs is required. Certificates for the high scoring multioperator entries will be issued only when there are at least three entries per section. Phone and cw scores will be listed separately. A trophy will be issued to the high scoring Canadian and to the high scoring US entry.

9) *Mailing:* Please make sure that your call and section are on each page, and especially on the top left-hand corner of your envelope. Mail logs to: VE/W Committee, Miss Ethel Pick, VE2HI, 535 Lansdowne Ave., Westmount 217, Quebec, Canada. QST

Learning Morse

(Continued from page 62)

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Seashore, H. and A. K. Kurtz. "Analysis of Errors in Copying Code," *ORSD 1944 Publ. Bd. No. 12170*. Washington, D.C., U. S. Department of Commerce, 1946.

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_____. "The Learning of Radiotelegraphic Code," *American Journal of Psychology*, LVI (1943), 319-53. QST

Hamfest Calendar

Alabama – The annual North Alabama Hamfest is August 20, at the Mall, intersection of U.S. 231, 431 and 72, Huntsville. Games, contests, swap-sell, and plenty of parking space. No charge. Saturday tour of Alabama Space and Rocket Center. Additional details from North Alabama Hamfest Assn., PO Box 423, Huntsville, AL.

Alberta – Jubilee Hamfest of the Northern Alberta Radio Club is September 16, 17 at the Silver Slipper Saloon, Edmonton Exhibition Grounds. Preregister at $9 per person until August 15 ($10 at the door). Further info available from Neil Smith, VE6AZA, PO Box 5986, Station L, Edmonton, Alberta, Canada.

Florida – The 7th Annual Melbourne Hamfest sponsored by the Platinum Coast ARS is September 16, 17 at the Melbourne Civic Auditorium, 9 A.M. to 4 P.M. Gear trade and sell, plenty of paved parking, registration $1.50 (children free). Write Donald E. Sanders, W4BWS, 1422 Virginia Drive, Melbourne, FL 32935 for details.

Illinois – The Bel-Rock Hamfest is August 20, at the Boone County Fairgrounds, north of Belvidere on highway 76. Free coffee and donuts from 9:30 to 10:00 A.M. Talk-in on 146.94 MHz. Advance registration $1 ($1.50 at the gate). Info from Lee Gehlhausen, WA9WVY, 4610 Cayuga, Rockford, IL 61107.

Illinois – The Aurora Area Hamfest is Sunday, August 27 at Phillips Park Pavillion, Aurora. Swap Tables, picnic grounds, playground, food, shelter, tickets $1.50. Sponsored by Fox River Radio League, PO Box 443, Aurora, IL 60504.

Illinois – The fourth annual Danville Hamfest will be held September 3, at Douglas Park. $1 advance and $1.50 at the gate. For further information write Alan Woodrum, WA9IAC, 1615 N. Bowman, Danville, IL 61832.

Illinois – The Peoria Area Amateur Radio Club's 15th annual hamfest is Sunday, September 17, at Exposition Gardens, northeast edge of Peoria. Free coffee and donuts from 9:00 to 9:30 A.M.; lunch is available. Camping site with activities for entire family. Free swap section, parking, contests, and cartoons for kiddies. Registration is $1.50 ($2.00 at gate). Write to Wendell McWilliams, WN9DVJ, Box 1, Rome, IL 61562.

Indiana – Indianapolis Hamfest is September 17 at the Gas Co. recreational area on Thompson Rd., east of Five Points Rd. and west of Franklin Rd. Easy access from I-465 and 74. Vendors free, picnic facilities.

Iowa – Annual Iowa 75 meter phone net picnic is August 20, at Riverview Park, Marshalltown. Starts at noon. Swap table and camping facilities available.

Kansas – The Boothill Amateur Radio Club Annual Hamfest is Sunday, August 20 at Hoover Pavilion-Wright Park, Dodge City. Starts at 10 A.M. Registration is $1.50. 75-meter mobile hunt at 11 A.M. Swap table, homebrew contest, and new equipment display. Further info available from Harold Fick, KØJDD, 1903 Hart, Dodge City, KS.

Kentucky – The Greater Louisville Hamfest sponsored by the Kentuckiana Radio Club is August 27, 8 A.M. to 5 P.M. at Pine Grove, Otter Creek Park, S.R. 1638 off U.S. 31W near Fort Knox. Registration $1, flea market $1. Food, picnic tables, auction, ladies program. Contact Guy Partridge, K4KZH, 8276 Walker Rd., Louisville, KY 40258.

New Jersey – The South Jersey Radio Association 1972 Hamfest is September 10, at Molia Farm, Malaga, rain or shine. Swap shop, games, contests, displays. Picnic and protected swimming facilities are provided for entire family. Advance family registration is $2 ($3 at gate). For reservations write Fred Holler, W2EKB, 348 Bortons Mill Rd., Cherry Hill, NY 08034. Molia Farm is near Route 47, Malaga Lake.

New York – The Hamburg International Hamfest is September 16, 10 A.M. at Erie County Fairgrounds, Hamburg, off South Park Ave. (Rt. 62) south of Buffalo. Flea market, awards, displays, technical talks, organization meetings, food and camping facilities. Talk in on 146.94 and 7.260 MHz. Advance registration $2 ($2.50 at gate), children under 12, free. Flea market, $1 per car. Trailer hookup, $1. For tickets, write to Lin Brownell, WB2HCL, 210 Buffalo St., Hamburg, NY 14075.

New York – The American Red Cross Emergency Radio Club annual hamfest is September 17. For details write to Gregory Sievers, 90-07 166th Street, Jamaica, NY 11432.

Pennsylvania – The 17th Annual Hamfest of York County clubs is at Flickers Grove, 1/2 mile west of York airport, 10 miles west of York, on September 3, rain or shine. Registration ($3) begins at 9 A.M. Talk-in on 50.62, 145.62 146.94 and 34-76 repeat. Flea market, transmitter hunt on 2 and 6 meters and picnic tables available. For info write KeRoy Frey, K3POR, 170 S. Albemarle St., York, PA 17403.

Pennsylvania – The Uniontown Amateur Radio Club's 22nd Annual Gabfest is September 9 at the Club Grounds, Old Pittsburg Rd. Free coffee and parking. Swap shop and refreshments available. Registration $2. For details write Joseph Sofranko, 438 Braddock Ave., Uniontown, PA

South Dakota – The Prairie Dog Amateur Radio Club Summer 1972 Picnic is August 19-20 at the Isaac Walton League club house on Lewis & Clark Lake west of Yankton. Starts at 1 P.M. Saturday with talk-in on 3955 kHz and 146.94 MHz. Swap tables, transmitter hunt, films, and ladies programs. Preregister at $4 ($5 at the gate) by writing PDARC, PO Box 321, Yankton, SD 57078.

Tennessee – The 13th Annual Cedars of Lebanon Hamfest is August 27, Cedars of Lebanon State Park ten miles south of Lebanon on Route 231S. Talk-in on 50.25 and 3.98 MHz. Pot luck lunch at 1 P.M. Auction and gear swap. Write Richard Brown, W4VJW, 203 West Main, Gallatin, TN 37066.

Tennessee – The Greater Memphis Council of Amateur Radio Clubs Hamfest is September 17, State Technical Institute, Interstate 40, east of Memphis. Flea market, technical talks, MARS meeting, XYL meetings and food from 8 A.M. to 5 P.M. Talk-in on 3.98 MHz and 34-94, 22-76 repeaters. Write Evin Perdue, WB4VDH, 239 Kenilworth, Memphis, TN 38112.

Washington – The Radio Club of Tacoma Ham-Fair is August 19-20 at the Sportsmen's Chateau, 164th and Canyon Rd, south of Tacoma. Contests, transmitter hunts, technical talks, displays, auction, country store and beauty contest. Talk-in on 146.76 MHz and 3965 kHz. Advance registration is $5 ($3 without Saturday evening dinner). Camping $1.50 per night. Contact Emil Koth, K7GPK, 13616 10th Ave. East, Tacoma, WA 98445.

QST

Strays

Effective 1 July 1972, regularly scheduled transmissions from WWVL will be discontinued. Contingent upon the need and the availability of funds, the station will broadcast experimental programs thereafter on an intermittent basis only.

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity NRH

CONDUCTED BY GEORGE HART,* WINJM

ALERTING SYSTEM

DOES YOUR ARPSC or other emergency group have an alerting system? If not, it should. If so, does it depend on the telephone? Most do, strangely enough, in what is often referred to as a "fan out" or an "alerting tree." The original alert goes only to certain key people (or maybe one person) each of whom calls a certain number of other people, each of whom in turn calls another group of people, etc., so that, assuming each person alerted does his job, in a very short time everybody is alerted. It's a good system – if the telephones are operating.

But it's a bit on the paradoxical side, since backup to normal telephone communications is one of the functions we are set up to serve. If telephones are operating, there are usually few communications problems. Why, then, plan on using them for an emergency alert?

Because most emergencies are predictable, that's why – and because it seldom happens that the entire telephone system in a given community goes off.

Nevertheless, it can and has happened. In fact, what brought this subject to mind was an item in a club bulletin saying: "It was rather shocking to activate the emergency calling list only to find the phone system inoperative." What then? Well, in this case an alternative system was quickly devised, and so all was not lost. But loss of telephonic communication and electric power are two situations we are supposed to be set up to overcome. It seems verging on the ridiculous to depend on them for an emergency situation.

True, many emergencies are predictable. You might even go so far as to say that most are, at least to the extent of general preparedness. For example, along the Gulf Coast hurricanes are fairly common, and can be spotted and tracked in advance. Snow storms can be predicted. Even earthquakes, geologists claim, can be predicted with a higher degree of accuracy than previously thought possible. But usually fires, explosions, industrial or commercial accidents of various kinds, vehicle pileups and such are *not* predictable and require an alerting system that does not depend on availability of commercial facilities, either telephone or electric.

Such as what? Such as a tacit understanding among your emergency group, be it AREC, RACES or whatever, that all stations will automatically report to a certain frequency or a certain place should an emergency situation develop. Nobody has to be told that an earthquake, hurricane, windstorm or the like has occurred and emergency communication might be needed. In some cases, of course, the situation may not immediately be apparent. Just listening to the *news over the radio won't always alert you*, so something more sophisticated is required. How about monitoring a local repeater frequency? What, you have no local repeater? Every AREC group should have one, and it should be capable of operating *sans* commercial power. But even if you have no repeater, local monitoring of a commonly-agreed-upon frequency (vhf is best so that a squelch circuit can be employed effectively) would be practical for sufficient coverage in most cases.

Alerting is a most important part of emergency preparedness. You can't get 'em out if they don't know they're needed! An alerting system that depends on a commercial facility is better than none, since in many cases the alert can precede the actual emergency. But it has a serious shortcoming for unpredictable disasters, which should be overcome.

*Communications Manager, ARRL.

AMATEUR SPONTANEITY

Every time a communications emergency occurs, amateurs pop up out of the woodwork, so to speak, importunately volunteering their often-

George Williams, WA5KTO (center) receives an award from Ft. Worth/Tarrant County CD Director Robert E. Lord (while George's XYL Barbara, WA5QEA, looks on. WA5KTO is Trustee and Chairman of the Board of the 34/94 VHF FM Repeater. The award is for using "his many talents, hobbies and leadership to augment greatly the emergency communications capability of the local civil defense."

The AREC of Silver Bow County, Mont., was alerted to take part in a simulated bus accident on May 21. Communications were handled through the Butte-Anaconda 2-meter repeater, WA7KZF. At the EOC in the sheriff's office are EC WA7PZO and WA7MUU.

unskilled services. There is much floundering about while the requirements are ascertained and nets or procedures are set up to meet them. The very spontaneity of it is impressive and glamorous. Public officials and especially the press are vociferous in their praise, the former reluctant to criticize because in most cases they hadn't expected any assistance from this quarter and received considerable, the latter simply because it makes "good copy." But once the emergency is over and the amateurs go back to their hobbying feeling proud of themselves, public officials, now with a better idea of what is required, set about improving their communications facilities "so we won't have to rely on amateurs again."

Now supposing the amateurs had been organized, already in contact and worked into the local, state or regional disaster communications plans as an integral part of same. Come the emergency they would have activated systematically, handled the required emergency communications pretty much in stride (with a few always-inevitable foul-ups), then after the emergency gone back into preparedness status until the next one. As a part of the official set-up they would be involved in the critique, the press would be less vociferous in praising a routine performance in which everybody did as expected, and instead of chest-thumping the amateur contingent of official communications would be examing flaws with a view to rectifying them.

Sounds as though spontaneity is better, doesn't it? Perhaps so, except for one thing: *the amount of effective public service actually rendered!* Under the planned program it would be infinitely better, although perhaps not so spectacular, and improvements planned would be within the amateur service, not outside it. In our lust for recognition, status, glamor, publicity and concern for our "image," this "minor" factor of actual service is often neglected. It is the service performed that is important; everything else is secondary.

SET FEEDBACK

We regret the incidence of a few errors in the SET writeup. When so many reports are received on nonstandard form, or on a standard form in unintelligible fashion, errors are bound to occur. In some cases, just plain carelessness on the part of headquarters is indicated – might as well admit it. Anyway, here are some corrections to the SET writeup which appeared in June *QST*.

The Central Ohio AREC provided communications for a March of Dimes hike on April 30. That's W8JMD at left operating six meters while EC W8ERD holds down the two-meter position. *(David photo)*

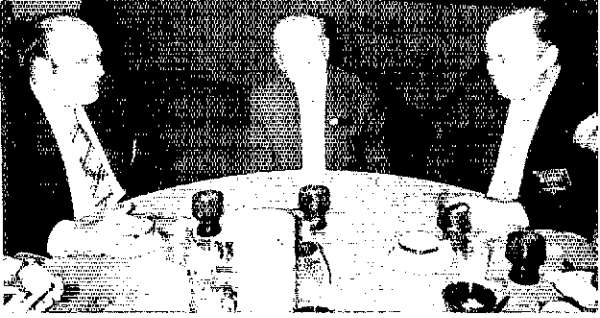
(1) Report for the "Detroit Area" by W8BEZ was inadvertently (just love that word!) put in Ohio. Detroiters objected! Naturally, it should have been under Michigan. This boosts the Michigan total to 2032 instead of 1825 and lowers the Ohio total from 5055 to 4842.

(2) Eastern N.Y. SEC W2URP advises us that the Albany County point total should have been 458 points, not 124 as listed. The 124 points listed was for the Town of Bethlehem in Albany County under Assistant EC W2OOJ. Also, the Albany County EC is WA2EAH, not W2GTI as shown. This changes the Eastern New York Section total to 1143 instead of the 809 shown.

(3) The report of Colorado District 13B EC WAØPXF was omitted entirely, but there it was in the file, big as life! With a fine total of 530, this is no minor omission, and it brings the Colo. total up to 987, surpassing last year's score. Thanks to Colo. RM WØLRN for calling this to our attention.

(4) Also in Colorado, the report of the Silver State Net (SSN) was omitted from the NTS summary. The entry should have read SSN - 82 - 557 - 20 - 55 - 35 - 769. WØLRW is the net manager.

(5) SCM VE3DV tells us that the Champlain Mininet, the Northwest Ontario Net and the Ontario Amateur Radio Service (ONTARS) were active in addition to the Grey Bruce Net (GBN). Research of the report file shows a report from PAM VE3CRW to the effect that OPN was *not* active, and one from VE3PJ indicating activity by OPN, ONTARS and GBN with a total of 666 points for all three. Since VE3PJ is not the manager of any of these three nets, and since GBN Manager VE3DPO submitted a standard report for that net, the latter was the only one entered.



At a joint Connecticut Net - Conn. Phone Net meeting in West Haven, Conn., May 20 are, left to right, PAM K1YGS, SCM W1GVT, SEC W1HHR. *(WB2CUO photo)*

Hope this squares everything with everybody. – *W1NJM.*

Traffic Talk

On October '71 *QST*, under this subhead, we discussed a proposal for a new HX prosign (HXG?) authorizing cancellation of a message if it cannot be delivered by telephone. Subsequent correspondence on it was received from W3TN, a long-time advocate of quality originations and erstwhile *QST* author on the subject, and a further rebuttal from the originator of the idea, K4KA. Here is the gist of the exchange.

W3TN says he is not in favor, that a review of messages (64 of 'em) received at W3TN for delivery suring a three-month period showed 45 delivered by phone, 21 with no phone numbers given, 19 mailed. All kinds of difficulties are met in trying to deliver by telephone, such as (1) no answer, (2) busy, (3) number changed, so we have to do it over again, (4) number is "unlisted," an increasing condition resulting from solicitation annoyances and other unwanted calls, (5) number not in service, disconnected, or "not a working number." Many of these pieces of info are dished out by a recording that you can't argue with. With a new prosign authorizing cancellation, sez W3TN, "what other reaction can we expect from delivery stations than simply to accept this invitation to lie down on the job, perhaps easing their consciences with a service message. That's not Service, that's quitting. Instead of making it easy *not* to deliver a message, I suggest we make a big drive for more complete and accurate addresses, phone numbers and ZIP codes. And wherever we solicit messages, let us shy away from messages to folks in places where delivery is unlikely. We want traffic, that can be delivered, not cancellations and not service messages back to originating stations. Let's encourage, not discourage delivery."

To which K4KA disagrees by saying "I agree with everything you say but still find my suggestion not in conflict with your feelings. Only the *originator* should use such a handling instruction, for he must know whether or not his message is worth having mailed. The types of uses that I see would include hams communicating with other hams regarding log receipt acknowledgements, QSL receipts, etc. There can be some benefits, even from such 'useless' traffic, in the practice it gives us. But let's make it easier for the guy at the receiving end not to pay the postage IF the originator doesn't think it is worthwhile. Let him off the hook by returning a non-delivery service message to the originator."

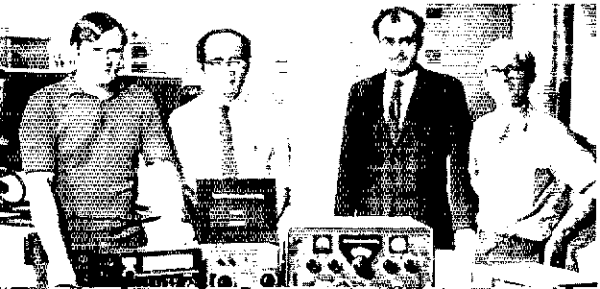
Who wins the argument? Both have points: W3TN that we should not admit that a message accepted for origination cannot be delivered; K4KA that we should authorize the originator to waive mail delivery. Think it over. – *W1NJM.*

National Traffic System. At the meeting of the Eastern Area Staff of NTS last May one of the subject discussed was the effectiveness of NTS in delivering messages. It was provoked by a letter from a reliable NTS traffic man citing five instances of nondelivery out of six messages originated within the system. The sixth message was delivered but was unintelligible. The question was: How do we determine whether this message stayed within the system or strayed off it somewhere en route? Also, how do we go about pinpointing the difficulty which results in *any* NTS message being delayed, garbled or lost?

Oh, it's easy enough simply to call it "operator error" and continue to be smug about the system's infallibility if properly implemented (and we have often taken refuge in this), but critics will point out that if we didn't have so many relays in the system the probability of operator error wouldn't be so high. For a system requires relays and the need for accuracy and reliability is higher in a system of nets than in a single net which purports to handle all traffic within itself. If we don't have that accuracy and that reliability, we had better find out where and why it is lacking and take steps to correct it.

The question at the EAS meeting was, how? The only obvious way is to originate some test messages. What we would like to prove, of course, is that NTS is not so slow and inaccurate as critics would have us believe, but herein lies a pitfall in using test messages – that is, we use the test messages to prove our infallibility rather than to tell us whether or not we are fallible. If properly used, the test messages will inevitably show us that our system is far from perfect, and if properly analyzed their use will go far toward pinpointing the difficulty, which in turn will indicate the solution, if any.

It just so happens that we have had some previous experience with test messages, and to get the information required as a result of the test is not easy. It isn't just a matter of sending a message to some buddy asking him to let you know when he got it. The message should be from a third party to another third party. It should avoid any appearance of being a test message, and certainly should not say so (i.e., no HXD). It should be originated at the lowest NTS echelon possible (not higher than section) and destined to a point not known to have good coverage in the system. Not to



Members of the Charlotte Amateur Radio Club set up this station at the studio of WSOC-TV in Charlotte for handling election returns in the N.C. primary election, May 6. From left to right, K4NLH, WB4ETF, K4UHJ, K4ANL. *(Photo by Don Stewart)*

a big city, for example, or to the location of an NTS leadership appointee. The addressee should be requested *by mail*, in advance, to advise you when he receives it and to furnish you with a copy exactly as received. Thus, your non-amateur addressee should be someone who will cooperate with you.

Let's say the message arrives in three days, garbled. The next step is to find out where it was delayed and for what reason, and where in the process of relaying it became garbled. This is the most difficult part of all, because it depends on the cooperation of all stations along the line – and any station who knowingly mishandled it usually will not cooperate, leaving you only suspecting, not really knowing. For example, if you trace it from the delivering station, Z, back one relay to station Y, and from the originating station, A, two relays to B and C, but you are unable to get any answer from station X or station D, then you don't know (unless X and D are the same station) how many relays were between or, even if they are the same station, what caused the delay. You can only guess, suspect, and that's not good enough.

As for pinpointing the garble, even with the best cooperation it can be narrowed down to only two stations. That is, you can pinpoint the two stations between which the garble occurred but it's impossible to determine whether the sender sent it improperly or the recipient copied it improperly. One will say "that's the way I sent it" and the other will say "that's the way I copied it, just the way he sent it" and again you won't know, you'll only suspect.

Anyone for test messages?

May reports. W2ZRC ends his NCS tour of duty on EAN at 709 sessions, starting in 1953 as an unexpected sub and beginning as a regular in 1956. Better reporting by NCS reported on CAN. KØBAD/4 is subbing for RN5 manager W5SBM while latter recovers from operation. Former RN6 Manager WB6BBO is covering some RN6 skeds for W6RSY and W6LRU during vacations. Welcome back, Lou! RN7 certificates have been issued to K7QUF and VE6AGU.

This month's report had to be compiled early, but not before the regular nominal deadline (15th). Managers who let themselves get into the last-minute syndrome will find their reports omitted.

Net ..... *Sessions*	*Traffic*	*Rate*	*Avg. Rep.*	*(%)*
EAN 31	1495	1.156	48.2	96.8
CAN 31	901	.871	29.1	100.0
1RN 62	502	.388	8.1	94.9
2RN 62	485	.624	7.8	99.9
3RN 62	448	.419	7.2	99.5
4RN 58	542	.348	9.3	90.0
RN5 62	549	.336	8.8	89.5
RN6 62	662	.450	10.7	99.5
RN7 61	202	.226	3.3	64.0
8RN 62	457	.377	7.4	84.4
9RN 60	424	.428	7.1	91.7
TCC Pacific 1241	738			
Sections[2] 2173	9863			
Summary *2786*	*17268*	*EAN*	*6.3*	
Record *3237*	*29677*	*1.313*	*18.4*	

[1]TCC functions not counted as net sessions.

[2]Section and local nets reporting (64): MDCTN (Md.-D.C.); BUN (Utah); GCRN EPA, WPA, PTTN (Pa.); NJN, PVTEN, NJSN (N.J.); BNR, BN, SSEN, OSSBN, Apricot (Ohio); GSN, GTN (Ga.); FMTN, VEN, FAST, WFPN, QFTN (Fla.); CCN (Colo.); NSN (Wash.); Nutmeg VHF, CPN, CN (Conn.); NCNN (N.C.); N.M. Roadrunner; ILN (Ill.); Orange Co. 40M AREC, NCN (Cal.); TN, TNN (Tenn.); VN, VSBN (Va.); NLI, NYS (N.Y.); LAN (La.); SGN (Me.); WQV/UHF (Que.); PAW, MSN, MJN, MSPN (Minn.);

Public Service Honor Roll May, 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)*	
Max. Pts.	*10*	*10*	*12*	*12*	*12*	*20*	*3*		*5*	*Totals*
W6UF	10	10	9	12	12	20				73
W3EZT	10	7	12	12	12	13			5	71
WA3QOZ	10	10	12	12	12	7		3	5	71
WB4SON	10	10	12	12	12	8			5	69
WA8ETX	10	10	12	12	12	2	3		5	66
WA2EPI	10	10	12	12	12	4	3			63
WB5DEK	10	10	12	12	12	2			5	63
WA3CXY	10	10	12	12	12				5	61
W3HCS	4	10	12	12	12	6			5	61
WB4KDI	10	10	12	12	12				5	61
WB4PNG	10	10	12	12	12				5	61
WB4SVH	10	10	12	12	12				5	61
W7BQ	10	10	12	12	12				5	61
WAØVYB	10	10	12	12	12	5				61
K6UYK	10	9			12	20	3		5	59
KØBAD/4	10	10	12	9	12				5	58
WØLRW	10	10	9	12	12				5	58
WAØVAS		10		12	12	20	3			57
WB2OYV	10	10	12	12	12					56
WA3OGM	10	10	12	12	12					56
WA3PJG	10	10	12	12	12					56
WB8KVU	10	10	12	12	12					56
WA8UPI	10	10	6	12	12	1			5	56
W1YNE	10	10	12	9	12	2				55
WB4PTH	10	10	9	12	12	1				54
K7CTP	10	10	12		12	10				54
WB5EIN	10	10	12	9	12					53
WBØCCB	10	10	12	9	12	4				53
W2OE	10	10	12	12			3		5	52
WA7JQS		10		12	12	13			5	52
W7OCX	10	10	3	12	12				5	52
K1OXD	10	5	12	12	12					51
WB2NOM	10	10	12	6	12					50
K3ZNP	10	10		12	12	6				50
W6LRU	10	10	12		12				5	49
WA6TVA	10	10		12	12				5	49
WBØCNM	10	10	12	3	12	2				49
WAØMLF	10	10	12		12				5	49
KØMRF	10	10	12		12				5	49
KØONK	10	10	9		12		3		5	49
VE3FRU	10	10	12		12				5	49
VE3GGN	10	10	12		12				5	49
W6MNY	10	6	12	3	12				5	48
WB8CWD	10	6	12	3	12				5	48
WA2ICH	10	10	12	3	12					47
WA6DFI	10	10	12	3	12					47
K8NQW		10		12	12	5	3		5	47
WA8NOQ	10	10		12	12	2				46
WA8VKF		10		12	12	4	3		5	46

WBØBIV 45	K3HR 39	K2KTK 34
WB2EBX 44	W3LOS 39	WB2NRK 34
WA2EUO 44	W3NEM 39	W3OKH 34
W2TPV/Ø 44	WA3PLP 39	W3TN 34
K3PIE 44	W4ZJY 39	W3YA 34
WB4JMH 44	WØHJ 39	K4KNP 34
K5KOZ 44	VE3EWD 39	W4UQ 34
K7QUF 44	W1BVR 38	W5TFS 34
WB8JAD 44	WB6AKR 38	WB6VKV 34
WB8JEL 44	W6DEE 38	WaVBV 34
KØBIX 44	W6OAW 38	W7LBK 34
WØBV 44	WAØZTW 38	WA8ETW 34
WØMA 44	W2CU 37	W9QLW 34
VE3ERG 44	W8IBX 37	KØAEM 34
VE3GBR 44	WB9BXX 37	VE3AIA 34
VE3SB 44	WØGHJ 37	VE3CYR 34
W6BGF 43	VE3DPO 37	VE3GF 33
WB2YNK 41	VE6YL 37	WA2NLP 32
W7GHT 41	WB4SQA 36	WB4THU 32
WB9AHJ 41	W6INH 36	WA8ZNC 32
WAØIFU 41	WA8BCX 35	VE3EHL 32
W1UBG 39	WBØDVP 35	VE3FQZ 32
W2FR 39	W1CE 34	W2MTA 31
W2RUF 39	K1SXF 34	WN3OYP 30
	WA2ELD 34	

*Denotes multioperator 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.

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for May Traffic

Call	*Orig.*	*Rec'd.*	*Rel.*	*Del.*	*Total*
W3CUL	290	923	876	25	2114
W4VR	173	391	359	21	944
WA4IJH	23	387	356	31	797
WA8VAS	122	335	33	302	792
K3NSN	14	383	383	4	784
K9ONK	115	272	234	12	633
K5TFY	2	299	299	--	600
W7BA	15	253	221	28	517
WA2EPI	175	180	97	64	516
W3EMI	30	288	182	1	501

BPL for 100 or more originations-plus-deliveries

WA5MUM	220	K6UYK	122	K8NOW	107
WN3RCI	144	W4BAZ	120	WA8VKF	106
WA4JQS	134	WB6VTK	119	WB9GVT	106
WA3QOZ	129	WA2OHV	116	W5TL	105
K7VWA	126	W9MEG	116	WA3KWU	103
W8QCU	123	WA8ETX	112	WN4YQX	103
WN3OYB	122	WA4NBT	110	W2QE	101
		W8IBX	107		

More-Than-One Operator Station

WA5IIZ 247

BPL Medallions (see July, 1968 *QST*, p. 99) have been awarded to the following amateurs since last month's listings: WN4SON.

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.

WMN (Mass.); DFPN (Del.); MNN (Mich.); MTN (Man.); TTN, TEX (Tex.); WSBN, WIN, WSSN, BEN (Wis.); APSN (Alta.); MTN (Miss.); AENB, AEND, AENM, AENO, AENR, AENT (Ala.); QKS (Kans.); SATN (Sask.)

Transcontinental Corps.

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Pacific	124	96.0	1476	738

The Pacific TCC roster (W6VNQ, Dir.): W5RE, K5MAT, W6s BGE EOT IPW MLF MNY RSY VZT VNQ, WA6DEI, W7s BQ EM KZ PI DZX EKB GHT, W0IQ, K0JSP.

Independent Net Reports (May)

Net	*Sessions*	*Traffic*	*Check-ins*
No. American 20M SSB	22	227	439
Clearing House	27	221	390
Early Eighty Free	28	211	230
North East Traffic	31	150	409
75 Meter ISSB	31	276	1098
7290 Traffic	48	701	2013
International Mission RA	50	505	1808
20 Meter ISSB	21	1127	329

Public Service Diary

On Mar. 25, tornadic winds swept through Hillsboro, Texas, causing interruption of electric and telephone service. WA5UGR opened the North Texas Emergency Net at 1818 CST. K5ENL and WA5MKV served as NCS while WA5MGV carried on liaison among City Hall, the police department, NTEN and CB mobiles, ignoring his own damage. The emergency session log shows 55 stations as having participated. – (K5ENL)

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The Nassau County AREC-RACES net was alerted on Apr. 2 to assist in the search for a missing person, culminating in activation of nets in Queens, Manhattan and Suffolk Counties as well. It all began when WB2MIF alerted W2ZAI that the former's father, a cardiac patient, had disappeared. The telephone fan-out was activated and within ten minutes the Nassau group was in action. The Suffolk-Huntington repeater was activated. Mobiles and police scoured the areas, checking hospitals, railroad stations, parking areas, but no trace of the missing man was found. He was discovered the following day parked on a side street in Manhattan, victim of a fatal heart attack. Thirteen mobiles and six fixed stations comprised the Nassau County AREC-RACES operation. – (W2ZAI)

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On April 6, fire destroyed an apartment house in Adrian, Mich. The Monroe County Red Cross disaster unit was dispatched to assist, and communication was via WA8MTX in Monroe, operated by W8YIQ, WA8YMB and WA8YBZ. The Monroe organizer was K8LYY and the relay in Toledo was K8OSH. WA8EFK and WA8OFZ were mobile at the fire. Base station in Adrian was manned by WA8LPV, who worked 36 hours without sleep. WA8IWQ and WA8DVP assisted at Adrian. The fire caused four deaths, left 31 homeless. – (W8IUC)

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A small tornado struck Springfield, Tenn., on Apr. 22, knocking out telephone and power lines. WB4PUD got on the air, made contact with K4VFA on 75 and the latter handled traffic into Nashville via 2-meter repeater (W4RFR). WB4PUD then contacted the sheriff's office and the Red Cross to see if further help was needed. – (WB4ANX, SEC Tenn.)

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On May 13 W2AND and W2ZPR, mobiling near Williamstown, Mass, spotted smoke arising from a forest area on a nearly mountain. A call was placed through the Mt. Greylock repeater, K1FFK, and was answered by WA1KJI, who alerted the forest fire warden. A crew of volunteers, including WA1KJI, was dispatched to the area and quickly extinguished the incipient blaze. – (W2ANB)

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On May 20 WB4MDC/mobile was involved in an auto accident. He was in instant contact with W4WWQ on 2-meter fm requesting assistance, which was dispatched within two minutes.

The same day, WB4ONL/mobile came upon a traffic altercation in which the participants' cars were blocking traffic. Via the WB4HCX repeater to WA4PMY, city police were quickly advised. – (W4GCE)

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During a regular morning gab session on 75 meters, Mich. SCM W8ZBT suffered a mild heart attack. Knowing "Oley" was home alone, W8NLO was able to summon immediate assistance in the form of an ambulance which rushed him to the hospital. At last reports, Oley was doing well. – (W8NLO)

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On May 30 in the Birmingham, Ala., area, K4TQR/mobile came upon the scene of an accident in which a car had gone off an embankment and was lying on its side. He recognized the car as that of WB4LNL and put out a call for WB4LNK, WB4LNL's father. W4ERW was monitoring, answered, knew where WB4LNK was and promptly notified him. – (K4AOZ)

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On May 1 high winds and waves caused damage to the Kingsley Dam at Ogallala, Nebr., necessitating the alerting of the Nebraska Storm Net on 3982 kHz at 0415Z. WØGEQ alerted the net and sixteen stations responded. EC WØLOD and WØGEQ served as net controls and planning traffic was handled for the Red Cross and Weather Bureau as the situation worsened. However, at 0630Z the net was secured as winds died down and the dam was still holding. It was a tense couple of hours. Kudos to WØUJI who maintained contact with the Weather Bureau and to KØUWE, KØWFB and WØYSQ who kept the frequency clear. – (WØLOD, EC Keith Co., Nebr.)

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An almost-emergency occurred in Washington state on June 1 when the Okanogan River overflowed its banks and threatened widespread flooding. When the water continued to rise on June 2, the Northwest Amateur Monitoring Service (NAMS) on 3970 kHz started getting ready. K7USG at Omak and W7GSN at Okanogan kept the net informed of the situation while W7UU got in touch with Seattle radio KIRO, which put W7GSN's description of the flood on the air live. The circuit from W7GSN/K7USG via W7UU phone patch to KIRO was kept open, and "live" reports were made a half dozen times on June 2 and through the morning of June 3. As the water continued to rise on June 2, home evacuations started and sandbags were filled to prevent flooding of inhabited areas. K7USG and W7GSN personally toured the flood areas and continued their reports, which were picked up by other radio stations via WA7CZH (Walla Walla) and perhaps others covering the entire state. The waters lapped to within an inch of the top of sandbag dikes before it stopped rising and a serious emergency was averted. – (W7UU)

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The file contains a dozen or so reports on non-emergency public service activities for which there won't be space for details. Here is a chronological list. Please keep them coming (with pix!), we'll include details whenever space permits.

Apr. 5 – King's College raft race, Luzerne County (Pa.) RACES – (K3YTL)

Apr. 15 – March of Dimes Walkathon communications provided by 28 hams in Kansas City, Mo.-Kans, via 2-meter repeater. – (WBØBBD)

Apr. 15 – Hospital disaster test, by Central Ohio AREC/RACES. – (W8ERD, EC/RO Columbus, Ohio)

Apr. 15 – Fund drive for American Cancer Society, by Central Ohio AREC/RACES. – (W8ERD, EC/RO Columbus, Ohio)

Apr. 16 – United Clothing Drive, 21 amateurs in Greater Cincinnati area, sponsored by SW Ohio AREC. – (WA8COA, EC)

Apr. 29 – Hudson County Walk for Development, by six mobiles of Hudson Co., N.J., AREC – (WB2LTW, EC)

May 3 – Hospital emergency drill, by nine members of the Suburban Amateur Radio Club, Elkins Park, Pa. Real flooding occurred at one control center, so WA3FOF coordinated the mobiles from his home station. – (W3LUW)

May 6 – Again the Central Ohio AREC/RACES in action, this time for a Girl Scout training exercise, eight amateurs participating. – (W8ERD, EC)

May 6-7 – Communications for canoe and kayak races in Northern Warren Co., N.Y., by the Glens Falls Area AREC on six and two meters, 24 amateur on hand. – (K2AYQ, EC)

May 6 – Election returns for Texas primary elections for Arlington newspaper by seven members of the Arlington Radio Club. – (WB5EBC, EC)

May 13-14 – California Wheelchair Games in Palo Alto, using San Mateo repeater K6QFO, five amateurs participating. – (W6DEF, EC)

May 21 – Communications for two Memorial Day parades, one in Ecorse and one in Melvindale, by five amateurs of Wayne County, Mich., AREC. – (W8BEZ, EC)

May 21 – Communications for Cystic Fibrosis Drive covering Butler, Warren, Clermont and Hamilton Counties, Ohio, by 30 mobiles and many fixed stations of SW Ohio AREC. – WA8COA, EC)

June 1 – SW Ohio AREA net on 2 meters again in action for Frontier Days Parade in Milford, Ohio, ten amateurs using fm simplex. – (WA8COA, EC)

June 3 – Sports Car Rally, Las Cruces to Socorro, N.M. Portable repeater installed at Emery Pass, hams at checkpoints. – (WB5BHN)

June 3 – Centennial-Bicentennial Day Parade, San Leandro, Calif, by 9 amateurs of San Leandro Amateur Radio Club. – (WB6COB)

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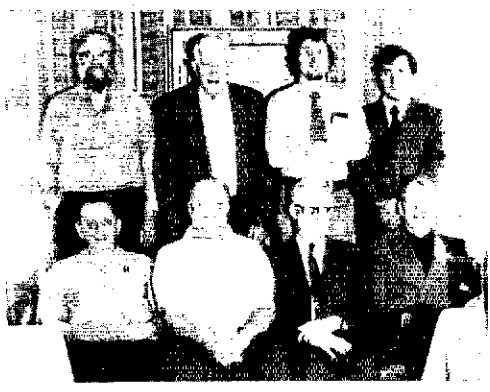
We received 34 SEC reports for May activities as of copy deadline for this issue, representing 10,898 AREC members. This is two under last May's low and almost 2000 AREC members short. Late April reports were received from two sections. Here's the list, in chronological order of receipt: (April) NNJ, SNJ. (May) Ore, SNJ, WFla, Okla, Del, Alta, Va, SanD, WPa, Wash, Tenn, WNY, EMass, WVa, WMass, Nev, Colo, Iowa, ENY, SacV, Ont, Ind, NTex, EFla, SDak, Wis, Conn, Nebr, Sask, Utah, Minn, Ohio, Mont, Mar.

Reports received after the fifteenth of the month may or may not make this column. QST



At the NTS Eastern Area Staff meeting in Syracuse, N.Y., May 6-7, are (seated, l. to r.) 3RN Manager W3NEM, 2RN Manager W2FR, Member-at-Large and Chairman W4UQ, 8RN Manager W8CHT; standing, Member-at-Large W1BJG, TCC-Eastern Director W3EML, EAN Manager K2KIR, ECN Manager VE3ERU. Missing were 1RN Manager W1EFW, who departed early, and 4RN Manager W4SHJ and Member-at-Large W8RYP, who were unable to attend.

Happenings of the Month

ARRL DIRECTOR NOMINATIONS OPEN

To All Full Members of The American Radio Relay League Residing in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions:

Nominations are now in order for director and vice director in these eight divisions of ARRL. Only ten Full Members need to join together in naming a candidate, by a petition which must reach the Secretary of ARRL by noon EDST September 20.

Democracy within our League starts with these nominations. If more than one candidate is nominated, and each meets the requirements explained below, then all Full Members of the League in the division will have a chance to choose from among the candidates by secret ballot between October 9 and noon of November 20.

The election procedures, outlined briefly here, are specified in the Articles of Association and Bylaws; copies will be sent to members free upon request. An informational pamphlet generally outlining duties and responsibilities of elected League officials is also available for the asking.

Any eligible Full Member of the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern or West Gulf Divisions can be nominated for either director or vice director. If one person is nominated for both offices, his nomination for director will stand and that for vice director will be void; no person may simultaneously be candidate for both positions.

Since all the powers of the director are transferred to the vice director in the event of the director's death, resignation or inability to serve, careful selection of candidates for vice director is just as important as for director. The following form for nomination is suggested:

Executive Committee
The American Radio Relay League
Newington, Conn. 06111

We, the undersigned Full Members of the ARRL residing in the ..... division, hereby nominate ..... of ..... as a candidate for director; and we also nominate ..... of ..... as a candidate for vice-director; from this division for the 1973-1974 term.
(Name Call City Zip Date)

The signers must be full members in good standing. The nominee must be the holder of at least a General Class amateur license, or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a Full Member of the League for a continuous term of at least four years at the time of his election. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communications, is commercially or governmentally engaged in frequency allocation planning or is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs.

All such petitions must be filed at the headquarters office of the League in Newington, Conn., by noon EDST of the 20th day of September, 1972. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to more than one petition for the office of director and one petition for the office of vice director. To be valid, a petition must have the signature of at least ten Full Members in good standing; that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures, since nominators are occasionally found not to be Full Members in good standing. It is not necessary that a petition name candidates both for director and vice director but members are urged to interest themselves equally in the two offices.

League members are classified as Full Members and Associate Members. Only those possessing Full Membership may nominate candidates or stand as candidates; members holding Associate Membership are not eligible to either function.

Voting by ballots mailed to each Full Member will take place between October 9 and November 20, except that if on September 20 only one eligible candidate has been nominated, he will be declared elected.

Present directors and vice-directors for these divisions are: *Central:* Philip E. Haller, W9HPG and Edmond A. Metzger, W9PRN. *Hudson:* Stan Zak, K2SJO and George A. Diehl, W2IHA. *New England:* Robert York Chapman, W1QV and Roger E. Corey, W1AX. *Northwestern:* Robert B. Thurston, W7PGY, and David O. Bennett, W7QLE. *Roanoke:* Victor C. Clark, W4KFC and L. Phil Wicker, W4ACY. *Rocky Mountain:* Charles M. Cotterell, WØSIN and Allen C. Auten, WØECN. *Southwestern:* John R. Griggs, W6KW and Arnold Dahlman, W6UEI. *West Gulf:* Roy L. Albright, W5EYB and Jack D. Gant, W5GM.

Full Members are urged to take the initiative and to file nominating petitions immediately.

For the Board of Directors:
July 1, 1972

JOHN HUNTOON, W1RW
Secretary

OSCAR 6 LAUNCH IN NOVEMBER

Changes by NASA in its meteorological satellite programs have caused a rescheduling in the launch

of Amsat-Oscar C (which would be redesignated as *Oscar 6 when in orbit). Originally planned as a* piggyback on Itos-D this summer, our device is now scheduled to be a secondary payload on Nimbus-E in November. Projected technical details include: 600-nautical-mile (690 statute miles) circular polar orbit; period of 108 minutes, inclination of 99.9 degrees; sun-synchronous; overhead passes expected around local noon in the northbound equator crossing (ascending node) and about midnight local time southbound. Other dope on utilization of Oscar 6 can be found in the articles by Dunkerley in March and May *QST*.

NEW ADVISORY COMMITTEE MEMBERS

President Dannals has named four members to advisory committees, filling vacancies caused by resignations.

R. Gary Henrickson, W3DTN, joins the Repeater Advisory Committee. He's from Severn, Maryland; works for NASA at Goddard Space Flight Center; and has been licensed since 1955. Gary was secretary of the Maryland Fm Association from its founding in 1966 until 1971, and is a charter member of Amsat. W3DTN is one of the control stations for the MFMA repeater on 146.16/146.76 and is building gear for 29 and 220 MHz. He's already operational on the hf bands by cw, a-m, ssb and RTTY and on 50, 144 and 420 MHz bands by fm. Non-amateur interests include flying and rock 'n' roll trumpet.

Also on the Repeater Advisory Committee is **Richard Bromley, K1ABR** of Cranston, Rhode Island. Dick started in ham radio in 1956 and now holds Extra Class and First Phone. As radio officer for the City of Cranston, he is in charge of radio systems for the police, fire and highway departments. K1ABR is a director of the Rhode Island Fm Repeater Group and is deeply involved in the design, building and maintenance of its repeater, for which he is also trustee. He serves as manager of repeater work for Rhode Island Army MARS as well.

Jo R. Kilgore, W2EIF, has been named to the Contest Advisory Committee. A member of the Mt. Airy Vhf Club popularly known as the Pack-Rats – Jo has churned up good activity in the Vhf Sweepstakes each January for the past 15 years, posting the number-1 score in the nation on one occasion. The June QSO Party sees him out with W3CCX/3, usually handling the 220 MHz operation. He hits the September party from his home in Stratford, New Jersey, often winning the SNJ section award.

Forty-plus years of DX chasing qualify **John H. Thompson, W1BIH** for the DX Advisory Committee. John lives in Torrington, Connecticut; is a Life Member of ARRL; member of the Quarter Century Wireless Association; Connecticut Wireless Association; and the First Class Cw Operators' Club (FOC). He's been on "the other end" many times from various PJ stations, and currently is licensed as PJ9JT.

Next month in this department there will be a list of all current members of the three advisory committees, together with a call for further nominations.

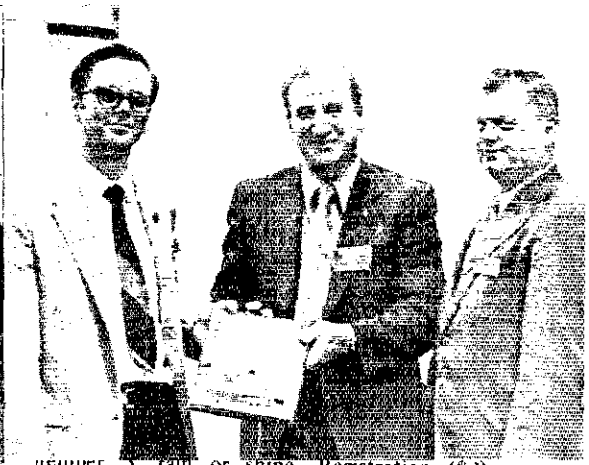
MORE AMATEUR RADIO WEEKS

Connecticut observed its week June 18-24. Governor Thomas Meskill's statement mentioned amateurs' communication in times of natural disaster; traffic handling for servicemen throughout the world and their families; and the work of the Talcott Mountain Science Center in showing teachers how to use Oscar satellites to teach space science, physics, mathematics and social studies. Our thanks to WA1GFJ who took the initiative in securing the proclamation.

Kearny, New Jersey, had its week June 4 through June 10. Observances sponsored by the

"What You Always Wanted to Know About SSTV," in the January issue of *QST*, won for its author Eugene H. Hastings, W1VRK, the Cover Plaque Award. Here, from left, are Gene and Clara Hastings with New England Division Director Robert York Chapman.

Richard T. Knadle, Jr., K2RIW, garnered the April Cover Plaque with his story, "A Strip-Line Kilowatt Amplifier for 432 MHz." The award is presented at a Suffolk County (NY) Radio Club meeting by Stan Zak, K2SJO, Hudson Division director and President Dannals.



North Carolina marked Amateur Radio Week June 25-July 1, 1972. At the presentation: Tom Martin, K4CQJ, vice president of the Raleigh Amateur Radio Society; Audrey Browne, WB4ZSM, RARS publicity chairman; Chuck Brydges, W4WXZ, North Carolina SCM and the Honorable Thad Eure, Secretary of the State. *(Photo by Alan Browne, WA4AFB).*

Kearny Amateur Radio Club included an on-the-air exchange of greetings by the mayor with his opposite number in Kearney, Nebraska and a hidden transmitter hunt. (Our info via K2YFF.)

Florida makes it 18 in a row with its week June 18-24! Governor Reuben Askew emphasized the emergency communications networks of the Amateur Radio Public Service Corps and the Radio Amateur Civil Emergency Service in his proclamation. (Tnx agn, W4IYT).

CONGRESSMAN SALUTES AMATEURS

Early in June, League headquarters exchanged correspondence with the office of the Honorable Charles Thone, of Nebraska, relative to amateur radio week June 18-24. On the 21st, the following extension of remarks appeared in the *Congressional Record:*

HAMS SERVE US
HON. CHARLES THONE
OF NEBRASKA
IN THE HOUSE OF REPRESENTATIVES
Wednesday, June 21, 1972

Mr. Thone. Mr. Speaker, radio amateurs, licensed by the Federal Communications Commission to operate broadcasting stations on a noncommercial basis, call themselves hams. They form one of the most valuable groups in the United States in giving public service, particularly in times of emergency.

There are more than 270,000 hams licensed by the FCC and more than 100,000 are members of the American Radio Relay League, the ham's association. Hams have provided advances in radio techniques, bouncing signals off the moon, and developing the single-sideband system, since adopted by the military as their means of communication.

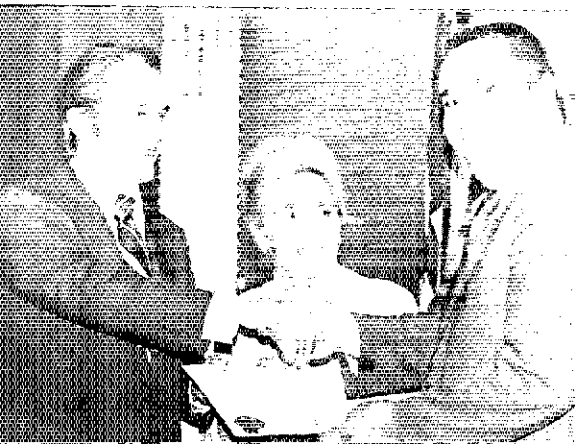
Hams provide the only link for the outside world in remote areas, such as Pitcairn Island. Hams were the means by which Thor Heyerdahl's Ra expeditions remained in touch as they crossed the ocean.

Whenever there is a disaster, such as the flood at Rapid City, S. Dak., in 1972, or the Alaska tidal wave of 1964, the hams are on the air 24 hours a day providing communication. They serve in little publicized ways also. For example, a fire on railroad property in Nebraska was quickly extinguished earlier this year because it was reported by a radio amateur.

One of the greatest public service ventures involved with the war in Vietnam was organized by a Nebraska ham, Hugh Tinley [KØGHK]. Back in 1967, he arranged with the Pentagon for establishment of an amateur radio station in Vietnam, operated by hams in service. Through this station and the hams in America, about 30,000 mothers, wives, and children have talked to their servicemen in Vietnam in a project called Operation Hello.

A man who had just escaped after being a prisoner of the Vietcong was able to inform his mother personally of his safety through Operation Hello. A mother who had just been informed that her son had been wounded was reassured by a personal call from him. A wife and mother of a Marine captain talked to him shortly before he was killed in battle in Vietnam. They wrote: "You can understand how precious that call was."

The radio amateurs are organized to work both



Fairfax County, Virginia, celebrated Amateur Radio Week June 19 to June 25, 1972, particularly marking amateurs' efforts in disaster communications and in helping stranded motorists. From left, Herbert E. Harris, II, vice chairman of the County Board of Supervisors and Centreville Supervisor Martha V. Pennino congratulate Tom Gooding, K4LHB.

with the American Red Cross and Civil Defense. *The week of June 18-24 is Amateur Radio Week* and a celebration of the 58th birthday of the American Radio Relay League. This weekend will be the annual field day for thousands of hams who will travel to unpopulated areas to test their *abilities to operate under emergency conditions.* With their own power supplies, they will be operating portable equipment; so that they will know they are ready to function in event of disasters.

America is grateful for the hams who serve us.

On behalf of all amateurs, our warm thanks to Congressman Thone and his executive assistant, William H. Palmer. QST

Who the Devil Is Who?

Number 24 in a Series of Call Conversion Charts

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

Now	*Was*	*Now*	*Was*	*Now*	*Was*	*Now*	*Was*
W1SO	W1FPC	W2UE	W2UVE	K4TV	W4VLX	W7UN	K7QXV
K2EN	W2CRR	K3BD	W3GFM	W5WY	W5PGF	W7VP	W7KAG
K2EU	W2PFI	K3CA	W3LNW	W5YB	K4ECR	W7WE	W6VXL
K2FA	WB2WGK	K3DX	W3RAN	W6RT	W6JNC	W7WM	W6FCX
K2FB	W2FSU	W3SW	W3EPC	K6TM	K6UCP	W8NQ	WB8HXM
K2FL	WA2IZS	K4PM	WØMCX	K6UB	W6CQO	W8NX	W8DAY
K2FM	WA2HXP	K4RA	K4EOK	K6UD	WA6BBZ	W8OB	WA8MHV
K2FS	K2SKP	K4SM	WØBFB	K6UG	W6PTO	W8OF	W3DTE
K2FS	K2SXV	K4SN	WØJHL	K6UU	W6LZS	W8OP	WB8HWM
K2FV	W2TLX	K4SP	WB4SQZ	K6VE	W2NNW	W8OU	K8PSL
K2FW	W2ITX	K4ST	W4GQX	K6VH	W6WNR	W9JU	W9PAP
K2FX	W2SJH	K4SZ	W1KDK	K6VK	W7FEW	W9KB	W9LAX
K2FY	W2DAW	K4TJ	W4BFO	K6VL	W6PQL	W9KG	W9PVA
K2GC	W2MON	K4TK	WA4LTG	K6VV	W6QVS	W9KL	W9MED
K2GO	W7RIT	K4TN	W3KPK	K6VY	W6NGD	WØNE	WØZSA
K2LF	W2KHK	K4TP	W4VON	K6WQ	W7BFU	WØNJ	WØUAD
K2OO	K2CPR	K4TU	W4ZCC	W7UD	W7DIJ	WØNW	WØMCU

"It Seems to Us..."

(Continued from page 9)

can reduce us all to 27-MHz standards. We *cannot* look the other way, not wishing to get involved; such instances should be promptly reported to FCC, with complete details.

One of the most important functions we amateurs can fulfil is to make certain that newcomers are imbued with the need to observe regulations, and courteous procedures as well. Years ago, a prospective ham either studied from League literature (there was little or no other) or was trained by another ham or a local radio club. Either way, newcomers were introduced early in their studies to the Amateur's Code, to the amateur tradition of self-policing, to the amateur practice of intelligent and courteous use of the spectrum. Now, a beginner may buy any one of numerous booklets by various publishers, some of which literature teaches only the minimum necessary to pass the test, and avoids taking space to discuss operating principles and practices, and one's responsibility as an FCC licensee.

So all of us – and especially those called upon to be instructors in club-sponsored classes, and who are asked to serve as code examiners and witnesses to FCC tests – should make certain that newcomers realize that along with the privileges of amateur radio they also have responsibilities . . that every one with an amateur license has an equal right to the air, but that there are no "reserved frequencies" . . that there are so many amateurs today, and so many other users of radio, FCC cannot police all bands 100% of the time, and therefore we hams must look after much of our own affairs . . that, nevertheless, FCC still does apprehend and punish consistent violators . . that if you and I operate selfishly, others will too – and the end result will be bedlam. *And the eventual loss of some or all of our privileges.* QST

Correspondence From Members-

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

HAM VS. CB

● By now I think the EIA's lack of interest in cleaning up the Citizens Band operation should be evident to all. The EIA is not interested in "clean" operation; it is interested in dollar volume, and the bigger the better.

Unfortunately, the U.S. electronics industry has dropped the ball and instead has given the volume to the overseas manufacturers. Its latest proposal for an E class will fall to the same fate. In short, the EIA has not come to grips with the market problem. It would much rather have another round of meetings designed to smoke more glasses rosy red.

The EIA and the electronic industry are grossly negligent in their design specfications and performance. I cite as an example the unshielded TVs, susceptible to many forms of radiation, and a problem existent since early TV days. And now they have added police and emergency service monitors to their long list of shortcomings. You have reported these problems before, but there has been no change in the situation. If anything, it is worse today than ever as costs are juggled.

Your reference to the group as acting like purse snatchers is amusing but far from the real intent. The group does not want one purse -- they want all!

In the middle of this morass sits the amateur radio operator, guilty if he does operate, but guaranteed the right or privilege to operate. He is confronted regularly with complaints of interference to the public reception. Someone seems to have forgotten that the amateur is also public and he, too, has a right to complain of interference to his reception. -- *Ervin R. Buehler, K9CFG, Galveston, IN*

● Keep up the fight against the 220 MHz CB. I see it as another market the manufacturers are trying to open and they have demonstrated in the past that any means which achieves their goals is acceptable to them.

It has been only a few years since the 27 MHz band was lost to CB and some of the arguments used to justify the grab included the unavailability of uhf communication equipment low enough in cost to enable potential users to buy. The same type of circuitry being used in the multichannel ssb/a-m transceivers now on the market was available in the industry at the time of the 27 MHz grab. The difference was that they needed to generate a market with the fifty dollar specials before they hauled out the better stuff and they were so successful that they hope to do it some more.

An evening monitoring the 27-MHz band will show what kind of "service" is being carried on there and these are the same stations and users who would operate in any other part of the spectrum where licenses require no technical preparation of operators who are unsupervised. *Arlie M. Thomason, W7DAN, Gardiner, OR*

● I support your efforts 100% and am in agreements with your stand on the current EIA plan to add new CB channels. I was disappointed when we lost the old 11-meter band and feel they have plenty of channels available if the frequencies they have are used as they were originally intended to be used. -- *Ralph Alley, W9JR, Fontana, WI*

L'ESPRIT DU CORPS

● An American friend and *confrere* paid my Associate Membership dues for 1972, last year,. Since January, I had been literally counting the days waiting for the arrival of my own copy of *QST*. At last, it came: the March issue on the 25th of May! I stayed up 'til the small hours that night savouring every page of it.

Going thru *QST*, what impressed me wasn't so much the technical information it contains, but *l'esprit du corps* that it exudes! I'm not yet a licensed radio amateur; I'm just preparing for the first exams (equipped only with the *Handbook*, (1971 Edition), the *will* to be an amateur and an unflinching hope in Divine Providence!).

For us in Africa, amateur radio is a difficult field to get into. Few people even know of its existence. For the few who do, the cost is prohibitive. "You mean you seriously want to indulge in that millionaires' hobby; Good heavens!" friends exclaim incredulously. The double "scandal" especially if one happens to be a Religious!

And now while I start counting the days to the arrival of my next copy of *QST* I'd like to close with *Vive l'ARRL*. -- *The Rev. Adem Emaikwu, S. J., Kinshasa, Zaire*

CORRECTION

● In April *QST* you published, under the heading of "Strays" on page 98, comments by Dr. Karl Doebel, ex-HB9OO, on amateur licensing in Switzerland. May we call your attention to the fact that the information given you by Mr. Doebel is not correct. A license in Switzerland does not cost 100 Swiss francs; a radio amateur has to pay a yearly charge of 30 or 60 francs, depending on the power of the transmitter used.

Moreover, Dr. Doebel states that he was fined $200 because he allowed a U.S. ham to use his station to make a private call. We have consulted our records and found that Dr. Doebel was never fined for violating our licensing regulations. Nor have we any knowledge of a fine which he had to pay because of a phone patch set up by him.

We regret that radio amateurs abroad, through this incorrect information, have been given a false picture of the radio amateur situation in Switzerland. -- *Swiss P.T.T., Bern, Switzerland*

PARTS PROBLEM

● It was with sympathy and a degree of satisfaction that I read Messrs. DeMaw and Wilson's final

paragraph in their article on the "High-Performance Tunable Fm Receiver" (*QST*, April, 1972); sympathy because I too have been frustrated more often than not in my homebrew project attempts in recent years due to the same problems, and satisfaction, I suppose, because misery loves company – particularly prestigious company!

To quote from the article: "No longer can the home construction buff find the necessary components to build a complicated piece of amateur equipment – at least not in a reasonable period of time . . . more and more parts houses (are) dropping their services to small buyers . . . outrageous minimum-order fees are becoming commonplace . . ."

I have a suggestion – two of them, in fact. One, I suggest that all contributors to *QST* be required to list the source of all components used in their design (except for the most commonplace items) and pre-assure their availability to the would-be builder. This is now a partial practice but too partial to be of much use.

Two (and more dramatic), I suggest that ARRL consider taking on a new task; become the middleman supplier of components for desk-top electronic projects appearing in *QST*, at least for those developing a significant volume of fraternity interest. This would require the development of a consolidated supply branch at Headquarters, but the additional expense (which would be added to the cost of components) would, I believe, gladly be borne by constructor-members. In fact, the "service" fee could be adjusted to underwrite some of the rising costs of ARRL operation. Quite a job? Possibly. But it might prove to be one of the most beneficial new policies in recent ARRL history. Something needs to be done! – *R. D. Althaus, W3KGD, Silver Spring, MD*

● If the League is genuinely concerned with the decline of amateur construction activity and the corresponding decrease in amateur technical competence, let us use our not-inconsiderable influence in improving parts availability, in terms of both service and stock.

Although these are tight times, one would not have the electronic retailers forget their responsibility to the radio amateur and other small consumer. That this relinquishment of responsibility indeed is developing was brought strongly to my attention today. One of the oldest and most-respected electronic dealers in Chicago no longer maintains any over-the-counter sales facilities, nor will it honor a mail or will-call order for less than five dollars. True, fiscal problems press, but where is the spirit of service?

Even among those firms yet available to the ordinary amateur, there is a marked reluctance to deal in many of the small parts hams so often need when homebrewing. They push their kits vigorously, but what if you want to use your own design brains and don't want one of their kits? What has become of that old bit about the rightness of the customer? Or does this apply only to large customers?

Unless he has a well-equipped junkbox, access to cast-off gear from a service shop or commercial connections, the typical radio amateur will find it increasingly difficult to pursue his homebrewing interest. And we all know what already has happened to our game in this direction.

Here is a place where the League, with its significant membership, can bring pressure upon the industry to reverse this miserable trend. The wishes of some hundred-thousand radiomen, and potential customers cannot, it would seem, be ignored even by the powerful electronic establishment. Besides, we're not asking for something for nothing, but that our legitimate needs be met. We have the money. Let them provide the goods, even down to a couple of resistors, if requested. – *C. F. Rockey, W9SCH, Deerfield, IL*

HAM FISTED

● Why do hams still behave as "actual hams" in the full sense of the word? My first ham ticket was in 1921 as 6AKH. The following year I received my First Class Commercial Telegraph ticket, so I can be labeled an "Old Goat." However, in 1927 and 1928 I had the pleasure of serving under a fine Chief Op, E. N. Pickerill, on the *SS Leviathan*. "PK" was of the opinion that a "bug" mishandled was an atrocious keying method. Listening to the hams on the lower end of 14 mc. – pardon – 14 MHz – I must agree. "PK" insisted we use hand keys, which we did at up to 35 wpm with perfect copy – danged few repeats. The garbage I hear from "buggy bugs" with dots at 95 wpm and dashes at 20 wpm makes my old blood boil. Rotten sending of this type with numerous repeats, or an imagination by the receiving person, makes me wonder if the sender is communicating or is trying to brag! Why not settle down for a good 35 to 40 wpm that has the musical sound of a good fist!

Whom (or it is who?) are these 150-wpm "buggy" fellers trying to impress? – *Charles E. Maass, W2RTV, Short Hills, NJ*

● I wish to protest vigorously against the title given those of us who use the air lanes to carry on communications and sustain the art of telegraphy, namely "Ham" and "Amateur."

Surely there are thousands of commercial operators who have worked every kind of morse and radio circuit around the world who cannot help feel deflated because they are called "Hams" or "Amateurs." At what point does one cease being a ham? In telegraph language a "Ham" is a "Lid" or poor operator. Surely those who have worked all kinds of circuits at any speed required deserve something better than being referred to as a ham.

If, after years of practice and performance, a musician was referred to as a ham, I feel sure he would not be flattered. Is there a real difference between an accomplished musician and an accomplished telegrapher?

Being a telegrapher carries with it a feeling of pride, because he has become a telegrapher only after years of practice and hard work. We are now asking you to dignify the name of the art as it should be. Perhaps the name "Wireless Operator" would be appropriate and would in general classify operators as such. – *C. D. Combs, W9LHL, Berwyn, IL*

VOICE FROM AFAR

● Surely the letter from K4OV in Correspondence, February *QST*, needs comment (Sorry to be so late but alas, the February issue was only just received here).

So 1-kW cw is needed on 40 meters to overcome foreign amateur a-m stations?

It seems incredible to me. From my knowledge, most foreign stations on a-m use only an average

power of 100-150 watts. If they have the money for more then they are more likely to use ssb.

Surely a *good* cw receiver plus notch filter and other filters could overcome this problem.

However, one must emphasize that to take advantage on low power one should use the best band for a given time. Maybe K4OV would be better to use 75 or 160 meters for his "local" Stateside cw contacts and let 40 meters be better employed for DX. It used to be a very good DX band once.

Out here on 7.0-7.1 MHz (which is all we are allowed) not only has one to compete with high-power phone commercial stations but also ssb military and police nets from Thailand and, worst of all, numerous ssb nets from Viet Nam which are not military but American civilian contractors. Here's one amateur who would bless the ARRL if they could use their considerable influence to stop the latter. – *James C. Pershouse, 9M2DQ, Penang, Malaysia*

[EDITOR'S NOTE: Ulo Vilms, K4OV, has had experience from both sides of the DX fence, having started as ES6E in 1938.]

GOADED

● I get quite tired of seeing little addendums concerning some moral lesson such as the one by K3EDL in May "Operating News." I agree with him completely on the matter of operating manners, but that next-to-the-last sentence goads me somewhat. If *QST* is devoted entirely to amateur radio, then why, may I ask, are such trivia printed? The same goes for the W8BU editorial of November of last year. That little harangue about having the American flag upside down on the seat of one's pants certainly has little connection with amateur radio, and if he really needed some sort of a comparative jingle concerning the remainder of the editorial, I am sure he could have thought up something with somewhat less political implication. I don't chide the ARRL constantly, and certainly don't talk down the benefits of membership. I feel that a little more thought on the part of amateurs wishing to make a constructive point *related to amateur radio* could make reading of these notes somewhat more understandable. After all, if you have already got the reader on the other side, then how can you possible expect him to agree with the point of the article? *Alex Smith, WA1MWH, Cumberland Center, ME*

SELF POLICING

● Start giving the American amateur the word on good operating. I have been guilty of lousy signals, but always tried to correct the problem when I got called by another ham. It took me a long time to appreciate what a low SWR and an oscilloscope could do for me. I am finally convinced that a square wave produced by a mistreated linear amplifier doesn't gain me any points on the other guy's S-meter or the respect of the really good DX operator. But God help some of the slobs I hear calling a DX station while he is in QSO with an old friend. There is no doubt that equipment operators (or appliance operators as they are called by some) are becoming the norm in ham radio. I have commercial gear. I once had all homebrew gear, including ssb equipment, but it's getting tougher to build good clean ssb rigs without some pretty decent test equipment. I would rather put out the cleaner signal possible with equipment using the expertise (I hope) of some equipped lab. But I still know where to find the trouble spots in my gear, and I can still locate the mike gain control. If the ARRL doesn't convince U.S. hams to learn how to operate on something besides the mike push-button, we are going to splatter ourselves right out of the spectrum.

Also, the League should occasionally remind U.S. hams that they are not commercial communication stations, even though they use a lot of factory-built gear. Phone patches are great – and by the grace of Mother Bell, the FCC, and supposedly our own common sense, we in this country are allowed to use them. Woe unto us if one of the Bell System economists ever monitors some of the "commercial" traffic going over ham phone patches. – *Lawrence Rosine, WØDGG, Leawood, KS*

RIP's RETURN

● This is "Old Rip Van Winkle" reporting for duty.

In 1916 I was 1SI. Station closed spring of 1917. 56 years later, on again as WN1QDZ.

I have enjoyed *QST* and listening to members of a wonderful, progressive organization. Your service is exemplary. *James W. Alger, WN1QDZ, Pittsfield, NH*

ADDING INCENTIVE

● Here is a proposal that we do not think will lower "the price." It has been in the process of evolution since we have been involved in incentive licensing.

1. Novice Class, as always, 5 wpm with elementary theory. License good for 2 years, nonrenewable.

2. Technician Class, 5 wpm, General theory, and retain Novice cw privileges. License effective for 5 years, renewable.

3. Conditional Class, 10 wpm, General theory. All privileges of Novice and Technician plus a limited band of phone privileges on 160-uhf bands. Complete General cw privileges. For 2 years, nonrenewable.

4. General Class II, former Conditional. No change.

5. General Class I, former General. No change.

6. Advanced Class, no change.

7. Extra Class, no change.

Note: These should be implemented along with the proposed phone-band enlargement.

We realize that we may get a lot of flak from the Membership, but we think this does *not* lower the price of admission! This gives the prospective ham the chance to gain more privileges and not be stuck as a Technician with no cw privileges in the hf bands, thereby isolating him from the rest of us. Please note that this letter is written by a General and a Novice.

This makes more sense than no incentive for the Novice to upgrade and thereby hopefully will not stymie those who find the General a bit too much to bite off from a dead start. – *James "Rocky" Johnson, WNØEWR, and Ronald Folkert, WBØBHG, Rockwell City, IA*

THE ONE AND ONLY

● Listening outside the ham bands I heard the *original*, the *one-and-only* NST.

So this is the station from which so many ham "testers" learned the code. I know it wasn't from W1AW. – *William L. Smith, K4RJ, Franklin, NC*

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,WN1[1] – Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

W2,K2,WA2,WB2,WN2 – North Jersey DX Assn, P.O. Box 505, 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,WN4[1] – 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,WN6[1] – 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,WN8[1] – 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.

WØ[1] – Reggie Hoare, WØOYP, P.O. Box 115, Mitchellville, IA 50169.

KØ,WAØ,WBØ,WNØ[1] – Dr. Phillip D. Rowley, KØZFL, 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, VE1FQ, P.O. Box 663, Halifax, NS.

VE2 – A. G. Daemen, VE2II, 2960 Doublas Avenue, Montreal 301, PQ.

VE3 – R. H. Buckley, VE3UW, 20 Almont Road, Downview, ON.

VE4 – D. F. McVittie, VE4OX, 647 Academy Road, Winnipeg R3N 0E8, MB.

VE5 – A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, Sk. S4S 5k3.

VE6 – D. C. Davidson, VE6TK, *1108 Trafford 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.

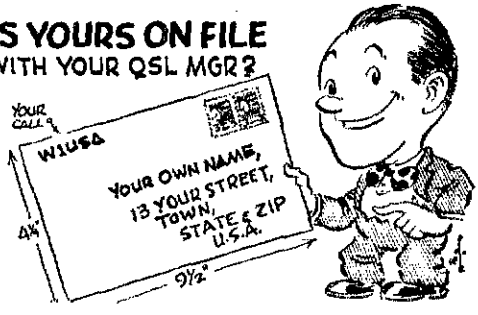
VO2 – Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, LB.

SWL – Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

[1] These bureaus prefer 5 × 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.



Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

WA1EYW, Raymond A. Levesque, Somerset, MA
W1GVJ, A. Jerome Goodwin, Oakdale, CT
W1NOQ, George E. Metelsky, Willimantic, CT
W1NN, Theodore C. Barron, Reading, MA
Ex-W2CVS, Paul J. Herrmann, Carlstadt, NJ
WB2DZD, George A. Space, Whitehouse, NJ
W2QIS, Harold R. Bailey, Windham, NY
WB2RHX, Raoul W. Van Acker, Morris Plains, NJ
W2UXP, Joel Payne, Webster, NY
W3BVL, William T. Heller, Glen Burnie, MD
K3HAO, James A. Hansen, Conneautville, PA
WA3HGI, Melvin G. Robbins, Bear Creek, PA
WN3RDF, John W. Warner, Pittsburgh, PA
WA3RNA, James R. Ryba, Coopersburg, PA
W4ADB, Martin C. Kirkland, Eustis, FL
W4BCB, Lloyd D. McBurney, Naples, FL
W4BP, Joseph W. "Tiny" Smith, Mt. Dora, FL
W4ELL, William R. LaVielle, Jr., Louisville, KY
W4FOW, Walter L. Leonard, Arab, AL
K4GRF, Lucine Pendrey, II, Melbourne, FL
W4GXM, John W. Austin, Jr., Brentwood, TN
W4KPD, Victor C. Bankowski, Huntsville, AL
K4MA, Allan N. Moore, Bradenton, FL
Ex-W4RMV, Robert E. Olson, Alexandria, VA
K4RUD, Raymond S. Godsey, Greenville, SC
WA4UPW, Harry E. Finley, Sarasota, FL
W5DMP, Francis L. Pullen, Baton Rouge, LA
WB5FAP, Onif J. Landry, Metairie, LA
W5IL, Robert L. Clinkscales, Garland, TX
W5KRC, Marvin J. Easterwood, Jr., Beaumont, TX
W5MXX, Gerald A. Johnson, Austin, TX
W5PRR, Paschal S. Harwell, Brady, TX
WA5REG, Joe L. Williams, Hernando, MI
W6AAU, Clement F. Johnson, Oakland, CA
W6BEZ, David H. Wagener, Piedmont, CA
K6EGE, Bobbie L. Crain, Lancaster, CA
K6IHA, Forrest A. Lowery, Cypress, CA
K6THM, Harold V. Garretson, El Monte, CA
W7CPE, Jack M. Moore, Hoquiam, WA
W7HST, Otto A. Moellmer, Albion, ID
K8ASF, Earl C. Hartson, Port Huron, MI
WA8BZH, Frank C. Anderson, Detroit, MI
K8CBK, George M. Machwart, Houghton, MI
W8FV, Earle R. O'Connell, Englewood, OH
W8FWD, Peter Maxim, Cleveland, OH
W8HEU, Dr. John S. Hopping, Newcarlisle, OH
Ex-8OA, Frederick V. Hunt, Barnesville, OH
W8RPO, William S. Thrun, Port Huron, MI
WA8SXW, Oscar D. May, Hillard, OH
K8ZFJ, Carl E. Haight, Milford, OH
W9EE, William N. Short, Crown Point, IN
W9HLF, F. Claude Moore, Pekin, IL
W9KCJ, LeRoy C. Dank, Chicago, IL
W9MM, Fowler E. Macy, Converse, IN
W9TPS, Jerry L. Dame, Belleville, WI
W9OUZ, John W. Trzesniak, Friendship, WI
W9WE, Noble B. Watson, Greenwood, IN
WØBJN, Artie D. Davis, Denver, CO
WØCPU, Kenneth M. Wells, Centerville, IA
WØDEF, Gordon A. Spry, Waterloo, IA
WØDYT, Bryan G. Lamb, Hubbell, NE
WØLWJ, Everett E. Richardson, Fargo, ND
WØVGH, William E. Wilson, Seward, NE
KH6SL, Paul R. Fenner, Honolulu, HI
VE3GMH, C. W. Howard, Ottawa, ON
VE7LP, J. A. McFegan, Vancouver, BC
DJ1IM, Ludwig W. Schaefer, Beethovenstr, West Germany
DJ3ND, Dr. Karl Griesing, Bahnhofstr, West Germany
I1ER, Mario Santangeli, Milano, Italy
PY2JU, Jan J. Roos, Brazil, SA
SM5RM, Olof Fridman, Stockholm, SW
ZL2JE, G. W. F. A. *Sargeant, Paraparaumu*, NZ

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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

REGION 1 CONFERENCE

Thirty European-African national amateur societies, 22 in person and 8 by proxy, were represented at the triennial conference of the IARU Region 1 Division, held in Scheveningen, Netherlands, in May. The attendance was thus a record by any measure, and reflects a continued growth of interest in IARU affairs.

Representation of the amateur radio service at future ITU conferences was a major topic of discussion and action. In the words of the conference decision, "Subscribing member societies shall give priority to all programmes intended to improve the status of the amateur service with the national administration." Particular attention was given to the desirability of providing amateur representation on both national and international technical study groups – e.g., *CCIR* – because of their effect on eventual allocations decisions.

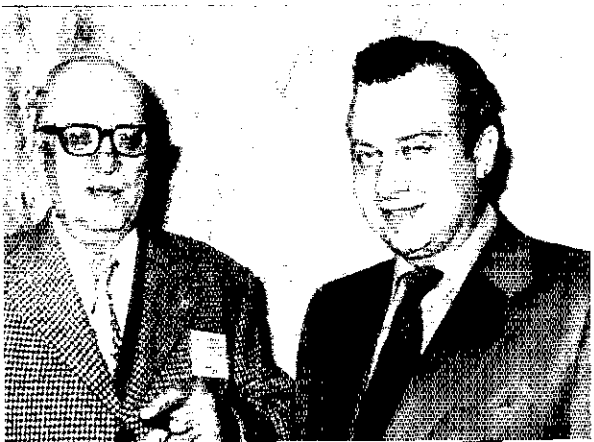
In the same field of protecting amateur privileges, the Intruder Watch program was heartily commended and a bouquet tossed to the regional coordinator, G3PSM. Agreement was reached on the principle of forming an IARU Monitoring Service, with *RSGB* as the central office for the region, looking toward the time when "IARUMS" can reach the point of formal recognition by ITU.

The band plan was modified in several respects. Suggested center frequencies for RTTY are now 3600, 7040, 14090, 21100 and 28100 kHz. Especially during contests, 3500-3510 should be reserved for DX cw, and 3790-3800 for DX sideband (in the Soviet Union, 3635-3650 is designated for such purposes). A "Yuri Gagarin" 24-hour worldwide cw contest sometime in 1975 was proposed by the *Radio Sports Federation* and accepted by the conference.

Electromagnetic compatibility (EMC) reared its ugly head, with discussions of problems of RFI, TVI, etc., and of difficulties in obtaining proper protection from national authorities, who seem reluctant to place the blame squarely where it belongs: on the manufacturers of the entertainment equipment. It was agreed that each Region 1 society will designate an expert from among its members to deal with the EMC matter and will join with others in exchanging information for mutual benefit. Membership was expanded by one to a total of seven. After 22 years of dedicated participation in the affairs of the region, Per-Anders Kinnman, SM5ZD, retired with plaudits ringing in his ears. The new chairman, with almost as long a history of service, is former treasurer Win Dalmijn, PAØDD. Vice President F3FA and Secretary G2BVN were re-elected; OH5NW was chosen as the new treasurer; and YU3AA, EL2BA and SP5FM were named as additional members of the Executive Committee. As proposed by *OeVSV*, Vienna was chosen as the site of the 1975 conference.

VISITOR OPERATION IN BELGIUM

Under trial regulations adopted at the request of *UBA*, it is now possible for a short-term visitor to Belgium to operate as a "second operator" from the station of Belgian amateur if the visitor is the holder of a valid permanent license from his own country. This arrangement is intended to supplement the existing procedures for obtaining a reciprocal license on those occasions when there is not time for the short-term visitor to obtain his own authorization and ON8 call sign. Information on operating in Belgium may be obtained from: *Union Belge des Amateurs Emetteurs* International



Major W. C. "Bill" Borrett, VE1DD, was one of the founders of the International Amateur Radio Union. Bill represented Canada at those important first meetings in 1925. Still enjoying good health at the age of 80, he is a founder and vice-president of CHNS Radio. Pictured with VE1DD is VO1FX, president of the Society of Newfoundland Radio Amateurs.

QST for

David Urfer, EL5B, was recently decorated by the Liberian government for his part in providing communications during a recent epidemic. Making the presentation is Mrs. Mai Padmore, Liberian Minister of Health and Welfare, with *IARA* officials EL2BA (newly-elected member of IARU Region 1 Executive Committee) and EL2CI looking on.

Affairs Service, Diepestreet 52, 1970 Wezembeek-Oppem, Belgium. Enclose two IRCs for fast response.

SPECIAL EVENTS STATIONS

GB3TCF will be operating from August 25-27 from the National Town and Country Festival at Kenilworth, near Warwick. QSL via *RSGB*.

GB3BIC will be on the air from August 5-12 from the Berkshire International Camp, where two thousand Boy Scouts are expected to be camping.

LA1SS, the headquarters station of the *Norsk Speidergutt-Forbund* (Norwegian Boy Scouts Association), will be on the air from the National Jamboree site near Roros from August 3-9. Every station contacted will receive a special QSL.

DX OPERATING NOTES

Reciprocal Operating

(Bold face type indicates changes since last list.)

United States reciprocal operating agreements exist only with: Argentina, Australia, Austria, Barbados, Belgium, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Finland, France*, Germany, Guatemala, Guyana, Honduras, India, Indonesia, Ireland, Israel, Jamaica, Kuwait, Luxembourg, Monaco, Netherlands*, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Sweden, Switzerland, Trinidad and Tobago, United Kingdom*, Uruguay, and Venezuela. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write *ARRL* headquarters for details.

Canada has reciprocity with: Belgium, Brazil, Dominica, Dominican Republic, Ecuador, France, Germany, Israel, Luxembourg, Mexico, Netherlands, Nicaragua, Norway, Peru, Portugal, Panama, Senegal, Sweden, Switzerland, U.S., Uruguay, Venezuela, and Commonwealth countries.

Third-Party Restrictions

Messages and other communications – and then only if not important enough to justify use of the regular international communications facilities – may be handled by U.S. radio amateurs on behalf of third parties *only* with amateurs in the following countries.** Argentina, Barbados (only U.S. stations /8P), Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad & Tobago, Uruguay, and Venezuela. Permissible prefixes: CE CM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO W or K/8P XE XP YN YS YV ZP 4X 4Z and 9Y4. Canadian hams may handle these same type third-party messages with amateurs in Bolivia, Chile, Costa Rica, Dominican Republic, El Salvador, Honduras, Israel, Mexico, Peru, U.S., and Venezuela. Permissible prefixes are: CE CP HI HR K OA TI W XE YS YV 4X and 4Z.

DX Restrictions

Amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the ITU under the provisions in Article 41 of the Geneva (1959) Conference.

The Director General of the Posts and Telegraphs Department of Vietnam has notified the ITU that there is no objection to communications between amateur stations in other countries and XV5AC. However, communication with other amateur stations in Vietnam (XV or 3W8) is forbidden. Canadian amateurs may not communicate with Cyprus, Gabon, Iraq, Pakistan, Turkey, Khmer Republic, Vietnam, Libya, and Yemen. Prefixes to be avoided by Canadians are AP TA TR8 XU XV YI ZC4 3W8 4W 5A. QST

* Agreement includes overseas entities.

**By special agreements, third-party traffic is also permissible with Australian amateurs for traffic regarding amateur satellites, with 4U1ITU, and with personnel of Project Hope in Jamaica.

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* KØCER

1972 — A Record Year?

THE LABEL "best ever" should be used with caution in discussing sporadic-*E* seasons. Writing about 1972 that way, at the end of June, could still give the year as a whole the kiss of death! Equipment and operating keep improving each year, which must be borne in mind when we compare 1972 with, say, 1952. There were probably never before so many big 50-MHz beams, with 2-kW PEP amplifiers attached, trained on the *E* layer as in early summer, 1972. TV carrier monitors on the low channels, giving warning of rising muf and alerting 2-meter operators to the possibility of skip on 144, must be credited with catching at least one 2-meter DX chance that might well have been missed otherwise.

And there was long-range warning. LU3EX had it sized up when he told W5SXD, early in May, to be ready. The LUs had just come through their best *E* season on record, in the period which is our winter and their summer. To detail all reports this summer would be impossible, but all are appreciated. Though only highlights will be touched on here, every report helps to clarify the overall picture. All eventually are sent to Mel Wilson, W2BOC, for detailed correlation and study. If you didn't hear Mel on 6 too much this summer, it's probably because he was too busy poring over your letters!

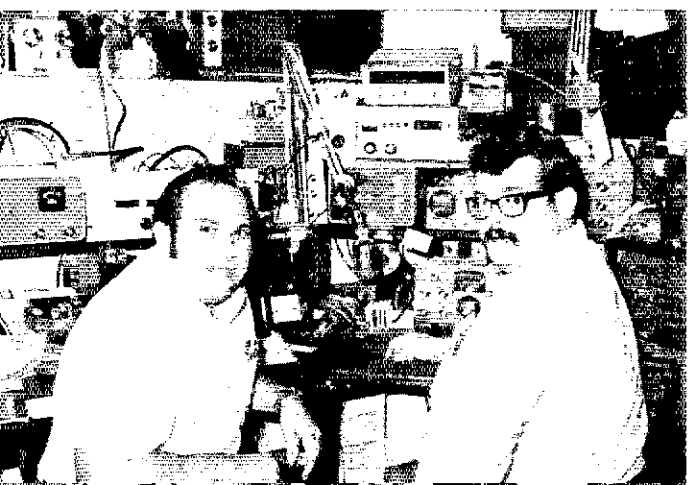
W1HDQ, who like W2BOC has been observing *E* for some 37 years, says he has seldom heard multihop signals of the strength and duration is evidence this year. He filled in some early observations on the last weekend of May in this space last month. It was too good to fast through the June Vhf Party, Ed says. The night of June 9 (early June 10, GMT) California stations were at extraordinary levels in New England, but in the midst of S-9 rain static and frequent crashes of ear-splitting proportions, associated with cold front storms passing across the Northeast. By the time the contest got underway Saturday afternoon, the band was quiet, except for the DX mill at VP5RS, knocking off exchanges at a record clip.

Some idea of the caliber of the night-before-the-contest opening can be gained from the report of WA3GSH/3, in Western Pa. Using only a halo, Barry logged 26 California and Arizona stations between 0107 and 0242 GMT, June 10!

E openings bracketed the contest period neatly, multihop coming in again on the 12th.WA7GCS, Tigard, Oregon, reports working VP5RS, KP4AHQ, and Maryland, Pennsylvania, Virginia and Florida stations between 2156 and 2342 GMT, June 12. Oregon to Puerto Rico, and the many contacts reported with 8P6EN from distances of 3000 miles or more extend the *E*s frontiers for U.S. 50-MHz stations. Which brings up a point.

We have many second- and third-hand reports of extreme DX. KL7s are said to have worked areas of the country never before reached via the *E*s route. JAs are reported to have been worked from the West Coast; 7s have worked into Brazil, it is said, and a 4 has worked South Africa. Such rumors always fly when DX is rampant. But like all rumors, they should not be passed on lightly, or worse yet, added to. Over the years we have justified our position in the 50-MHz region by the good we can do in extending man's knowledge of the true potential of this most-exciting part of the

* Send reports and correspondence to Bill Smith, KØCER, ARRL, 225 Main St., Newington, CT 06111.



W5SXD, left, and WA5HNK are well known 6-meter DXers from Texas. W5SXD is also active on 144 and 432 meteor scatter.

radio spectrum. Enough interesting has happened in 1972 so that we have no need to feed on rumors. At this writing, legitimate DX worked on 6 from various parts of the contiguous 48 states in May and June, 1972, includes KP4, VP5RS (Turks and Caicos), HI8LC (Dominican Republic), KL7s, 8P6EN (Barbados), XE, VE, CO, and FPØCA, St. Pierre. Anyone have proof of others? Let's hear from the principals!

OVS and Operating News

WA5IYX/5, San Antonio, sent a report so detailed it alone would make an interesting column. In May Pat noted 56 separate openings, ten of which exhibited multihop, for a total of more than 100 hours of 50-MHz *E*. "It's hard to come up with any comments that would do justice to May, which was better than many Junes," said Pat. On numerous occasions, Pat noted above *E* 107 MHz. May 26 had the best multihop *E* Pat has heard, to Washington and Oregon. June 12 brought multihop to the Caribbean where the KP4s, VP5RS and 8P6EN were working W6 and 7 around 2300 GMT.

Also in San Antonio, K5ZMS/5 noted many of the same openings reported by Pat including in May 26 show which produced all U.S. mainland call areas, including KL7. June 4, Ray worked FPØCA and a batch of W1s on multihop – 36 states logged in a single day! But June 12 was Ray's day. He worked KP4s, VP5RS and 8P6EN. WA5HNK had similar experiences, working VE6 and 7 on May 27 after hearing KL7GLL, Sitka, the day before. Joe worked VE1 and many W1s May 28, all multihop, and on the 29th, heard both ends of a contact between XE1PY and VE1ASJ at 0130 GMT! June 2 produced the most intense *E* ever heard by WA5HNK. Six meters was open to everywhere stateside, frustrating Joe as he listened to W6s working KL7s GFB, GLL and HIF.

WA6HXW, near Los Angeles, was one of the lucky 6s to work KP4s and VP5RS June 12. These are paths beyond normal (?) *E* range. WA6JRA got his 50th 50-MHz state June 9, working K3MPZ in Delaware. The Delaware station was also worked by WA6HXW, WB6WAX and WA6ARC – and Delaware is more rare in California than KP4s! W6YKS, Stockton, reports working three KL7s around 0630 GMT, May 27. WA6IYC reported the same opening to Alaska, but Dick says, "the night of June 1 was the weirdest, with all kinds of *E* propagation simultaneously including multihop to 4s, single-hop to ϕ and KL7, and backscatter from 6s and 7s." Dick says KL7HIF, new this year from Ketchikan, has been widely worked on the West Coast.

WAØWZY, Minneapolis, reports working W1HOY/KP4, VP5RS and 8P6EN within 30 minutes on June 12. And, by the way, most of us know the identity of the fellow on a-m who claimed to be operating with solar cells in the South Pacific and Indian Oceans!

WAØVJF, Overland Park, Kansas, worked HI8LC and KP4AAQ around 2300 GMT May 21. HI8LC, Dominican Republic, reportedly worked W6 the same May 27-28, and June 2.

VE2BYG, Quebec, says "the usual stuff" and then goes on to report multihop to Wyoming, Montana and California June 6. VE5US, Saskatoon, Sask, sent a copy of his entire log for May, with the 27th being the highlight. "The four corners of the U.S., Florida, New York, California and Washington all worked within two hours."

1215-MHz Standing

K9AQP/1	.5	3	–
WA2LTM	.10	4	290
K2JNG	.7	4	220
WA2VTR	.6	4	330
K2YCO	.2	2	350
K3IUV	.7	4	320
K1SFF/3	.7	4	260
K4QIF	.5	3	420
K4NTD	.2	1	350
W4VHH	.2	1	350
W8YIO	.4	3	350
W9JIY	.4	3	300
WA9HUV	.3	2	220
W9JTP	.3	2	165

Listing compiled June, 1972

WB4PXW (WB2RLK), Naples, Fla., reports 50-MHz contacts with W1HOY/KP4 May 21, 8P6EN May 28, and XE1PY June 4. Bob will be signing WB2RLK/VE1 in Nova Scotia, and possibly from Prince Edward Island through August.

Additional *E* reports were received this past month from W1CFZ, WA1DFL, WA1FSZ, WA1IFE, WA2MZH, WA2OAF, WA2SAZ, WA3KFT, WA3SEE, W4BD, W4DO, K4EJQ, WB4BND, K5CWS, W5SXD, W6DPD, WA6HXM, K7BBO, K7ICW, K7IEY, K7QFW, WB8BOK, WB8HQS, W9YT (K9OKY operator), WØMOW, WØPFP, KØLCB, VE3OJ and VE3GDV. My thanks to all for helping make this month's *E* picture more complete.

While the appearance of several DX stations this summer provided much extra *E* fun, two stations in particular created quite a frenzy. VP5RS, in the Turks and Caicos Islands off the eastern end of Cuba, operated by W4GDS, WB4BND and WB4OSN June 8 to 14, was widely worked. WB4BND says they worked 1100 stations in 44 states, and Canada, Mexico, Barbados and Puerto Rico! The only states not worked by VP5RS were Maine, Idaho, Wyoming, Utah, Alaska, and Hawaii, and their contacts included 35 W6s. The three Miami-area operators used a TR-6 and 5-element Yagi, with a code wheel which proved useful in showing up openings which might otherwise have gone unnoticed. VP5RS had over 2500 additional contacts on the hf bands, with some 50 countries. QSL cards are available from W4GDS, if the request is accompanied by a self-addressed stamped envelope; surely a reasonable requirement.

The other station is 8P6EN at Bridgetown, Barbados. Alan is from Australia and expects to be on Barbados through most of 1973. He runs a homebrew transverter and 4-element quad up 40 feet. Alan is also interested in scheduling 2-meter stations on scatter. His address is P.O. Box 177, Bridgetown, Barbados.

Three 50-MHz WAS certificates have been issued by Headquarters recently. Number 99 went to K6ZXS, number 100 to K7MUR, and number 101 to K5EFW, who worked all 50 states since 1968, and on ssb. Others known to have completed 50 worked include WA6JRA, WB6WAX, K6QAX and W7FN. Congratulations to all!

DX has also been exciting in Asia. Joe Mancuso, KA6RS (exKR6RS), writes from Okinawa he

worked numerous Japanese stations in April, and up until May 15, when Okinawa reverted to Japanese control and contacts between KAs and JAs become illegal. Joe worked HL9WI, Korea, May 8 and 10.

Bill, HL9WI, reports that VS6CN, Hong Kong, had April contacts with Guam, Alaska, and Hawaii but a request to VS6CN for specifics went unanswered. Bill says KC6APP, Guam, has been popular, working many JAs since April. Bill worked Guam May 1 for his 8th country on 50 MHz. HL9WI worked DU1JS, Philippines, May 10 crossband six to twenty meters. The latter had a bad tube in his 6-meter transmitter which prevented a 6-meter two-way.

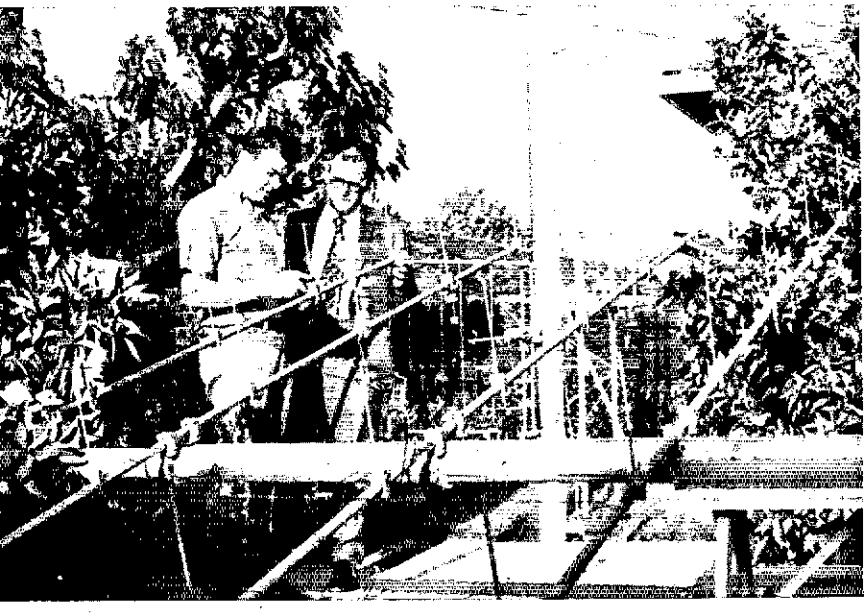
144 MHz has been a DXciting band this summer, and the Perseids shower and fall tropo season are still ahead. We have reports of two sporadic *E* openings in early June. I doubt that the extent of these openings has been fully reported, and there may have been others. On June 2 144 MHz was open in the early evening over paths in excess of 1100 miles, from Minnesota to New England. WØMJS, Minneapolis, first heard VE2DFO, Quebec, at 2306 GMT a solid 30 dB over 9. Ron also worked K1GYT, Vermont, at 2307, 30-watt K1OJQ, Mass., at 2309, and VE2YU. The *E* cloud was quite selective, as 20 miles to the north WØLER just made contact with VE2DFO and heard none of the others. WØRLI, about five miles from WØMJS, heard WA2WOM calling CQ at 2310, after working K1MTJ, Maine, at 2307, a 1130-mile path. WØRLI also worked VE2DFO. VE2DFO worked KØQKN in extreme southwest Minnesota at 2323. Minneapolis area stations heard strong *E* backscatter on one another for a few minutes during the 40-minute opening. KØCER, S.D., noted *E* on 181 MHz at 2310 while monitoring a Channel 8 video carrier frequency.

Earlier in the evening, W8KPY, Dayton, Ohio, worked W5GVE, Waco, Texas at 2245, while hearing a multitude of other weak signals. At 0345 GMT, June 3, W7JRG in Montana worked W5LO, N.M.. This has been confirmed by W5LO and his wife, WA5MFZ. At the same time WA5BPS, Oklahoma, was working Tacoma, Washington and Butte, Montana on 146.94 fm simplex. Other simplex contacts are reported between K5FVL, and KØLCB, Kansas City, with stations in Utah, Arizona, Idaho and Montana, but times and details were not given.

The second of the reported 144-MHz *E* openings came early June 9, GMT. WAØTRO, Smith Center, Kansas, worked 146.94 simplex with W7CTX, W7ZRQ, WA7FDR, WA7JZJ/7, W7PR, W7DQU, W7BZ, K7OVG/7, WA7PNE, W7MXN and W7CVS, *all* Idaho; W7ILL/7 in Wyoming, WA7LLL in Oregon and W7ZEP, Washington, between 0158 and 0341 GMT. Now we know where W7 activity is on 144! Congratulations Larry on some fine DX! W5YFN, Roswell, N.M., worked several Calgary VE6s at 0415 GMT.

Adding to the *E* fun was a long-lived aurora June 17, beginning in late afternoon and lasting until sunrise the following day, all across the country. The Space Environment Laboratory at Boulder, called the magnetic storm "major" and placed the beginning at 1312 GMT, June 17, with the most intense part between 1500 June 17 and 1200 GMT, June 18. The storm ended about 24 hours later. ERL says this was the most intense geomagnetic storm since March 7-9, 1970.

Reports are far from complete at this writing, Your editor, visiting WØLER, Minneapolis, was amazed at the strength of W2AZL from New Jersey, over nearly 1000 miles. Long-haul signals from the East Coast were heard in the Twin Cities area for at least an hour, very unusual for long-haul aurora at 144 MHz. WØLER worked W2AZL and K2HLA, while WØRLI was working the same stations plus W2UK, K2TXB, VE3ADJ, and K5BXG. K1PXE, Conn., and K1ABR, R.I., were heard. K2TXB heard or worked all W1, W2, W3 states, and four W4 states. K5BXG, Oklahoma City, reached 27 states worked, by contacting



W6FZJ, left, will soon be moon-bounce-ready on 432 MHz with this 128 element extended collinear array. With Joe is Chuck, WA6EXV, also active on 432 and a frequent sched of W6FZJ.

WØEYE, Colorado. Charlie also worked Ohio, Illinois, Iowa, Nebraska and Minnesota. Aurora is not often worked at the Oklahoma latitude, and this was the first experienced by K5BXG.

Meteor scatter is a reliable DX mode -- if you spend enough time. WA2UDT worked K4IXC for state number 24, June 3. Bill worked WAØCHK, Mo., May 28 for number 23. K5BXG worked W7JRG during the Arietids daylight shower June 8. Calls and reports were easily exchanged on a single burst, but the Rs took 45 minutes.

This mode is popular in Europe. EA4AO, Spain, worked German stations DK2UO April 21 and 22 and DJ6MB April 22. May 5 and 6 EA4AO worked DK1KWA and on the 7th, EA3PL. May 7 also produced a meteor contact between DK5CU and Russian UK5EAD. The latter runs 150 watts and a 15-element Yagi, DK5CU has 500 watts and a 10-element Yagi.

220-MHz news this month comes mostly from the known hotbeds of activity. WB8IDD, editor of the *Mid-Michigan 220 News*, says WB8JSD is active in the Cleveland area running 20 watts and an 11-element Yagi. K8HWW continues very active from Sterling Heights, Michigan with a converted 200-watt military amplifier. K8AXU, Marietta, Ohio, has returned to 220 with 120 watts and wants schedules. WA8LBH, Hazel Park, Michigan, is testing a ssb mixer and in the Detroit area, WA8MEC, WB8DSG, WB8LDU and W8DTO will soon be active.

K9QCB, Tipton, Ill., is back on 220 after a bout with Channel 13. He says W9CSM and WA9ESE, both Kokomo, are also active. At Decatur, Indiana, 220 old-timer W9MLY runs 400 watts and a 13-element Yagi at 70 feet. In Fort Wayne, K9KRR runs 350 watts and 12 elements at 120 feet. Also active in the Fort Wayne area are WA9CCH, WA9RRZ and WA9FVY with low-power a.m. From Baraboo, Wis., WB9ECM writes he is interested in 220, and at Des Plaines, Ill., WA9DLT will soon be active with 100 watts.

WB4KGW, Pensacola, reports some Florida interest in 220, and on the opposite coast activity remains high. W6RME, Los Gatos, reports numerous nightly contacts around the Bay Area. Your writer knows well the great extent of 220 interest in the Bay Area after recently attending the West Coast Vhf Conference, thanks to W6VMY, WA6GYD and others.

In Toronto, VE3DSS recently had his first 220 contact working WA8PKB, Ohio. VE3DSS is using an amplifier borrowed from VE2YU and a 32-element array.

420 MHz supports a wide variety of activity. K4EJQ, Tenn., has 250 watts of ATV on 436 MHz, with slides and live camera, in contacts with W4SZP. They use 146 fm for the audio link. At least five South Carolina stations are on 439-MHz ATV. WB4QDB, K4NHW, WB4VCX, WB4PEV and WB4KTY all run low-power video. WB4KTY would like to exchange ATV information with operators so interested.

W6FZJ had too many sidelobes from his 128-element collinear, built for 432 moonbounce, and has rebuilt the array. WA6EXV still runs schedules with Joe, but wonders if horizontal polarization is best over their particular path. Chuck, WA6EXV, has completed a 1296 converter and is working on 2300-MHz projects.

Harley, WA6HXW, is scheduling WØDRL, Kansas, looking for tropo scatter signals over the Rocky Mountains. Harley wants other schedules on the eastern side of the mountains, to test knife-edge refraction. He has August moonbounce schedules with VK2AMW, VK3ATN and VE7BBG. Harley says K6YNB provided June DX fun from Utah and Arizona, operating portable on several bands. WA6HXW worked Wayne from both states bringing him to five states on 432, excellent from Southern California. WA6UAM, San Jose, has finished a 1296 converter and is satisfied with the results.

K8DEO, Ohio, says he continues to be plagued with interference from ATV on 432, but maintains a nightly beacon on 432.005 beamed on New York from 0230 to 0300 GMT and towards the northwest from 0330 to 0400. Don says that the June 17 aurora was the best he's experienced on 432. He worked K2UYH, W2AZL, K2YCO, and W4FJ.

WØLER, Minneapolis, has successful nightly schedules with KØAWU, Grand Forks, N.D. and KØCER, S.D., over 300-mile paths.

West Coast Antenna Measurements

One of the most popular aspects of many vhf gatherings is the antenna measuring contest. So it was at the recent West Coast Vhf Conference in Santa Clara. Here are the partial results for 220 and 432 involving the more popular designs used on these bands. All gains given are over a dipole.

220 MHz

WB6NMT	14-element Swan Yagi	13.0 dB
K6GSS	6-element Yagi	9.0
WB6KBZ	7-element Yagi	10.5
WB6NMT	10-element Yagi*	11.0
WB6NMT	6-element Yagi*	9.0
K6YNB	7-element Yagi	10.2
K6YNB	9-element Yagi with three reflectors	11.0

*described in May, 1972, World Above 50 Mc.

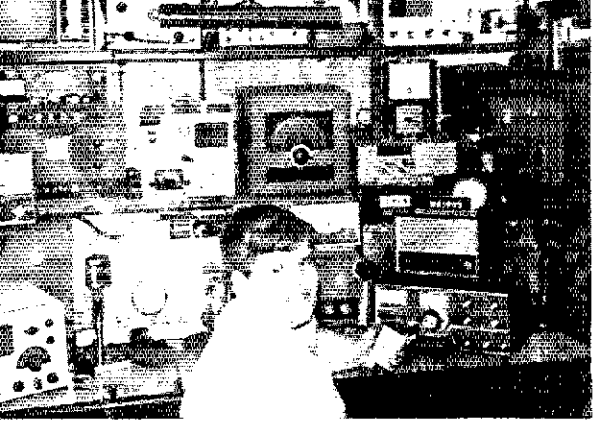
432 MHz

WA6SQU	11-element Tilton Yagi*	11.4 dB
W6FZJ	15-element WØEYE Yagi**	12.6
W6FZJ	13-element W8ROF Yagi	10.2
W6OWQ	20-element J-Beam Yagi	10.7
K6YNB	20-element Cush Craft col.	9.5
WB6YFX	14-element Swan Yagi	9.5
K7ICW	19-element WØEYE-style Yagi	12.3
W6FZJ	13-element W2CCY Yagi	11.7
K6MYC	27-element Swan Yagi	13.6
W6URH	16-element extended col.	11.0
WA6UAP	two 11-element Tilton Yagis stacked 52 inches	15.0

*described in ARRL *Vhf Manual.*
**described in January, 1972 World Above 50 Mc., corrected in March, 1972 column.

This was the first contest in which the WØEYE Yagi was entered. Further measurements such as those at the Midwest Vhf Conference in Kansas City, Aug. 18, 19, 20, will be interesting.

1215 MHz and Up has a new 1296 record, set May 27 when K4QIF, Va., worked W1AJR, R.I., over a 420-mile path. K4QIF worked two other new states during the coastal opening: K1PXE, Conn., and WA2VTR, N.Y. Rusty says New Jersey signals were S9 plus.



WA1KVS of East Boston, Mass., has been a "regular" on the 6-meter band for two years. First licensed as a Novice at the age of 9, Dave received his Technician ticket when he was 10. Now an old timer of 12, he has recently passed the General and Advanced exams plus earning a commercial ticket.

WA2VTR climbed to 6 states and 330-mile DX during the May opening. Dolph reports that WA2LTM worked W1AJR, R.I., May 26 on 2304 MHz. While I have not heard from the operators involved, the distance appears to be approximately 200 miles, a new fixed-station record for 2300 MHz.

W4VHH writes from South Carolina that he worked his second state on 1296, W4NUS in North Carolina. The distance is 130 miles and was the first 1296 contact for W4NUS. Both stations ran 10 watts, from varactor triplers, and 128-element expanded collinears.

South Dakota has to be one of the most unlikely places to find 1296 activity, but WØENC at Rapid City has 100 watts to a 6-foot dish, mounted at the 40-foot level on his tower. Tests indicate Bob's system is working. Now to find someone else!

Have you noticed the distances in the 1215-MHz table? Eight of the stations have covered better than 300 miles on 1296 MHz. Remember when across town was pretty good on this band?

Radio Astronomy Note

Dick Knadle, K2RIW, whose Apollo reception on frequencies near our 2300-MHz band has been documented recently in this column, reports a new twist. By use of a radiometer, a sensitive device for observing small changes in noise level, with their 2300-MHz receiving system, Dick's group now are able to detect black-body radiation from the moon. The instrument can indicate changes as small as 0.005 dB. When the antenna is aimed at the moon, there is an observed rise in noise resulting from black-body radiation of 0.05 dB.

Late Items

WB6KAP, Woodside, CA, informs us that his 50-MHz beacon is now off the air. It was in operation from March 29 through June 21, 0100 to 1500 GMT daily, except for a period in late April and early May. The radiation was slewed automatically in the last few weeks of operation, toward Tahiti the first minute, toward the Cook Islands the second and fourth minutes, and toward Samoa the third minute. A report is being prepared for FCC, to summarize results of this test. Anyone who has monitored the beacon is requested to let WB6KAP know of results, positive or negative. Permission is being requested to operate again from August to November.

Vic says that the ZK1AA beacon is not on, as of June 23. A beacon for 3D3AA, Fiji, 52.5 MHz, is about two months away. FO8DR, Papeete, Tahiti, is now on 50.1 MHz with a Swan 250, and has been heard by ZK1AA, 700 miles away. Rene transmits as follows: 1700 - 1715 – toward ZK1; 2300 - 0000 – presently open, but probably will be transmission and listening toward NE and NW; 0400 - 0415 – ZK1; 0415 - 0439 – transmit toward this country; 0430 - 0500 – listen. FO8DR, ZK1AA, and WB6KAP have a liaison schedule on 14.08 at 0500. Vic encourages U.S. stations to call and listen for FO8DR. He reports that ZK1AA is able to pick up TV video signals from Hawaii during the summer months. It is suggested that U.S. stations call the first 2-1/2 minutes of each 5-minute period.

Vhf/uhf DX-ers who are within traveling range are invited to the Northeast Vhf Association annual picnic, to be held at Mt. Tom State Park, Holyoke, Mass., Aug. 20. Gather by noon. Bring your own food and DX tapes. No charge. Contact K1ABR for further information.

TV Information for Vhf Operators

Though as its name implies, the Worldwide TV-Fm DX Association is primarily for TV and fm DX listeners and viewers, they have information that can be very useful for ham vhf DX enthusiasts. The *WTFDA TV Station List*, price $2.00, gives all TV stations by channels, with frequency offset, city, state, call, network affiliation, ERP, and height above average terrain. If you're planning to monitor TV channels with a converter and communications receiver, as described in this column for February, 1972, this may be your best bet for use in choosing channels and directions to monitor in your area.

WTFDA also publishes *VHF-UHF DX*. Sample copy 50¢; one year (monthly) $6.00, third-class mail, $9.00 first class. Available from Morrie Goldman, WA9RAQ, Box 163, Deerfield, Illinois 60015.

ATV enthusiasts may be interested in AS, published 6 times per year (subscription $2.50) by Ron Cohen, K3ZKO, P.O. Box 6512, Philadelphia, PA 19138. AS has technical articles, ham news, a classified-ad section and, in Vol. 2, No. 1, at least, substantial display advertising. QST

Strays

As information to those interested in wireless history, particularly early maritime radio, a new book, The Origins of Maritime Radio, the story of the introduction of wireless telegraphy in the Royal Navy between 1896 and 1900, published by Her Majesty's Stationery Office, London, is available in the U.S. from Pendragon House, Inc., 899 Broadway Avenue, Redwood City, California 94063, for $4.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

H o w :

van-dal-ism – *n*: willful or malicious destruction or defacement of public or private property

Webster's

Wireless vandalism, the malicious defacement of radio frequencies, is on the upswing. Most sectors of society seem to be suffering a similar malady so we hams can scarcely expect total escape. Vandalism ordinarily expresses disregard or contempt for institutions and their traditions, a familiar childish trait that can degenerate dangerously if not controlled until outgrown.

The nature of amateur radio, as stressed here before, makes it particularly vulnerable to such irresponsibilities. Perpetrators feel some sense of security in remote, if temporary, anonymity. They fling their unidentified or misidentified excrements from a deceptively safe vantage. The licenses they stand to lose – those who *are* licensed – obviously are lightly valued.

"How did *that* nut get into amateur radio?" is an occasional question, the answer to which is vital to us all. We are fortunate that entry into our ranks normally requires dedicated effort and is highly invitational. Elmers can choose their pupils wisely. They usually do, because frequencies potentially menaced are their own. Enough delinquents in control of little black boxes could reduce our rf highways to 11-meter anarchy.

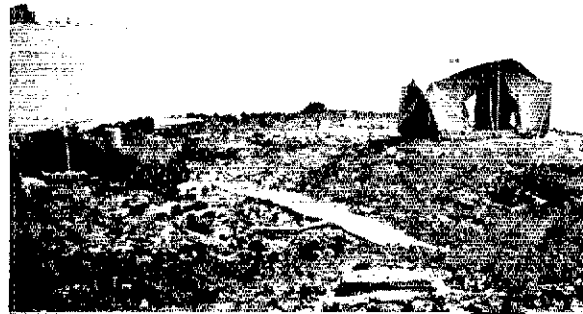
Tremendous factory outpourings of powerful plug-in transmitting equipments accelerate the likelihood of disruptive manipulation by unscrupulous mentalities. What can we do about it? Individually and collectively work to apprehend and disarm culprits, of course, but more than that. Our most promising deterrent must be to minimize the influx of moral defectives into amateur radio, to avoid attracting the destructive interest of casual kicksters unable or unwilling to assimilate necessary respect for the art. The amateur body long has been proud of its ability to look after itself, to solve its own problems. Responsible and effective self-policing over the years is one result. Can we keep this pride? Can we stay equal to the mounting task? The urgent need to maintain this capability is in conflict with perennial schemes of "growth" enthusiasts who would relax our licensing standards to the point of passing out ham tickets like confetti.

† † † †

W h e r e :

HEREABOUTS – "QSLers of the Month" this trip: CE1AP, EA1KC, EP2PR, F8TC, HC8GS, I6TAD, JA3VHQ/mm, K4FPQ/VP7, KL7GSC, KP4s DEY DLR, KSs 4CJ 6DH 6DY, KX6IY, OD5CS, PAØKZ, PY5YC, SM6EZD, ST2SA, TIs 2WX 8PE, VP2s A LAT LY, W5ZIS/YV1, XT2AE, YB3AAY, ZF1WP, ZLs 1BGT 2AFZ, 5H3LV, 5T5CJ, 8P6DV, 8R1G, 9X5s VA VL and 9Y4VU, together with QSL aides Ws 2PPG 3HNK 4BBP 4YKH 5GTW, K3RLY and ON5TO, all hailed by "How's" correspondents Ws 2HIU 5IB, WA2GMD, K3ZOL, WBs 4SXX 5CKR 8FLE, WNs 1AMU 4WHE 6OSS, VE7s BAF and BZY for QSL returns much snappier than the usual. Any quickies you'd like to commend here? . . . Help! These parenthesized brethren seek hints toward collecting overdue wallpaper from holdouts designated: (W4WRY) EL2S, FG7T1/FS7, GD4VH; (W7FSE) FR7AM/e/g, HK4s AD DF, KZ5s DM DN, TG9s GI MP, VPs 2AX 2SAB 7DL, 3V8AH, 8R1W; (WA2CDV) CXs 8BBH 9BT, SVØs WN WO; (WA2ZDK) CE8CE, CP6FG, CX1AAC, EL2DG, ISØBDO, KS6ED, OA4QN, TI2PZ, VPØAB, ZE8IJ, ZS3AW, 4X4s FS UF; (WB5CKR) CR7LE, CT2BG, KR6AY, ZE6DW; (WB8FLE) CP6FG, CR6NG, FG7AA, HA2CA, UA1MA; and(VE7BBL) W9FAB/KC4. Any 'alp? . . . Be glad to sign on as QSL manager for needful DX ops. (WA2CDV) . . . XYL TG9KE (WB9IMH) and I return to the States on the 22nd of next month after five years in Guatemala City. We faithfully answered direct all QSLs received, very expensive since most Stateside stations do not supply stamps or International Reply Coupons. We found that surface mail to Guatemala takes six weeks, cards via bureau at least three months. After September we can be reached through our Illinois address. (TG9UZ-W9UZC) . . . I handle QSLing for VP2ME's slow-scan TV QSOs only. Ray may shut down this month. (W4MS) . . . Thorough research affirms that last winter's XF4Q activity was spurious.

*c/o ARRL, 225 Main St., Newington, CT 06111.



W9IGW/CEØ and K9KNW/CEØ topped San Felix Island off many a DXer's most-wanted list in May. Wayne and Joe accumulated five kiloQSOs with some 120 countries from this remote promontory, a most worthy QTH of the Month.

ZD7SD is a steady St. Helena performer. Bill likes to hobnob with W/K friends between 14,200 and 14,250 kHz. *(Photo via K8PYD)*

(W2AXZ) . . . I QSL 100 percent from the NWT. (VE8YE) . . . May 1, 1972, is commencement date for my management of TG9DX QSLs. (W3HNK) . . . I've received a number of QSLs intended for 5R8AP and a 3D6. (W2BVU) - . . . Evidently those should have gone to WA2BVU. Let's all watch our prefixes!(W9BRD) . . . VP9BDA will QSL all contacts made in the recent RSB Test. (W1NU) . . . Six Costa Ricans worked but no QSLs yet despite self-addressed envelopes, IRCs, etc. (WA1HAA) . . . Nothing here from Russia's Box 88 since last October. (K6SE/2) . . . My QSLs were returned from Europe for being one-eighth of an inch too small per international postal regulations, a point printers and DXers should keep in mind. (W2AXR) . . . Hams not interested in working the Caymans anymore? Nonsense. ZF1ML (K9QFZ) and I quickly received 1200 QSLs for the 2200 contacts we recently scored there including four stations worked on five bands. (ZF1ML-K9RJP) . . . Navassa still gets lively response, too. KC4DX's 5250 QSOs drew 2700 QSLs in the first week after activation. (NTDXA) . . . Our club QSL design contest drew fifteen entries which have been narrowed down to three candidates (WWDXC) . . . WA9UCE was faced with a 6000-QSL chore after VP2LAT St. Lucia fun. (WCDXB) . . . W6s CNA and GFS joined W6ITD's hardworking local ARRL QSL Bureau staff. (NCDXC)

AFRICA — Union of Zaire Radio Amateurs handles incoming 9Q cards at its QSL bureau address, B.P. 1459, Kinshasa, including those for 9Q5ITU. (9Q5FP, UZRA) . . . As of early June ZD7SD still had received no logs for St. Helena operation by ZD7s XX and YL with 65 QSLs already on hand to answer. Bill says he sends his own cards regularly. I find that airmail from ZD7-land may take more than two weeks. (K8PYD) . . . As of May 5, 1972, I am QSL manager for 9X5VA on the usual s.a.s.e., or s.a.e. with IRCs, basis. (W2PPG) . . . I'll answer QSL requests for TJ1BF QSOs beginning in May. (WA4WTG) . . . My QSL managership for 4U2DO began May 15, 1972. I also do honors for EL2BA including Ben's portable work outside Liberia. (WA2DHF) . . . F6BFH, managing FB8WW's QSLing for 1972, now receives mail at 21 Rue de la Repulique, F-76, Bihorel, France. (DXNS) . . . Although I QSLd 100 percent, those who did not receive my 9G1GT QSLs can obtain them from my current QTH. (GM4AVR) . . . 9J2FO has closed down in Ndola and I would like to close my books on his QSLing as soon as possible. S.a.s.e. or s.a.e. plus IRCs, please (WA1HAA)

ASIA — I hold HS1AFP's logs dating only from April 15, 1972, but may be able to assist in confirming earlier QSOs. (WB2RLK) . . . VO2AH of the XU1AA staff departs Cambodia but may be reachable for QSL inquiries via GW3AHN. JA1KSO, who also handles cards for JD1s ABS and ADK, considers issuing another complete batch of JD1ABX pasteboards via bureaus because of frequent nonreceipt inquiries. Colleague JA2KLT manages QSLing for KG6s RA SH, VK9JV, VS5s AP PW, YJ8GH, 5W1AB, 9Ms 6AB and 8RY. (WCDXB) . . . Please note that I no longer handle QSLs for 4Z4BG. Still managing cards for 4X4s NJ UF and VB, however. (WA4WTG) . . . Add JF to the prefix list now in use for Japan proper which already includes JA-JE-JH-JR. Reminder: Ex-KR6s are KA6s as of May 15, 1972, suffixes the same. KA6DO, 21,355 kHz at 1530 GMT for example, is former KR6DO. (DXNS)

OCEANIA — I've assumed trusteeship for KJ6BZ and will do all I can to keep up the station's good reputation for QSLing. We will answer 100 percent all cards received with self-addressed stamped envelopes, and please note that regular U.S. mail rates apply here, no International Reply Coupons required by W/Ks. QSLs bearing time other than GMT will encounter lengthy delay. Despite publication of QTHs to the contrary, do not send cards to "Johnston Island" but send them via APO, San Francisco, CA 96305. (WA1LHW at KJ6BZ) . . . K1JHX also manages QSLs for my K1PKQ/KG6 contacts from May through December 9, 1971, at which time I obtained my present call. (KG6JBO) . . . New Zealanders again are authorized to use their ZM prefix in conjunction with state festivities, suffixes unchanged. (WCDXB)

SOUTH AMERICA — Beginning April 19, 1972, amateurs in the Brasilia Federal District of Brazil became PTs instead of PYs, a permanent prefix change. (PT2EYO, ex-PY2EYO) . . . 3G3AA evidently is CE3AA breaking in another Chile prefix. (LIDXA) . . . Is it true that bars in Bolivia accept IRCs as legal tender? (W3KOD) . . . Surface mail from the States takes three months or more to reach Asuncion, then another two months to reach my remote jungle location. Airmail can eliminate that first three-month delay. (ZP5TI-AP9AI-WA3RJF)

EUROPE — One year after our ZA2RPS DXpedition only forty percent of all W/Ks worked have bothered to claim their Albania QSLs. I'm still interested in generating more Iraq QSOs. (DL7FT) . . . The Swiss callsign HB9XJG was allotted to me and I intend to renew it. It is probable that there has been a printing error. (GM4AVR) . . . Error somewhere, all right. WA4WME writes with a February 24, 1972, postmark that *he* is HB9XJG. (W9BRD) . . . Off we go to the QTH catalog now, but remember that each suggested postal possibility is necessarily neither "official", complete nor accurate:

DU9VVL, Box 362, Makati, Rizal D708, P.I.
ET3USE, B. Berg, Jr., USASAFS Hq. Co., Box Q-58, APO, New York, NY 09843
FL8BC, Box 4, Djibouti, T.F.A.I.
FM7WR, Box 444, Fort-de-France, Martinique
GM4AVR, R. Hockey, Garelochhead, Scotland

VP9BDA, operated here by W1NU (left) and VP9GR, represented sponsoring Radio Society of Bermuda for the third straight year in the radiotelegraph portion of RSB's annual DX bash. In the '72 affair the boys performed from the lap of luxury, a Holiday Inn, in contrast to their usual rugged QTH in the gunpits of Fort St. Catherine. Also assisting was WB4CIN who snapped this photo.

HP1DV, Box 6474, Panama 5, R.P.
IZ1ISS, P.O. Box 250, Torino, Italy
ex-JX5CI, I. Nygaard, P.O. Box 79, N-6450, Hjelset, Norway
JY6GBM, Box 644, Amman, Jordan
JY9VO, P.O. Box 5089, Amman, Jordan
KC6SK, S. Kohn, P.O. Box 55, Colonia, Yap, W. Carolines 96943
OD5GU, P.O. Box 4393, Beirut, Lebanon
OJØSUF, P.O. Box 1, Mariehamn, Finland (or via OHØMA)
PJ2VD, J. Van der Velde (PAØVDV), P.O. Box 879, Curacao, N.A.
PTØMI, P.O. Box 19073, Sao Paulo, Brazil
PTØWH, P.O. Box 19094, Sao Paulo, Brazil
PZ1DX, P.O. Box 902, Paramaribo, Surinam
ex-TG9s KE UZ (to U9UZC)
TG9VN, P.O. Box 1123, Guatemala City, Guatemala
TR8VE, P.O. Box 13112, Libreville, Gabon
VA1LC, P.O. Box 552, St. John, N.B., Canada
ex-VE8BB, M. Pysar, VE6MP, Box 453, Whitecourt, Alta., Canada
VE8YE, R. Lenaghan, Box 308, Frobisher Bay, NWT, X0A-0H0, Canada
VK9MH, Box 204, Port Moresby, Papua
VK9ZB, P.O. Box 708F, Melbourne 3001, Vic., Australia
VP2DAH, 5 Solomon In., Goodwill, Dominica, W.I.
VQ9MI, Box 188, Mahe, Seychelles
VR1AD, Box 417, Tarawa, Gilbert Is.
WA2BAV/TJ1/TY3/5T5/9G1 (to WA2BAV)
WB2AQC/TJ1/TY3/5T5/9G1 (to WB2AQC)
XE1CI, P.O. Box 907, Mexico, D.F., Mexico
YJ8BG, P.O. Box 138, Santo, New Hebrides
ZD3M, Fr. M. Cleary, P.O. Box 463, Bathurst, Gambia (or via K3GJD)
ZPs 5TI 9AI (to WA3RJF)
ZSs 3BS 3KN 5AR (via WB2RLK)
3D6AQ, Box 99, Amsterdam, Tvl., South Africa
3D6AS, Box 61, Mbabane, Swaziland
5VZGE, Box 2, Bassari, Togo
7P8AC, Box 4, Maseru, Lesotho
9L1GC, R. Cary, G3DYY, 23 Greenfields, Earith-Huntingdon, England
9L1NB, P.O. Box 1, Makeni, Sierre Leone
9M8TJZ, A. Slocombe, Decca Survey Ltd., Topo Dept., Brunei Shell, Seria, Brunei
9X5MS, P.O. Box 420, Kigali, Rwanda
A51KV (via W6KNH)
C29ED (to C21TL)
C31AA (via F3EL)
C31FQ (to DJ5PN)
CX5RV (to G5RV)
DF1WA (via DK2BI)
DJ5QJ/TF (via DARC)
DK3SK/OHØ (to DK3SD)
DK6TB/9N1 (via DJ9KR)
DL2CI/HC8 (to DL2CI)
DL7NS/OHØ (via DL7MQ)
DL8NU/OHØ (to DL8NU)
EL2BA (via WA2DHF)
FB8WW (see text)
FCØAFH (to DJ8BT)
FK8BQ (via I1PQ)
FOØRV (to G5RV)
FPØLK (to WB2RLK)
FPØVQ (to W2NQ)
G5AZI (to W1BGD)
GB2IOS (via G3TBS)
GB3MKT (to GW3VKL)
HB9XJG (see text)
HBØLL (via DJ9ZB)
HBØXIW (to DJ5CD)
HBØXIZ (to WB8FGZ)
HBØXJQ (via K3SSC)
HC2DX/HC8 (to HC2GG)
HS1AFP (via WB2RLK)
IM-ISØBGJ (to I1BGJ)
IMØBUP (via ISWL)
JD1ADK (via JA1KSO)
JY9EA (to SM5EAC)
JY9GR (via DK4PP)
K1PKQ/KG6 (see text)
KA6DO (see text)
ex-KC6BK (to KC6SK)
KG6SH (via JA2KLT)
KJ6BZ (see text)
MP4BGX (via RSGB)
MP4MBQ (via G3LQP)
OA4AGR (via RCP)
OHØAB (via OH2BGD)
PJ8AE (to W2OVC)
PJ8WP (to W5KGJ)
PT2EYO (see text)
SKØITU (via SKØCC)
SM7CRW (via WB2RLK)
SUØTT (to DK6FB)
SVØWMM (to WB2JGZ)
TG9DX (via W3HNK)
TJ1BF (via WA4WTG)

G3DME continues his journalistic assault on the fallacy that 10 meters must become a DX void during sunspot declines. Alan edits and publishes *QUAX*, "the only amateur radio newsletter devoted solely to the 28-MHz band," a monthly multipage effort with world-wide contributors and circulation.

TY1ABE, a military instructor at Porto Novo, is widely worked on code and voice. Robert is scheduled to leave Dahomey next month. *(Photo via WB2AQC)*

TN8AU (via VE2AVU)
VP1BH (via VE2AKZ)
VP2ME (see text)
VP2MZ (via VP2MM)
VP8MX (via ZS1ACD)
VQ9DC (via RSGB)
VS5AA (via K3RLY)
VS5AP (via JA2KLT)
VS5JA (Via K3RLY)
W1PL/YV5 (to W1PL)
XEØAAA (to XE3BL)
YJ8RV (to G5RV)
YJ8XX (via ZL1AMO)
3AØPY (to F9UW)
3AØGF (to F6BBJ)
3G3AA (to CE3AA)
4Z4BG (see text)
5H3NN (via VE4ODX)
5T4ITU (via 5T5AD)
5U7AU (to WB2AQC)
5U7AV (to WA2BAV)
5VZAA (to WA2BAV)
5VZBB (to WB2AQC)
5VZYH (via VE3GHL)
5X5NK (to DJ3JV)
7Q7AF (to DJ4IJ)
7X2MD (via 11IJ)
8P6EK (to G4AMD)
ex-9G1GT (to GM4AVR)
9H3WTD (via 9H1N)
9M8WUW (via JA2KLT)
9Q5ITU (see text)
9X5DN (via WA9VOL)
9X5VA (via W2PPG)

This month's QTH advisory committee: Ws 1PL 2HIU 4BA 5IB 6AM 9LNQ 9RJM, Ks 3ZOL 4PRT 4SD 8PYD ØECG, WAs 1LHW 2DHF 2ZDK 4WTG, WBs 4SXX 6EQT 8FLE 9CJS, WN60SS, VE7s BAF BBL BZY, Columbus Amateur Radio Association *CARAscope* (W8ZCQ), *DX Newssheet* (G. Watts, 62 Bellmore rd., Norwich N. 72T, 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, Illinois, 60104), Nigeria Amateur Radio Society *News* (5N2ABG), North Texas DX Association *Bulletin* (W5SZ), Northern California DX Club *DXer* (Box 608, Menlo Park, California, 94025), Southern California DX Club *Bulletin* (W6EJJ), VERON's *DXpress* (PAØs INA 1O), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club (W7YBX). Right on!

† † †

W h e n c e :

EUROPE — From mid-August to mid-September DJ5PN will distribute C31FQ QSOs from 160 through 10 meters, phone and code. (W2HIU) . . . I've noticed a number of German DXers cavorting on 10-meter a-m with five-watt CB-type rigs. (VE3CUI) . . . OY9LV, very active near 14,207 kHz around 0100 and 2000 GMT, will aim a new TH6 Statesward before closing down by early '73. (W3HNK) . . . 9H1R tells me his neighbors dig for TV programs from Cairo, Madrid, Yugoslavia and north Africa. Some fringe area! (K2QHT) . . . Finally finished all USSR countries on sideband but will they QSL? (K8PYD) . . . It took more than four months of military red tape to produce my Scottish license. (GM5AXO-WA4UAZ) . . . Idaho and Wyoming still elude me after working 143 countries since firing up in February, 1971. (DA1SU-WAØTNW) . . . REF's Paris branch at 38 Rue de la Chapelle is eager to welcome ham visitors. (F6ADI) . . . I shut down SVØWO in May. (K4CQI) . . . Ambassador Porter signs FØADL. (W1RU . . . W3ASK tells of the passing of 11ER, 51 years an amateur. Mario was a protege of Marconi with many Italian and European DX "firsts". (W1RW) . . . With 200 countries confirmed I still need Montana and North Dakota for ARRL's WAS diploma. (9H1CD) . . . Czechoslovakian amateur licenses are issued in four classes: Novice, 10 watts cw (10 wpm) on 160 and 2 meters; Class C, 25 watts cw (10 wpm) on 160 and 80, cw or phone on vhf; Class B, 75 watts code (15 wpm) or voice all bands; and Class A, (20 wpm) 300 watts likewise. (CRC) . . . We decided on an FT-101 and quad at C31DZ last month. (G3ZOQ of G5YC) . . . Our Isle of Man June-July thing also featured a quad, three transceivers and some linears. (GD3s FTQ GKF TWJ XMW) . . . PAØHR enjoys cw on 15 and 20 again aftet a sixteen-year layoff. He manned VERON's QSL bureau for many years. (WN5ERI) . . .

Planned a go at the DX end as G5AZI in July, operating mostly from G3FXB's QTH. (W1BGD) . . . Watch for German ten-meter beacons DLØs AR and IGI on 29,000 and 28,200 kHz. (DL1EL) . . . Enjoyed a recent visit to HA3GA and friends. (W2RIR) . . . Continental comments from the aforementioned DX press: UR2s AR and DW knocked off thirteen kiloQSOs with 157 countries on their April-May UK1ZFT Franz Josefland fling . . . OJØSUF made several thousand contacts from Market Reef in May with an SB-101 and dipole . . . SVØs WOO and WWW consider another Crete feat before summer's end . . . . OHØNI offers the Alands on 14,280 kHz around 1130 GMT, often in the native tongue . . . . 3AØGA (DJ9ON) knocked off five kiloQSOs in a seven-day May stint. . . . G3USF, ON5WL, ZC4TE and 9M2DQ are new supporters of *QUAX*, the 10-meter promotional publication of G3DME. Members are logging a flock of Radio Moscow a-m harmonics throughout the 28-MHz range. . . . SM4DHF, G2s KO WQ and BRR ran 1-2-3-4 in the 1971 DX Transmitting Contest of ISWL. . . . Check with Russia's CRC bureau for information on a certification issued for QSOs with those "50" commemorative-special calls in fifteen republics plus an additional 35 USSR contacts during the period. . . . Royal Signals Amateur Radio Society's net frequencies are 3720, 7050, 14,075-14,080, 14,180, 14,280, 21,075-21,080, 21,180 and 21,380 kHz. . . . DK2BI of DARC hopes you'll all be in there pitchin' in this year's WAEDC shebang scheduled for (cw) the 12th-13th of this month and (phone) September 9th-10th.

OCEANIA — Also mark your shack calendars for the rockin' '72 VK/ZL-Oceania DX Contest: October 7th-8th (phone) and 14th-15th (cw). It is

NZART's policy to increase operating interest and activity through a lively awards program. S.a.e. plus IRCs will get you details on our new British Commonwealth Games Award plus info on WAP, WAZL and other worthy diplomas. (ZL2GX) . . . KX6JI is now defunct. No ham gear on Japtan island. (KX6IY) . . . YBØAAO likes to work Europeans on 7-MHz cw when not punching out 500 watts on ten with a six-element rotary.A35FX held out on me till my 37th call. (W3CTE) . . . My friend WØKON/KG6 aimed to give the gang more Guam on 40 and 80 cw. Buzz also is interested in increasing Saipan QSO output. (W1DXB) . . . ZL2BE's straight-a-m 100-watter really stood out on 10 this spring producing coast-to-coast pile-ups. Jim has seven rhombics on seventy acres! (VE3CUI) . . . We tried 40, 80 and 160 in May and June with inverted Vs supported by Perth Channel 7's 375-foot TV mast. Signal reports for VK6HD/p reception will be appreciated. (VK6HD) . . . WA5VTU and I sailed Statesward from Hong Kong in March aboard 42-foot sailing yacht *Luthien* with borrowed Yaesu equipment hoping to operate from rare spots under IDXA auspices. After we leave Darwin our timetable is flexible. I previously signed HS3AB and KL7FMM. (WA1ALT) . . . A35FX is quite active on cw and ssb, 14,040 and 14,240 kHz, 0330 and 0700 GMT respectively. (ZL2AFZ) . . . Visited DUs 1EJ 1ER 1FC 1GF 1LRP 7EG 7ER 7RLC, KH6AX, VU2s IAZ ST, ZSs 4AA 6BEJ, 5Z4ERR, 9V1NR and others on a recent world tour undertaken for the express purpose of meeting DX. (K6OPG) . . . With on-the-air time limited I managed about 700 contacts, mainly 10, 15 and 20 cw, from Rizal as DU1POL. (W5QKO/Ø) . . . I'm looking for DX on 40, 75 and 80 meters with a new tower. A 7-MHz vertical and 3.5-MHz inverted-V has accounted for forty states on 40, thirty-one on 80. This year's ARRL phone test was great down here, especially on 28 MHz where I worked 1200 stations in all states. Have WAS on 10 and 15, one holdout on 20. Could use a better receiver for cw. (KS6DY) . . . VK9FH, 14,211 kHz at 1130 GMT, leaves New Guinea for the States next month. (WA2DHF) . . . ZL3JO has 784 QSLs from Yank Novices and recently was QSO No. 1 for WN3SZM. (W8OZA) . . . I schedule VK9BS weekly and, for Papua sked arrangements, can be found on 14,207 kHz at zero GMT almost daily. (W3HNK) . . . We've erected a new 80-meter antenna on Johnston but a 1500-kW Loran transmitter two miles away makes reception poor on that band much of the time. (WA1LHW at KJ6BZ) . . . More Pacific patter via the DX press grapevine: 9M6AB hopes to operate from VS5 and 9M8 during this year in East Malaysia. Allan formerly signed VS5AP and 9M8WUW. . . . VE8RA rang up five kilocontacts from Wallis as FWØAB. Karl was more impressed by the number of stations who claimed his FK8CD QSOs were their New Caledonia firsts. . . . VK6IZ watches 160 for sunset breakthroughs down under. . . . VR1AC may close shop next month. . . . VK9ZB, 14,215 kHz at 1300 GMT, will radiate from Willis isle through November. . . . Ex-KC6BK moved from Ponape to Yap where he signs KC6SK on 10 through 80, code and phone, with FT-101, ground-plane and horizontal wires.. . . . VK5XX managed 59 countries from Norfolk isle with his pet cw 25-watter. . . . KH6GLU & Co. accomplished their June VS5AA-JA swing under the International DX Association banner.

SOUTH AMERICA — I'll be in Argentina through this month signing LU3AU and will investigate the possibility of PYØ or VP8 operation as well. (WA1FAX is my American "brother" in the student exchange program. Beginning this month I'll be on DX bands with my new Class A license. (PY1EBE) . . . Note that Netherlands Antilles island groups Aruba, Curacao and Bonaire, where reciprocal operation is prefixed PJ9, are considered part of the South American continent. St. Maarten, St. Eustatius and Saba, all PJ8 for reciprocals, are North America. (K2FJ-PJ8DX) . . . I live in a Paraguay jungle outpost as a missionary for New Tribes Mission. (ZP5TI-ZP9AI-WA3RJF) . . . K9KNW and I found San Felix inhabited only periodically by a few lobster fishermen. CE3s ABZ and AEV were of great assistance in making our DXpedition possible. (W9IGW/CEØ) . . . W9IGW and K9KNW made their first San Felix contact with W9FIU at 0030 GMT April 11th, their last with JA3AAW at 1256 on the 14th. Of five thousand QSOs with 120 countries they scored 150 on 7 MHz but none on 3.5. (WCDXB) . . . I'm interested in recording W1AW's code practice transmissions because I am a cw instructor for our LABRE society. (PT2EYO) . . . I'll be working DX from Curacao again as PJ2VD for the next three years. (PAØVDV) . . . DX periodicals add more from down south of the border: Venezuelans may renew YVØ Aves isle availability this month or next. . . . Erstwhile CP1AP staffer K3BHL now sports his own CP1JV label, cw preferred.

WHEREABOUTS — The 5th-6th of this month will find Western Washington DX Club (W7FR) officiating at the 20th annual Northwest DX Convention. W7AUK has the details. WWDXC officers are W7YBX pres., WA7JCB v.p., K7CVL treas. and W7APN secy. W7APN, K7CHT,

PJ8DX (K2FJ) enjoys DX sport in cozy quarters at the government guest house on Sint Eustatius. Quaint QTH, eh? Ken tallied 1112 QSOs here and at VP2VAN on his two-week Caribbean jaunt in March.

WA7JCB and WN7LAG assist editor W7YBX with club bulletins. . . . Rush inquiry for attendance info on the annual W9-DXCC shindig set for the 23rd of next month near Chicago. The customary wingding program is in prospect according to chairman K9LTN. . . . Forty-three percent of Northern California DX Club membership is Extra Class, 48 percent Advanced. An intraclub DX marathon competition began in July to run through next month. NCDXC's 80-meter DX race finds W6PM, K6AHV, W6AM, WA6IVM, W6s JKJ KG and CYX with 134, 114, 112, 46, 45, 36 and 32 countries. Forty-meter kingpins are W6s PM AM, K6AHV, W6s NKR JKJ KG and WA6IVM with 165, 137, 119, 115, 113, 102 and 100 apiece. W6PM, by the way, is well known as former W3NU. Disorderly noisemakers at club meetings drew member W6ISQ's editorial wrath in a recent *DXer*. . . . Columbus Amateur Radio Association DX scribe W8ZCQ observes: Only two or three years to go till we hit sunspot minimum, a new experience for new DXers. This doesn't mean you won't work DX at the low, but openings will be short and spotty. You'll have to be on your toes to catch the goodies as they go by. Regarding "list" operation, perhaps we should establish that *two* list-derived QSLs be required to equal one card earned by a selfmade DX QSO. . . . Preparation of net lists off frequency, such as efficiently done by HS2AGP for XU1AA, is an excellent approach to minimizing pile-up QRM. (K6UGS) . . . Fun radiating from Barter island this spring on 20 voice. (K6UNT/KL7) . . . You'll find our Yukon cw net on 3740 kHz at 0430 GMT daily except Tuesdays, Thursdays and Saturdays. I formerly signed VE6AUD. (VE8CD) . . . Mark me down for agreement with sentiments DXpressed by those May limericks. (WBØBHE) . . . I can see why foreign amateurs dread U.S. phone subband expansion. At KZ5LS I found it very difficult to carry on a decent QSO through breakers. Can't see need for all the power used by W/Ks. A barefoot T4XB has me close to DXCC. (WB5FIU) . . . Hunting DX has lost much of its kick in these days of kilowatts, propagation forecasts and announced DXpeditions. Elusive DX is the best DX. I vote emphatically against this "list" business as practiced by KH6EDY, M1B and others. (WB4SXX) . . . Nearing a fun DXCC on a simple dipole sans linear. I previously signed OX3GE and W9MZK. (W4WQW) . . . After my 25 kiloQSOs on 10 through 160 meters no active DXer should still need Guantanamo Bay. Among many certifications collected will be NCDXC's California Award. (KG4CS) . . . Ran into KV4s AB EY, PJ7VL, VP2, VAG VAM VAO VL and VV for eyeball contacts while DXcursioning as PJ8DX and VP2VAN this spring. (K2FJ) . . . W4BPD promises some SSTV on his next DXpeditionary go. W8YEK has 49 slow-scan countries and I have 46. (W4MS) . . . Visiting amateurs who hold U.S. General Class or higher will find it easy to obtain VP9 operating authorization. Just look up "Ham Radio" in the Bermuda telephone directory's yellow pages and follow instructions. W2MS won the first "Bermuda 100" award back in '67, no easy achievement since there are on average only about thirty VP9s active. (W1NU) . . . The Caymans government is also extremely cooperative in authorizing hamming by qualified visitors. ZF1ML (K9QFZ) and I operated for about a week on 10 through 80, cw and ssb, including sessions in Novice subbands. (K9RJF) . . . Where did all that 28-MHz cw DX go? Possibly to 15 meters where the hunting is still good for my homespun half-kW and vertical. (WA2CDV) . . . Swapped an Arkansas QTH for Louisiana where a dipole does fine on 28-MHz DX. (WB5CKR) . . . Sure is hard to keep one's cool when sombody casually fires up right atop one's DX QSO without the slightest pause to see if the frequency is busy. Let's keep 10 alive! (WA2ZDK) . . . W6UC, K6s DIA ICQ ICS QPE QXN, WA6SHI, WB6s CUK CVR CWN DZG HSZ OAO and TQF, signing XE2 calls with the same suffices, participated in June's Baja 500 Off-Road Race. (K6ICS) . . . Long work hours hold down my DX but I recently visited KP4CRT, the YV5 gang, PJ2s HT PS and VD. DJØXX, F9LT and ZS6OS dropped by my QTH. Enjoyed catching 20 countries on 160 meters in the ARRL Test. (W1PL) . . . Twenty takes the DX prize right now in B.C. Ten has the doldrums and fifteen the lazies but nighttime 21-MHz openings do occur. (VE7s BAF and BZY) . . . Finally managed a hundred countries on 10 phone but where is West Virginia? (WB2MBP) . . . Anybody need North Dakota? I'm ready for skeds on cw or ssb, 80 through 6 meters. (KØALL) . . . Ten usually opens up daily to somewhere but it takes continuing activity to prove this. (K8PYD) . . . Local chatter via club and group literature: FG7XT claims 110 countries on RTTY. . . . The annual Fresno DXtravaganza apparently will be switched to April dates next year. . . . W6EYY has 18 countries and 38 states via 150-watt SSTV. . . . WA6EPQ's indoor dipole was good for sixty quick countries. . . . SCDXC members W6s DQX EJJ NJU, WA6s AAW EPQ and GLD manned KD6USA on Armed Forces Day for 1600 sideband QSOs, 1100 cw contacts. The club has arranged shipment of new 6HF5s to TR8DG. . . . Jerry Heien finds it necessary to relinquish editorial chores for the *Bulletin* of Newark News Radio Club. . . . W6AM, OA3B, F3NB, CT3AB, JA7FYR and ZL4BLC gave W6BXL/m all continents on 40 while mobiling on the L.A. freeway last year. . . . Since most stations in rarer U.S. possessions in the Pacific and elsewhere are operated by General or Conditional personnel you'll find most of that type of DX in our more crowded subband regions. . . . If you're a close follower of ARRL Official Bulletins over W1AW you found out fast about Vietnam QSOs with XV5AC being okayed by our Federal Communications Commission. The station opened up on 20 cw, then ssb. . . . . The hungry horde also lurks for OR4BS's return to Dacca for Bangladesh QSOs. . . . Notes now from the Novice world of DX: CT3AS, EL2CB, TJ1AW, ZS6BMP, VQ9R and many more ops at the DX end are to be thanked for their patience in working the WN gang. A long-path QSO with the latter is my best DX. My first try at learning the code was 30 years ago. (WN8IOT) . . . Fifteen keeps holding its own, even producing midnight DX now and then. KP4DLR likes to give WNs their first Puerto Rico contacts, and good sideband stuff occasionally answers my cw. (WN6OSS) . . . WNØEMZ has 20 cw-to-ssb countries worked on 15. (WN2AMU) . . . Delighted to hear my proteges WN4s VGZ and YFZ knock off New Zealand on 80 meters. They have 52 and 49 countries worked with a 2NT and DX-40 respectively, no beams, and each has WAC. Myself, I'm busy adding 5BDXCC to my 5BWAS. (WA4LDM) . . . I'm hot on the trail of Novice-style WAS on 7150-7175 and 21,100-21,150 kHz and wish nonWNs would let me give more priority to Novices. (VE8YE) . . . Graduated from Novicedom with 49/42 worked/confirmed. (WB8FLE) . . . Has any Novice ever made DXCC? (WN4WHE) . . . Sure, Dave — even a few of the old one-year-ticket breed turned the DXCC trick. (W9BRD)

Strays

I would like to get in touch with . . .

. . . anyone interested in joining a Novice net. WN9IDKW, WN4WND, WN8IFU.

. . . anyone interested in playing chess on the air. WB9AHR, WN8KYX, WA2PUX.

. . . any college or university chess team interested in a Saturday afternoon meet by radio with the Penn State team. W3LNW.

. . . any hams who are also Civil Defense officials. SMØECF.

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

YLRL 6th International Convention

FOUR YEARS AGO W6DXI, Gladys Eastman, invited the YLRL to hold its 1972 convention in conjunction with the 33rd anniversary of the club in California, with the YLRC/LA as the hostesses for the event. So, the YLs came to Long Beach in May this year from all but two of the ARRL divisions, from Canada, and from places whose call prefixes said Chile, Philippine Islands, Hawaii, Alaska, and American Samoa, with a pleasure cruise of friendship as a theme.

Friday was for gathering, registering and tours, with the *Queen Mary* as the focal point, as well as a harbor tour from the Marina. And the underlying plan that there is nothing like a YL proved itself again as YL met YL renewing old acquaintances from other conventions, or meeting gals whose voices and calls suddenly became tangible people as a face went onto a fist or a voice. Friday was swaps from tie tacks to recipe books, and it was picture in the "pic-swaps" that took the place of the group picture and became an illustrated autograph album for each YL. Friday was the Apollo splashdown pictures of Lenore, W6NAZ and Bob Jensen, W6VGQ, in the evening. And it was the BAYLARC "Splashdown Party" in their rooms with mermaids, and the "baby dolls" of W6BDE.

Saturday after breakfast, the men who had accompanied their ladies were washed out of our hair by sending them off on a tour, while we settled down to the business of the YL forum, with YLRL President, Mae Hipp, K7QGO, presiding. We discussed new plans for the organization, membership, contest rules, met and listened to the officers, *Harmonics*, and the many things that are the necessary part of keeping a club going and growing. Louisa Sando, W5RZJ, again agreed to add supplements that make up the story of YLRL and the activity of the women to her *CQ-YL*, with the cost underwritten by contributions from the group.

Saturday was more pic-swaps, and the Birthday Luncheon to celebrate the 33rd anniversary of the Club, decorated cakes on the tables, and souvenir pins. It was W6NAZ, one of the 13 original founders, as mistress of ceremonies with greetings from the gals who started it all. It was prizes and recognition of the truly young YLs, WA1NHK and WN7OXZ, aged 11 and 13, and it was a special award to W3CDQ who celebrated her 50th anniversary as an amateur radio operator. It was the adventures and misadventures of Chris Haycock, WB2YBA, as she struggled with antennas.

The day ended with the OMs' return to join their ladies in an Aloha Hour and luau complete with muumuus, loud Hawaiian shirts that complemented the leis and hibiscus decorations. The luau was plates piled high, and Hawaiian songs. It

* YL Editor, *QST*. Please send all news notes to WB6BBO's home address: 1036 East Boston St., Altadena, CA 91001.

Not Betsy Ross but she made the flag! Jenny Cable, K8PAM, of Zanesville Ohio, made the flag that was displayed at the Buckeye Belle Booth at the 1972 Hamvention in Dayton. *(Photo courtesy K8CKI)*

HK3BLD, Ruth well known on the Intercontinental Net and very active on 20 meters is anxious to add Colombia to WAC-YL or the DX-YL certificates of anyone who calls her.

WA6FSC, Darleen Soligny at the shack of Carlos Blau, TI2CG. *(TI2GI photo.)*

was K6KCI as MC, and the south Pacific cruise suddenly changed to a trip to all continents and ended up as a visit to "Box 88, Moscow," and the amateurs there with Florence, W7QYA.

The over 120 licensed women amateur radio operators represented Buckeye Belles, Alaska Lassies, WRONE, BAYLARC, PJ-YL, GAYLARC, MINOW, YLRC/LA, TASYL, Colorado YLs, WAYLARC, Chix-on-Six, NYC-YLRL in this country, and TOT, and CLARA in Canada.

Thirty-three years ago thirteen women picked up the challenge in a lace-bordered announcement in *QST*, and organized a club for YL operators that has grown to world-wide proportions. This convention highlighted the past, but was more interested in increasing the activities, and broadening the scope of the club in the future.

YLRL Contest Calendar

KL7FJW, Betty Marsh, YLRL Vice president announced the tentative dates of the activities calendar for YLRL Contests in 1972-73:

Howdy Days, September 20-22, 1972.
YLAP, cw, October 18,19, 1972.
YLAP, phone, November 1,2, 1972.
YL-OM, phone, February 24,25, 1973.
YL-OM, cw, March 10,11, 1973.

Howdy Days, September 20-22, 1972

Start: September 20,1972 1800 GMT
End: September 22, 1972 1800 GMT

Rules: Scores will be based on contacts with licensed women operators only. All bands and modes of emission may be used. Net contacts do not count. Only one contact with each station will be counted.

Scoring: Score two (2) points for each YLRL member worked, and one (1) point for each non-YLRL member worked. *No Multipliers.*

Awards: Top scoring YLRL member will receive her choice of a YLRL pin, charm, or stationary. Non-YLRL members will receive one year membership in YLRL.

Howdy Days is a get-acquainted contest, and QSO party and a plain rag chew rolled into one activity to get the new women in radio acquainted with other gals on the air. It is a good way to get the kinks out of the summer laziness and back into the groove for the big contests just ahead.

YLRL Membership Information

Again in answer to inquiries to this column regarding membership in YLRL here are the requirements:

Affiliation is open to all licensed amateur radio operators. Novices are welcomed as full members, but their membership is limited to the term of their license. All members receive *YL Harmonics*, the official publication, as a part of their membership. Dues are $3.00 per year.

There are three membership chairmen: For the western part of the United States, Beth Taylor, W7NJS, 14367 S.E. Fair Oaks Avenue, Milwaukie, Oregon, 97222; Eastern United States, Marge Campbell, K4RNS, 65 North Arbor Drive; Ormand Beach, Florida, 32074; and, International Membership Correspondent, Gretna Longware, Box 426, New Russia Road, Elizabethtown, New York 12932.

Buckeye Belle Nets

The Buckeye Belles, Ohio's statewide YL Club, now sponsors two nets each week: Monday, 8:00 A.M. EDST, on 3.950 MHz, and Tuesday 9:00 P.M., EDST on 3.950 MHz.

WA8EKQ, Beulah Shelly is NCS for the morning net, and Edie Best WA8KMT, is NCS of the evening session. All YLs who are interested in participating are welcome to check into either or both nets.

Age is no barrier in radio. Judy is one of the growing number of young YLs. She is 9 years old and in the 4th grade. Her OM is WBØCQU, and her mother is WNØFXH.

1972 LOLA Winners

The gals from VE1 land sponsor LOLA (Ladies from VE1 Land Award) in an annual contest held the Saturday nearest St. Valentine's Day. Its purpose is to encourage the YLs from that Canadian District to get on the air and operate. This year's YL winner was Chris Weeks, VE1AKO, who worked the contest with the call VE1YL. The OM winner was Ralph Dickieson, VE1ADV. A special prize was awarded to Louise Wilson, VE1ZV, who used cw emission for the entire period of the contest.

1972-1973 Ontario Trilliums Officers

The Ontario Trilliums, Canada's oldest amateur radio club for YLs have elected the following women as officers for the year 1972-1973: President, Betty Peterson, VE3ASZ; Vice-President, Irene Williams, VE3BEI; Secretary, Audrey Mc Dermott, VE3CCO; Treasurer, Barbara Newman, VE3BFN; Publicity, Cathy Hrischenko, VE3GJH; Editor, TOT *Topic*, Tholma Woodhouse, VE3CLT; Membership, Margaret Houston, VE3AIZ; Certificate Custodian, Marion Course, VE3CLP. The TOTs have two active nets each week: Saturday at 1600 GMT on 14.140 MHz, Saturday at 2000 GMT on 3.770 MHz, and Wednesday at 2400 GMT on 3.650 MHz

Darleen Souligny, – WA6FSC

Darleen puts it this way, "I have found amateur radio truly a bridge to international friendship, good will, and understanding, and, from experience, that the amateur license is indeed a passport to almost anywhere in the world."

Darleen speaks from experience of some 16,000 QSOs from 46 countries in her travels around the world. She is a member of WARO, SAWRC, YLRL, and honorary member of the Guyaquil and Quito, Equador Radio Clubs.

During her trip she was the guest of King Hussein and Princess Muna in Jordan where she spent eleven days visiting, sightseeing and operating.

Through the encouragement of her late husband, Gene, WA6DKW, Darleen obtained her Novice licence in 1969, only a few months before they traveled to the friendly islands of Tonga. Under the rules of that country any member of the family may operate ssb. The unfortunate death of Gene brought Darleen back to the United States where she received her General Class licence in January 1971. As WN6FSC, she worked all states and all continents. As a General, Darleen worked the world from the world with the following calls assigned to her: VR5DK, ZL1ATC, 3B8DK, 5Z4NE, 5X5NF, 3B9DK, JY9DK, WA6FSC/DL, WA6FSC/LA, WA6FSC/SMØ, WA6FSC/OH5, HB9IXC, WA6FSC/VE3, /VE6, /VE7, /OA4, /OA8, /HC2, /HC8, /TI2, /HRI. But that is not all. She has operated as guest operator at the following stations: VR2CC, VK3KS, VK6OV, 5H3LV, OE1MEW, PAØPHO, ON4QP, ON4OB, ON4KL, 4U1ITU, I1LLZ, EA8GZ, XE1CI, TG9KE, HK3BLD, HP1XIS, KZ5PW, and had the distinction of being the first YL from this country to operate the Vatican station HV3SJ with Brother Ed. The first YL to operate from the island of Rodrigues, Darleen is Roving Editor of the publication *World Radio*. QST

Buckeye Belles at the Dayton Hamvention: l-r, W9RTH, Ada; K8ONV, Mary, Vice, Buckeye Belles; K8CEN, Louise; K8CKI, Lillian, Pres., Buckeye Belles; K8RZI, Fran; W8RZN, Dottie; WA8HWL, Marian, Editor, Buckeye Burr; standing, WA8GPO, Shirley.

Operating News

GEORGE HART, W1NJM
Communications Manager
ELLEN WHITE, W1YL
Deputy Communications Mgr.
ROBERT L. WHITE, W1CW; *DXCC*
GERALD PINARD, *Training Aids*
ALBERT M. NOONE, WA1KQM; *Contests*

Cockpit Trouble. Reports from some of our observers seem to indicate that there are many amateurs who feel that their equipment is foolproof insofar as any danger of putting out a bad signal is concerned. This feeling seems to be particularly prevalent among amateurs whose rigs contain sophisticated speech-processing circuitry. When advised that his speech quality is not all it might be, such an amateur is prone to look down his nose at his critic and sanctimoniously proclaim the infallibility of his gear. But in reality, speech processing apparatus is not only subject to maladjustment and misconstruction, in some cases it can actually cause unclean signals.

The principal cause of all such discrepancies, however, is "cockpit trouble" – operator error or ineptness. There just is no equipment that is immune from abuse by the operator, and the sooner we accept this the sooner the general quality of our amateur signals will improve. As OO W8ZCQ points out in a recent letter, there are entirely too many signals on the air that are just plain lousy! Stop being so complacent about that gear for which you paid so much money, stop shouting into the mike with the gain at maximum in your confidence that the special circuitry will keep your signal in the ball park, put a 'scope on it and see for yourself what it looks like. You will find that it is always possible to foul it up, and not a single manufacturer will guarantee immunity from FCC pink tickets. You're still on your own as an amateur radio operator who has to use his gear in accordance with good operating practices, and you better not forget it. If you "blow it" and get a ticket (or even a friendly OO notice), blame yourself, not your gear or its manufacturer. You're still the one responsible.

Repeater Operation

(The following was purloined from text of a "Pink Ticket" occasionally sent to Texas repeater operators whose conduct is not all it might be.)

FM repeater operation is different in many ways from other amateur operation. A repeater is a single channel with all stations listening to the same frequency. When you transmit on the repeater input frequency all stations monitoring the repeater output frequency hear you. When one hears you, he has the following options:

1. Listen to you talk without answering. If he uses this option, he DOES NOT WANT to talk to you.

2. Switch to another repeater or frequency. If he uses this option he does not want to talk to you OR LISTEN TO YOU EITHER.

3. Turn off his transceiver. If he uses this option he does not want to either listen or talk to you, but cannot switch.

4. Answer you and carry on conversation. If he uses this option, REMEMBER all stations that did not answer are still hearing you and the station that answered you. You have the repeater "tied up" and the others will be forced to listen to your QSO or switch.

A repeater is a party line or intercom. Every station transmitting is heard by every other station listening on the repeater frequency, and there may be several dozen listeners for every talker. Therefore, keep your QSOs SHORT and TO THE POINT, especially in the morning and evening when most people are traveling to or from work. Greet your friends, ask your question, make your statement, BUT THEN GET OFF. Don't assume that all listeners want to join your QSO even if you broadcast an invitation to do so. ALMOST NOBODY EVER DOES.

HOW MANY TIMES HAVE YOU USED MORE THAN YOUR SHARE OF REPEATER TIME?

The Official Phone Station. This appointment was created in 1933 in recognition of the growth of amateur radiotelephone and its different requirements and characteristics from cw operating. The ORS appointment was retained as the cw traffic-handling appointment while OPS was formed to promote good operating procedures on phone including (but not exclusively) traffic handling. Thus, for a considerable time and even carrying over into the present, OPS, unlike ORS, is not strictly a traffic-handling appointment. In fact, in the beginning there was considerable resistance among phone men to any hint of a traffic-handling requirement for OPS appointment; thus, OPS was not then and has never completely become a parallel appointment to ORS for phone operators. It can be and often is held concurrent with ORS appointment by the more versatile operators who are equally at home in both modes and who like to handle traffic using both.

An OPS appointee sets a standard of excellence in voice operation. He speaks distinctly, enunciates clearly, has the highest signal quality, is friendly, helpful, courteous on the air and although traffic

(Continued on page 104)

Hawaii, Alaska and American Samoa with

W1AW 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[1] (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	7.095	14.095	3.625
0330	PHONE BULL.[2]	.....	← PHONE BULLETIN[2] →				
0335-0400[4]	.....	.....	7.290	3.990	7.290	3.990	7.290
0400	CW BULL.[1]	.....	← CW BULLETIN[1] →				
0420-0500[4]	.....	.....	3.7 Nov.[5]	7.080	3.990	7.15 Nov.[5]	3.580
1300	← CODE PRACTICE[1] (5-25 wpm MWF, 35-15 wpm TTh) DETAILS BELOW →						
1700-1800	.....	21/28cw[7]	21/28ssb[6]	21/28cw[7]	21/28ssb[6]	21/28cw[7]	.....
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	.....	21/28ssb[6]	21/28cw[7]	21/28ssb[6]	21/28cw[7]	21/28ssb[6]	.....
2030	.....	.....	CW BULL.[1]	.....	CW BULL.[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[8]	7.095[4]	3.625	14.095[4]	CPN[8]	.....
2300	.....	.....	6N[8]	RTTY BULL.[3]	CN[8]	.....	.....
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, 14.290, 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] W1AW will tune the indicated bands for Novice calls, returning the call on the frequency on which called.
[6] Participation in section traffic nets.
[7] Operation will be on one of the following frequencies, 21.02, 21.08, 28.02, 28.08 MHz.
[8] Operation will be on one of the following frequencies: 21.270, 21.390, 28.590 MHz.
Maintenance Staff: WIs, QIS, WPR, YNC.

W1AW CODE PRACTICE

W1AW transmits code practice according to the following schedule. Approximate frequencies are 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references.

Speeds	*Local Times/Days*	*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
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 W1AW (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.

Aug. 7: It Seems to Us
Aug. 10: Correspondence
Aug. 18: League Lines
Aug. 29: ARPS

The subject of practice text for the following sessions is *Understanding Amateur Radio*, First Edition.

Sep. 1: Three Novice Bands with Two Dipoles, p. 284
Sep. 6: Vhf Antennas, p. 290

Meet Your SCM

Alberta SCM Don Sutherland VE6FK was first licensed in 1937. Don is a former SEC EC and PAM and former holder of VE4FK. He has earned DXCC WAC and four Public Service awards. This active contest man is a member of the Calgary Amateur Radio Association and the Amateur Radio League of Alberta. VE6FK is employed as Ch. Terminal Electrician for Canadian Pacific Rail. A sports enthusiast, he enjoys Canadian football, hockey, soccer, track and field, and golf.

New A-1 Operators, May 1972

F3ZZ F8AU F9s MD OE WB2JCE K4KE W4YPX WB4s GHD NCH PNG PTH VOS SQA.

handling is not a specific requirement, it is encouraged, and when he handles it he does so in proper form using proper voice procedure as recommended by ARRL. The OPS is a League member or a station operated by League members who represent the standard of excellence in all voice operating pursuits – the standard of the League, which strives for the highest standards in existence.

As in all appointments, the SCM does the appointing, usually at the recommendation of the Phone Activities Manager, the leadership appointment for phone operators. If you operate phone, and are a League member with a Conditional Class license or better, get yourself an OPS appointment. What does it buy you? Nothing material. Oh, a nice certificate, a few minor privileges. Much more important, it sets you up as an example of all that is good and proper in amateur voice operation, a mark of distinction you must work to uphold and which is therefore a source of pride in accomplishment. You have to *be* exemplary to get the appointment, and *stay* exemplary to keep it.

CD Bulletin Poll. The July CD Bulletin (mailed quarterly to all elected officials and appointees) contained the results of a poll on ten different subjects of interest to the operating fraternity. The operating fraternity – that's you, who read this column, so perhaps you will be interested in the results also. The use of the appointment roster for poll purposes is a convenience, a means of getting what should be a very accurate sampling of opinion on operating subjects. A number of such polls have previously been conducted and have attracted quite a bit of interest.

The first subject was divided into two poll questions. The first one asked if the appointee favored the principle of a daytime NTS to supplement the existing NTS which operates in the evening. The second asked if the appointee favored the specific proposal made in the bulletin (see Jan. *QST*, p. 71 for some background). On the first question the vote was 510 to 112 in favor, on the second 355 to 147 in favor.

The next subject was on the question of more credit for originated messages, again divided in two, in the same manner. However, the basic idea was voted down by a vote of 334 to 160. This made the second question, on the specific proposal (see "Traffic Talk," p. 74, Jan. *QST*), somewhat academic, but it was greatly favored by most of the minority who favored the principle, 248 to 97.

Should ARRL life members be permitted to participate in the quarterly CD Parties? No, by a vote of 399 to 261.

Nationwide restructuring of sections for closer equity in member population and/or area received the nod by a vote of 302 to 238. However, a "test case" in Florida is having rough sledding. Most likely majority approval is based in assumed application to sections other than the voter's!

Proposals for a number of special "nights" fared as follows: Straight Key Night, 582-51 in favor; Emergency Power Night, 431-104 in favor; Mobile Night, 326-158 in favor; A-M Night, 195-305 against. Other popular "night" suggestions written in included QRP Night, RTTY Night, Home Brew Night, VHF Night and a few facetious ones, such as Three-Dog Night for K9s only, barking up the wrong tree, which figured to be a howling success.

(Continued on page 106)

SCM ELECTION NOTICE

To all ARRL members in the Sections listed below.

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been both the holder of amateur Conditional Class license or higher (Canadian Advanced Amateur Certificate) and an ARRL full member for at least two years immediately prior to receipt of petition at headquarters. Petitions must be received on or before 4:30 PM Eastern local time on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, Zip code of the candidate and signers should be included with the petition. It is advisable that a few extra full-member signatures be obtained, to insure that it will be valid.

Elections will take place as soon after the closing dates specified as full information on the candidates can be obtained. Candidates' names will be listed on the ballot in alphabetical order.

The following nominating form is suggested. (Signers should be sure to give city, street address and Zip code.)

Communications Manager, ARRL (Place and date)
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the . . . . . ARRL Section of the . . . . . Division, hereby nominate . . . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately.

George Hart, W1NJM, Communications Manager

Section	*Closing Date*	*Current SCM*	*Present Term Ends*
Nev.	8/10/72	L.M. Norman, W7PBV	10/22/72
Utah	8/10/72	C.F. Soper, K7SOT	10/23/72
Ky.	8/10/72	T.H. Huddle, W4CHD	10/30/72
Ga.	9/11/72	A.J. Garrison, WA4WQU	3/26/72
Que.	9/11/72	J. Unsworth, VE2ALE	7/10/72
Ariz.	9/11/72	G.M. Hamman, W7CAF	8/9/72
Orange	9/11/72	J.L. VerDuft, W6MNY (Resigned)	11/10/73
N.N.J.	10/9/72	L.J. Amoroso, W2ZZ	12/9/72
S.Tex.	10/9/72	F.L. Ulrey, K5HZR	12/10/72
Mich.	10/9/72	L.J. Olinghouse, W8ZBT	12/10/72
Idaho	10/9/72	D.A. Crisp, W7ZNN	12/10/72

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.

E.N.Y.	G.G. Berry, Sr., K2SJN	6/10/72
W.Pa.	R.L. Gawryla, W3NEM	6/11/72
W.N.Y.	R.M. Pitzeruse, K2KTK	8/17/72
S.J.V.	R. Sarroyan, W6JPU	8/20/72

Balloting results: In the Louisiana Section of the Delta Division, Mr. John A. Dobbs, WA5OLU and Mr. John R. Rivoire, K5AGI were nominated. Mr. Rivoire received 464 votes and Mr. Dobbs received 83 votes. Mr. Rivoire's term of office began June 11, 1972.

DX CENTURY CLUB AWARDS

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings.

May 1-31, 1972

New Members

K4MZU	315	JA6ARW	123	DK5PD	110	UA3XM	105	UB5QT	101	K4HQI	100
W5EDX	276	UY5ZM	123	JA1VE	110	UH8CS	105	UV3AP	101	K8ZTS	100
JA6BZI	230	3V8CA	123	W2DQC	110	DM3WYF	104	UV3CE	101	UA4WAE	100
WA8NMN	218	WB4NDX	121	IP1NUC	109	F6ADX	104	W1RED	101	UD6CN	100
SP5BAK	211	WA3DWO	119	VP9GK	109	WB6JOD	104	W2CHV	101	UV3DU	100
HB9ANR	140	JA3MGY	118	OK3RMG	108	UG6EA	103	WA3MQF	101	UWØIW	100
UA9HM	139	SM4EMO	118	WA5UGE	108	WA3GHC/1	103	WA3NKO	101	W1YNE	100
JA3BRB	138	VE3ENM	115	W8TIV	108	W4ATD	103	W4WQW	101	WA2DFC	100
W1MN	133	JA2KKA	114	DJ4XJ	107	SM3DXC	102	W7DQ	101	WB4SXX	100
F6AGB	131	OE1LM	114	K2VIV	107	UA6UO	102	W7EEJ	101	W8DET	100
JA3MGX	128	DM2ARE	112	SM7DNL	107	WB4SJG	102	ZD8H	101	WA8VYZ	100
SM6BDW	124	JA3LMU	112	UT5AB	107	WA5ZUH	102	ZL4CR	101	WB8ECX	100
TL8SW	124	JA6FUV	112	UA4AU	106	I1SBU	101	EA3NJ	100	WØGKE	100
		WA6KUR	111	JA6EYD	105	OH6ZJ	101	K3NEZ	100		

WA8NMN	218	VE7GD	129	WAØHZP	120	UA1LL	106	WA9YEW	103	WB2DLF	100
WB8HYN	207	JA3MGX	124	PY1BOL	116	YV1YD	106	WA1LXE	102	WB4SJT	100
DL7CM	164	WB2FBF	123	W3KV	116	K4AFH	104	EA8FS	101	W5QNQ	100
I1CRL	163	WA5SMM	122	WA8NNK	108	JA3MGY	103	W7DQ	101	WAØELW	100
PY2CPK	154	CN8GG	120	WØLPA	107	K1WVX	103	ZD8H	101	ZB2A	100
WA1IED	154	WB4NDX	120	DJ1QT	106	WB5DJA	103	W2PLH	100	ZL4CR	100
										SR8AH	100

Endorsements

In the endorsement listings shown, totals from 120 through the 249 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.

IT1ZGY	330	W4BRE	300	K6LQA	250	WB4DOY	220	KH6FQE	180	UWØIE	140
G8JM	325	YU1BCD	300	W4WSF	250	W5IJW	220	W1EQV	180	VE1AMB	140
W9KXK	325	JA4XW	290	WA4HHW	250	W7GSP	220	WA2LQE	180	WA1JMP	140
UA3CT	320	K2QOU	290	W5HCJ	250	WA9OUV	220	W4KA	180	W2SLF	140
DJ5DA	315	W1RLV	290	W5QIX	250	WØBA	220	W4OZF	180	WB2FBF	140
I1UA	315	WA2HSU	290	W6VD	250	WØLPA	220	WA4LDM	180	W4VON	140
K8WOT	315	WA3HGV	290	WA9SVY	250	DJ2XP	200	WA8WMH	180	WB4QFH	140
SMØAJU	315	DL3ZA	280	WB9FJX	250	F2PO	200	W9OUG	180	WA5YSC	140
VE3MJ	315	K2BT	280	G3KAA	240	K1ZND	200	WØJYE	180	W6FVU	140
W9WKU	315	WA3KSQ	280	K4CKA	240	K4DXO	200	WØMRN	180	W6MPZ	140
K6GLC	310	W4ORT	280	UA3ET	240	K9ZXG	200	ZL2ASM	180	WB6IEX	140
W1JMT	310	YV5AK	280	W2YLS	240	PY2YC	200	EA3RF	160	WA7PEZ	140
W6DOD	310	K2KGB	270	W3BRB	240	UT5CC	200	JAØAWE	160	WB9DZI	140
W9AZP	310	K4CYU	270	W3LB	240	UW3CX	200	K4LP	160	DL8HI	120
VK3YL	305	K6PZ	270	W3POE	240	W1LBA	200	K8YQW	160	K4AEH	120
W4RJL	305	ON4PA	270	W5QBM	240	WA1IED	200	KH6HIF	160	LA9GG	120
W6DOD	305	W4JD	270	WA5UCT	240	W2FWK	200	KZ5EK	160	UAØLS	120
W6NWZ	305	WB6APX	270	W9NN	240	WB2DJM	200	UB5LS	160	WA3DMH	120
F2IU	300	K6PB	260	G3JLB	220	W3CAA	200	WB6HDG	160	WB4OGW	120
K4AUL	300	K6UFT	260	K4LDR	220	W5PAQ	200	W8BOE	160	WB4TUP	120
K4CFB	300	SM6CVX	260	K4OD	220	WA5UBV	200	W9HUH	160	WB4ONR	120
OH2QQ	300	SMØMG	260	K4SHX	220	W9LI	200	K3QVT	140	W7GYP	120
W2CNQ	300	W5DRW	260	KP4DIW	220	WAØOOU	200	KR8BU	140	W9OEQ	120
W2LWI	300	W5LUJ	260	K7GYA	220	DJ1QT	180	PY2DTV	140	WAØTLT	120
		K4IE	250	K9VQK	220	WA7OJW/HR1	180	UAØLH	140		

VE5RU	330	W4EAL	280	W4WSF	240	WA5WEY	200	WA7OJW/HR1	160	WA4TMP	140
WØMX	325	WA4GUZ	280	W5QBM	240	W7ILR	200	K4PFK	160	W5LUJ	140
I1UA	315	W9HP	280	K4BMS	220	WB9FJX	200	KP4DIW	160	DJ6IN	120
VE3MJ	315	K2SHU	270	K4CKA	220	KH6FQE	180	OE2WR	160	DL9TJ	120
PY2ASO	305	UA3CT	270	K6PZ	220	K9LIH	180	VK2AOU	160	K6UFT	120
PY3BXW	300	W1DO	270	K7GYA	220	K9VQK	180	WA1HOT	160	K9ODF	120
W1JMT	300	WA4WTG	270	W3ATO	220	LA7JH	180	CE8AO	140	PY9FJ	120
W2CNQ	300	W5EDX	270	WA5TYU	220	PY9AI	180	DK4YA	140	W2FWK	120
W5QKZ	300	WB6GKK	270	W6LQC	220	VE2DJR	180	K4PFK	140	WA3RCE	120
W4RJL	290	K4BYM	260	W7GSP	220	WA1JPF	180	LU1SE	140	WB4NVH	120
WØYDB	290	EP2DX	250	WØBA	220	W3QND	180	UWØIE	140	W5HCJ	120
DJ5DA	280	K4IEX	250	DJ3LF	200	WA5UCT	180	VP7NN	140	WA5YSC	120
DJØPN	280	WA9SVY	250	K6RXZ	200	WA8WMH	180	WA1GNX	140	WB6HDG	120
G5AFA	280	9G1DY	250	OZ6RT	200	DK2MO	160	W3CUP	140	WB9DVV	120
K2QOU	280	K2ANT	240	W5DRW	200	EA8GK	160	WA4HHW	140		

Operating Events ..... de W1YL

AUGUST

9 *W6OWP Qualifying Run* (W6ZRJ, alternate) 10-35 wpm at 0400 GMT on 3590/7129 kHz, 10-35 wpm. This is 2100 PDST the night of August 8. Underline correct minute of highest speed copied, certify copy made without aid and send to ARRL for grading.

12-13 *Md.-D.C. QSO Party*, p. 104 July.

15 *W1AW 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 August 14. Underline one minute of top speed copied, state no aids used (typewriters OK), sign and mail to ARRL with your full name, call (if any) and complete mailing address.

19-20 *N.J. QSO Party, SARTG RTTY Contest*, p. 104 July.

21-24 *WR4USA Operation*, p. 104 July.

26-27 *All-Asian Contest cw, Delta and S.C. QSO Parties*, p. 104 July. *Ohio Interstate QSO Party*, sponsored by the Ohio Council of ARCs, open to all. There are two 8-hour operating periods: 1900Z Aug. 26 to 0300Z Aug. 27 and 1500-2300Z Aug. 27. No restrictions on operating time, power, no. of operators or transmitters. Each station can be worked twice on each band; once on phone, once on cw. Ohio stations may contact any other station for credit. Non-Ohio stations may contact only Ohio stations. Portables operating from any Ohio county EXCEPT Butler, Cuyahoga, Franklin, Hamilton, Lorain, Lucas, Mahoning, Montgomery, Stark, Summit and Trumbull may multiply their final score by 1.5. Portable operation is defined as operation outside your licensed county and signing /8. Score 1 point per complete exchange 80-10, 2 points on 160 and all frequencies above 50 MHz. A complete exchange with the Ohio State Fair special event station (expected call WO8HIO) are worth 5 QSO points on 80-10. The final score for Ohio stations is the total no. of QSO points multiplied by the no. of ARRL sections (including Ohio). DX stations may be worked for QSO points but do not count as additional multipliers. For non-Ohio stations, the no. of QSO points is multiplied by the no. of different Ohio counties worked. Portables changing counties during the contest may repeat contacts for QSO points, but multiple contacts may not be claimed by operating on a county line. Stations outside Ohio may claim both QSO points and counties. Exchange QSO no., RS(T) and ARRL section or county. Stations operating on county lines may issue more than one multiplier, but not more than one QSO no. to an individual station per band per mode. Suggested freqs.: 1805 3575 3975 7075 7275 14075 14285 21075 21375 28075 28575 50.15 and 145.10. Try phone on each even GMT hour and cw each odd hour. Try 160 at 0200Z Aug. 27. Appropriate awards. Logs with full info. and scores must be received by Sept. 28. Send to R. T. Bennett, K8EHU, 6470 Penick Dr., Reynoldsburg, Ohio 43068. Enclose an s.a.s.e. for results.

SEPTEMBER

1-15 *WX2MAP, Miss America Pageant* in Atlantic City, N.J. activated by the Southern Counties AR Assn. Operation is planned on 80-10, ssb 15 kHz inside the General Class band and cw 30 kHz inside the bandedge. Special QSLs via K2JOX. Include an s.a.s.e.

7 *W6OWP Qualifying Run.*

9-10 *VHF QSO Party*, this issue.

10 *Frequency Measuring Test*, open to all, begins with a callup at 0130 and 0430 GMT September 10. (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 3535, 7052 and 14,125. Late run frequencies are 3531, 7042 and 14,107 kHz. Your report must be RECEIVED by September 21 to qualify for the QST report of the competition. W1AW will start transmitting the official readings September 22. The next FMT is scheduled for November 11. Full rules will appear in the October issue.

13 *W1AW Qualifying Run.*

18 *High Speed Code Test* sponsored by the Connecticut Wireless Assn., W1EIA. Speeds of 40, 45, 50, 55 and 60 wpm *tape-sent. Five minutes of plain English text, copy one minute* consecutively solid to qualify for certification at any speed. W1EIA frequencies will be approx. 3637 and 7120 kHz, starting at 0115Z (Sunday night, local). Other frequencies not yet finally decided, but look for transmissions on the following: 3525, 3653, 3665, 3690, 7025, 14015. Copy W1EIA pre-code-practice transmissions (3637/7120 kHz, 0130Z Mondays) about a month preceding above date for up-to-date info on who will be transmitting where.

20-22 *YLRL Howdy Days.*

23-25 *VHF Contest*, this issue.

26 *W1AW Morning Qualifying Run.*

OCTOBER

4 *W6OWP Qualifying Run.*

7-8 *RSGB 21-28 MHz Telephony Contest, VK/ZL Contest phone, Massachusetts QSO Party, California QSO Party.*

12 *W1AW Qualifying Run.*

14-15 *CD Party phone, VK/ZL cw, CARTG RTTY SS.*

21-22 *CD Party cw, CQ-WE Contest hf, Scout Jamboree-on-the-Air.*

28-29 *CQ WW DX Contest, phone.*

November 11-12, 18-19: Sweepstakes.

December 9-10: 160-Meter Contest. QST

Op News

(Continued from page 104)

The proposal of SO for exclamation point was "shot down" by a vote of 363-277. We can't seem to get worked up enough to present any additional suggestions at the moment. None of them seems to be universally popular.

The appointment fraternity didn't want the CD Party setup monkeyed with. It voted down a proposal for reducing the number of CD Parties annually from eight to four (447-245) and reducing the space devoted to CD Parties in the bulletin (527-147).

Next poll? Not for a while, but we're open to suggestions for subject matter.

Staff Changes. Two new faces are being added to the CD staff. The most important addition is our new public service coordinator, Bill Mann, WA1FCM, who will occupy the seat recently vacated by Frank Connelly, WA1PMD/WA7GWL. Bill comes well qualified with experience in both traffic and emergency work, both phone and cw, and will be handling statistical and clerical functions in NTS and AREC while he accumulates background for possibly more extensive functions in the public service field. With him to the staff comes XYL Judy, WA1JCN, who will hold down a clerical function as assistant DXCC.

Rick Niswander, WA1PID/WA8VRB, will succeed to the contest position being vacated by Al Noone, WA1KQM, who is leaving the CD staff. Rick has been on the staff for almost a year as DXCC assistant, is an ardent contester and a "natural" for this job.

We welcome Bill and Judy to the staff and wish them and Rick success in their new roles.
W1NJM QST

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.

All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE – SCM, Roger E. Cole, W3DKX – SEC: WA3DUM. PAM: WA3GSM. RM: W3EFB. The Delmarva Hamfest committee continues its efforts to prepare for the big day Aug. 13 at the Harrington State Fair Grounds. WA3GSM was a May graduate from the U. of Del. and WA3LMY graduating from William Penn HS will enter the U. of Del. in Sept. Let's hear from other Del. amateurs and their accomplishments. Harmonics were welcomed for a change as a daughter for WA3HGV and a son for K3KAJ arrived in May and June respectively. W3DKX is now on 2-meter fm. WA3DUM, WA3GSM, W3PM and WA3DYG are working on a survey of active amateurs and an emergency alerting system for Del. WA3GSM has compiled a comprehensive list from Sussex County and is working on Kent County. K3NEZ received his DXCC and has a new SB-650 readout working. PSHR: WA3DUM. DEPN QNI 43, QTC 15/13 in session 155 minutes. Traffic: WA3GSM 70, W3EEB 66, W3DKX 32, WA3DUM 22, K3TVV 13, K3KAJ 10, WA3HGV 4, K3NEZ 2.

EASTERN PENNSYLVANIA – SCM, George S. Van Dyke, Jr., W3HK – SEC: W3FBF. RMs: W3EML, K3BR, K3MVO, WA3AFI, K3PIE, W3CDB. PAMs: K3BHU, WA3PLP. OBS reports from WA3AFI, W3ID, WA3KFT, K3EMA, WA3QOZ, W3CBH, WA3LWR. OVS reports from WA3KFT, W3CL, K3VAX. OO reports from W3KEK, W3NNC, K3RDT, W3BFF, K3EMA, K3NSN, K3PIE, K3OIO. PSHR this month WA3OGM, WA3PLP, K3BR, WA3QOZ, K3PIE. BPLs: W3CUL, W3VR, K3NSN, W3EML, WA3KWU, WA3QOZ.

Net	*kHz*	*Operates*	*QNI*	*QTC*	*RM/PAM*
PTTN	3610	6:30 P Dy	150	95	WA3AFI
EPAEP&TN	3917	6:00 P Dy	474	160	WA3PLP
EPA	3610	7:00 P Dy	394	291	K3BR
PFN	3960	5:30 P M-F	688	536	K3BHU

The Eastern Section Dinner Dance had 36 hams plus YLs and XYLs. Organ music by W3CUL and WB4FUJ! Best yet and W3HK had to miss it. HK1HMW is visiting K3NSN and soon will be /3 on all bands. W3EML reports all things going OK in TCC all spots filled and maybe a spare! WA3JSU back from school will now be more active. He is an announcer/engineer at WGET. WA3ATQ new QTH in the Poconos. K3MVO says BC station operation interfering with his ham operation, not BCI the job! Sorry to hear K3KTH has been seriously ill. K3VAX using 2-meter repeater for AREC and CD work. W3KEK on SSTV, anyone else? OO W3BFF did it again, zero deviation on last FMT! Phila. EC WA3HFT reports activity during Medical Emergency Drill May 3. WA3FOF took over the drill when region 3 was flooded out. AREC provided communications for the Pa. State Fishing and Game Protective Assn. during an all day outing. VHF used with hf to complete the coverage. Where did all those stations come from on FD? Traffic: (May) W3CUL 2114, W3VR 944, K3NSN 784, W3EML 501, WA3QOZ 474, WA3OGM 361, K3BR 210, WA3KWU 151, K3PIE 141, K3BHU 128, WA3MQP 112, WA3AFI 90, WA3GUK 76, WA3JSU 69, WA3QFN 55, WA3ATQ 52, WA3PLP 46, W3VAP 43, W3HK 40, K3OIO 37, WA3LWR 29, WA3QLG 24, W3CBH 19, W3ADE 17, WA3CFU 17, WA3PHQ 13, WA3KKM 12, W3VA 12, W3BUR 10, W3CL 9, K3MVO 7, W3BNR 6, K3KNL 6, W3ID 4, K3KTH 4, K3HXS 3, WA3BJQ 2, WB2LTW/3 2, K3EMA 1, W3EU 1, W3GMK 1, W3KEK 1, K3VAX 1. (Apr.) K3BR 244, K3PIE 179, WA3KWU 87, K3OIO 72, WA3GUK 58, WA3MQP 42, WA3LWR 25, WA3OVZ 13, W3OY 12, W3VA 4, K3KTH 3.

MARYLAND-DISTRICT OF COLUMBIA – SCM, Karl R. Medrow, W3FA – May BPLs: WN3OYP and WN3RCI. Congrats. W3TN would like to forget May, but made the most of his rig problems by spreading his originations around to the others. K3RUQ has taken off for Sweden. Look for /SM6 all summer. W3CDQ made it to the YLRL convention in Long Beach, and got a kick out of working WG3SFC. W3ROO worked 63 Novices from WG3SFC. W3OKN bemoans daylight saving time and poor propagation conditions – it knocks holes in his VE skeds. W3ZNW is back on 10-meter RACES. WA3RDU tries his hand at fone NCS duties. W3QU hamfested at Dayton and got that old fm religion with a new TR-22. W3GN exercises WB8GDL for 4 months from Fadner Pt., Mich. He says retirement means a busy operating sked with 424 USSR contest contacts, all the state QSO parties, and the VHF contests with new 6- and 2-meter gear. WA3LFU is home from college. W3FZV says the Orlando, Fla., hamfest had a lively bunch present. WN3RCI goes by the name of Exit. K3NCM's 2nd Op WN3OYP shows in PSHR this month. Very FB. WA3MJF and WA3IYS are on the move – household that is. WA3IYS says his new neighbor's name is Murphy no less. But then no worry Murphy didn't bother WA3MJF who lived there first! New officers at Springbrook High are WA3QCT, pres.; WA8FAE/3, trustee with WA3LDJ holding all other offices. At Goddard it is W3IXF, pres.; W3ABC, veep; WN3PTO, secy.; WA3MIL, treas.; WA3FUM, act.; W3PNT, pub. The Termite Net is back in full swing Mon. and Thur. 2100 local on 145.206 MHz. Congrats to the Albert Einstein High School ARC upon its affiliation – WA3LXB, pres. W3EZT building a new color TV, worked 40 new counties and has his sister and brother-in-law visiting from HS5-Land. K3LFD is our new SEC as of mid June. K3KMO is up to his ears in work, a new home and one night bandstandings. Thanks for an FB job K3KMO. WA3PKS Montgomery Co., and WA3PJG Balto Co. are new ECs. WA3PJG says where are all you potential AREC members, and who will volunteer for EC help? MDD had 439 show up for 62 sessions with 220 messages; MDCTN had 233 with 17 and passed 80 messages; MEPN had 392 check-ins with 21 sessions and 66 messages. Don't forget the net's picnic Aug. 6 and the MDC QSO party Aug. 12. Traffic: (May) WN3OYP 262, WN3RCI 224, W3TN 96, W3FZV 81, W3QU 74, W3FA 66, W3ABC 60, W3OKN 60, WA3PJG 56, K3BA 54, W3FCS 49, K3GZK 45, WA3EHK 28, WA3QIA 24, WA3LFU 15, WA3IIV 11, WA3MJF 10, K3LFD 8, W3ZNW 6, K3NCM 4, WA3RDU 3. (Apr.) W3QU 98, W3EZT 89, WA3EHK 25, K3RUQ 24, K3LFD 18.

SOUTHERN NEW JERSEY – SCM, Charles E. Travers, W2YPZ – SEC: W2LVW. RM: W2JI. PAMs: WB2FJE, WB2HMU, W2YPZ.

Net	*Freq.*	*Time(PM)*	*Sess.*	*QNI*	*Tfc.*	*Mgr.*
NJPON	3925	6 Su	4	82	31	WB2FJE

WA2PGS has successfully passed the Extra Class license exam. Congratulations Rose, we knew you would make it. Rose has done much to support and foster hams and ham activities; as an OPS, ORS, Salem County CD RO and a valued member of the Gloucester Co. RC. Congratulations also to WA2KWB, who completed the Electrical Engineering course at Rutgers U. and who always found time to handle traffic and make regular reports of his activities. It is gratifying to note that ORS W2IU will again be back with us. W2ORS is a recent OBS and ORS renewal. SEC W2LVW reports a new "No Novice Net" on the 15-meter band, more to follow. At the June meeting of the Quarter Century Wireless Assn. held at the Buck Hotel in Featerville, Pa., ARRL Director Connie Mac spoke briefly on recent regulations under consideration. W2HX, National secy. of QCWA also brought to the group a report of a recent meeting in Washington, D.C. with QCWA pres. Barry Goldwater. Rose Ellen received an ovation from the members of QCWA upon the announcement of her successful encounter with Extra Class exam. Traffic: WB2VEJ 252, WB2UVB 106, W2JI 41, W2ZO 32, WA2PGS 31, W2ORS 23, WA2CZA 22, WB2FJE 12, W2YPZ 12, WA2KAP 8, WB2PSX 6, W2ZI 6, WA2KWB 5.

WESTERN NEW YORK – SCM, Richard M. Pitzeruse, K2KTK – Asst. SCM: Rudy M. Ehrhardt, W2PVI. SEC: W2CFP. The list of Section Nets appears in Apr. QST. Congratulations to WA2CDV for his new DXCC. WA2PZD has a new job in Niagara Falls. The Auburn Amateur Radio Assn. assisted the local "Ride for Water" crusade. WA2QXA dropped the "N" and is manager of the Middle Atlantic Region Net which meets daily at 1630 local time on 3715 kHz. In 29 sessions, MARN had 131 QNI and QTC 26. WB2FAW has named K2KDP as asst. EC for Herkimer Co. WB2NSU has a new tri-band quad. K2VXN is building a new tower. NYS reports 333 messages handled with 791 check-ins in May. Very saddened to hear of the passing of K2IU, well known in QCWA and NYS. The Rome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Family Day was as usual, absolutely fantastic. W2YBU has 11, count 'em, eleven-elements on 40 meters. WA2BQL, not to be outdone, has three on 75. Ex-W2PPY, now W4RGL visited the RAWNY gang. K2HYQ enjoys 2-meter mobileering. K2ISN has a 2-meter repeater ready for the sky hook. WA2ZBD can supply the details for the Chemung Co. VHF Award. K2TQC has 5BDXCC – the ninth in WNY. WA2AYC has a new HW-101. Congrats to W2OE and WA2OHV on BPL. Your SCM had some very interesting discussions with W2TUK, K2SJO and W3EPC at Rochester's hamfest re the move of WNY to the Hudson Division. Such a move is possible and if you are interested in this PLEASE take the initiative to write to BOTH W3EPC and K2SJO. This move would allow for a more equitable division of Eastern and Western New York sections. WN2CVP is QSYing to Auburn. 2600 of us attended the WNY Hamfest at Rochester. WA2KND, W2ICE and company did their usual bang up job of organization. Traffic with * indicating PSHR: W2OE* 303, WA2ICU* 254, W2FR* 222, W2RUF* 220, WA2ELD* 148, WA2OHV 116, W2ROF 84, W2MTA* 82, K2KTK* 82, WA2SIR 77, WB2NRK* 73, W2MSM 68, K2UIR 59, WA2PUU 56, WA2AYC 48, WB2EEX 48, W2FEB 45, W2FZK 40, W2EAF 30, WB2VND 23, K2RTQ 19, WA2NPQ 16, WA2MPC 13, WA2PZD 13, WN2AEY 10, K2DNN 10, WA2OMN 8, W2CFP 6, W2PVI 6, WA2LUF 5, WB2FPG 2, K2IMI 2, WA2ANE 1.

WESTERN PENNSYLVANIA – SCM, Robert E. Gawryla, W3NEM – SEC: W3KPJ. PAM: K3ZNP. RMs: W3LOS, W3KUN, WA3IPU. WPA CW Net meets daily on 3585 kHz at 7:00 P.M. KSSN meets Mon. through Fri. at 6:30 P.M. on 3585 kHz. It is with deep regret we report W3UL, W3LDY, W3RSB and W3JIX as Silent Keys. The Indiana County ARC operated a special event radio station with the call WT3RFE during the Candlestick Festival May 18-21. They made over 600 contacts in 24 states and Canada. Highlight was the appearance of the newly-elected Queen Evergreen IX to the station. She had never heard of amateur radio before and ended up making a phone patch to her uncle in St. Petersburg, Fla. via WB4QWW. Excellent PR for amateur radio. W3LNW, trustee of WA3HCG, Penn State Univ. club station, now is K3CA. Also, WA3HCG is in new quarters on the campus. W3WGH has applied for 5BDXCC. K3HZL has them all worked but needs one more card for 5BWAS. WA3MDY has started at the Univ. of Pittsburgh at Bradford. The following are new Extra Class licensees: WA3GJU, K3HZL, WA3MWO, KØTHD/3 (W3GXF); WA3PQF and WN3RPO are new Advanced Class; WN3QJV, father of WA3PXA, is a new General Class; WN3SSU and WN3SWA are new Novices in the Greensburg area. WA3ODQ added a few hams to the family – XYL is now WA3QNJ and 12 year old daughter is now WN3QLH. Hearty congrats to all. Check your license. Up-grade when you renew. Public Service Honor Roll for May: K3ZNP 50, W3LOS 39, W3NEM 39, W3YA 34. WPA CW Net had 31 sessions, 328 stations checking in, and 133 messages. Traffic: W3YA 145, K3ZNP 127, W3LOS 106, W3NEM 106, W3MJ 42, WA3HCG 38, W3ATQ 36, W3KUN 31, K3EXE 24, WA3IYA 22, WA3MDY 21, K3HCT 8, K3SJN 4, W3IDO 3, WA3PMI 3.

CENTRAL DIVISION

ILLINOIS – SCM, Edmond A. Metzger, W9PRN – SEC: W9RYH. PAMs: WA9CCP and WA9PDI (vhf). RM: WA9ZUE. Cook County EC: W9HPG.

Net	*Freq.*	*GMT/Days*	*Tfc.*
IEN	3940	1400 Su	no report
ILN	3690	0300 Dy 2330	91
NCPN	3915	1300 M-S 1800	80
Ill PON	3915	2245 M-F 1430	418
Ill PON	145.5	0200 MWF	9
Ill PON	50.28	0200 M	4

The Lee County RACES Net meets on 146.94 daily at 0000Z. New Novice in the Clinton area is WN9IVR. W9LNQ has worked 6 countries and 30 states on his 2-watt TEN-TEC. WN9CMT now is WB9CMT. Our sympathy to the family and many friends of WB9GLU, W9MVT, W9DCF and W9SRJ who recently joined the ranks of Silent Keys. New ARRL affiliated clubs are the Libertyville and Mundelein Amateur Radio Society; the Lakeview Amateur Radio Assn. and the Jefferson Jr. High Amateur Radio Club. New call in the Western Springs area is WN9JTU. WB9FRV has just returned from a trip visiting VE3FXZ in Toronto. WB9ADQ and XYL WN9HVO's new QTH will be Phoenix. Ex-W9AYO retired from the State Police service. He was the Central Ill. Radio Club's (Bloomington) first pres. K9ORP is the EC in McLean County. K9PAK, editor of Ham Rag (of Rockford Amateur Radio Assn., Inc.) for several months has taken a new job in Waukesha, Wisc. Aug. 6 is the Annual 6-Meter Hamfest at Frankfort, Ill. and the following week end Aug. 13 is the Hamfesters annual picnic at Sante Fe Park in suburban Chicago. Sept. 17 is the date for the Peoria Hamfest. See you all there. WINJM of ARRL fame spent an enjoyable week end at the Starved Rock Hamfest. W9PRN and W9HPG accompanied him. Many an eyeball QSO was held. Traffic: W9NXG 120, WA9ZUE 115, WB9BXX 97, WA9OBR 93, WB9FHI 72, W9LNQ 45, WA9RTB 42, W9TAL 36, WA9NZF 33, WA9LDC 30, WB9FLP 17, WA9LHU 11, W9PRN 10, WB9HWS 10, W9II 6, WB9EDP 1, W9LDU 1.

INDIANA – SCM, William C. Johnson, W9BUQ – SEC: W9FC. RMs: WB9ANT, W9FC, W9HRY, WB9EAY. PAMs: K9CRS, WA9OHX, (vhf) W9HWR, W9PMT.

Net	*Freq.*	*Time(Z)/Days*	*Tfc.*	*Mgr.*
IIfeN	3910	1330-2300 Dy 2130 M-S	431	WA9OHX
QIN	3656	0000-0300 Dy	118	WB9ANT
PON	3910	1245 Su 1830 S-S	30	WA9UMH
PONVHF	50.7	0200 T-T	23	WA9TJS
Hoosier VHF			25	W9PMT
PON CW	3710	0000 Dy	38	WB9AHJ
PON SSB	50.2	0200 Dy	104	K9APH

With deep regret I report the following as Silent Keys: W9MM, W9WE, W9DRE, K9KQZ. W9HWR reports the Gibson County AREC Net traffic was 12. WB9ANT reports Apr. QIN 128. Honor Roll: W9EI, W9QLW, K9OPL, WB9GVT. WA9ABI gave a three hour Mini-Course on radio at the Portland High School. Mobile ARC of South Bend officers are WA9BVL, pres.; WB9IUJ, vice-pres.; K9SFQ, secy.-treas. Allen County Amateur Radio Technical Society, Inc. are K9UBF, pres.; K9SPD, vice-pres.; WB9FOC, secy.; W9JPG, treas.; W9BTZ, act. chmn. W9PQM worked 17 states using 20 watts on 40 meters. I went to the Starved Rock Hamfest, W1NJM, W9HPG and W9PRN were also present. Error: WB9GVT was listed in June QST as W9GZT and WA9GVT. New hams in Jeffersonville are WB9JYO and WN9JYP. QIN Honor Roll: WB9GVT, WB9EAY, W9QLW. W9BUQ's lineral went out. W9FWH has a new TR-4. Indianapolis Radio Club will have a class on amateur radio this fall. Indianapolis Red Cross ARC WA9LGQ lost their 80-meter antenna. BPL: WB9GVT. Amateur radio exists because of the service it renders. Traffic: (May) WB9GVT 304, WA9WJA 189, K9EFY 167, K9APH 134, WB9EAY 126, WA9OHX 118, W9QLW 95, K9CBY 55, WA9TJS 43, W9BUQ 42, W9FWH 40, K9JQY 30, WB9AHJ 24, K9RWQ 24, WA9AXF 22, K9KFM 22, K9YBM 21, W9DZC 17, WA9ULH 17, W9KWB 14, K9DIY 13, WB9EBR 13, K9KTB 12, K9RPZ 12, W9RTH 12, WA9OAD 11, W9UOZ 11, W9HWR 9, W9UEM 8, K9PNP 7, WA9BVL 6, W9JBQ 4, W9BDP 2, WA9OKK 2, W9AQW 1, WB9JYO 1. (Apr.) W9EI 21, WB9EBR 6, K9PNP 5.

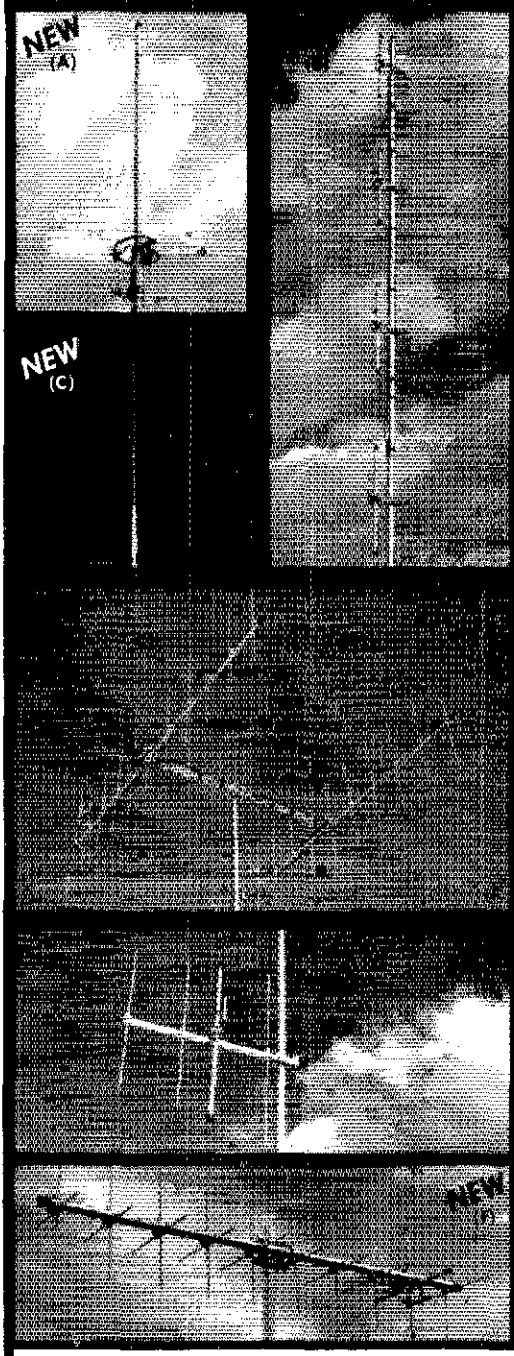
WISCONSIN – SCM, Joseph A. Taylor, W9OMT – SEC: W9NGT. PAMs: K9FHI, WA9OAY, WA9QKP, WA9PKM. RMs: W9UCR, K9KSA

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
WSBN	3985	2300 Dy	1115	208	K9FHI
WIN	3662	0015 Dy	190	90	(Apr.)
BEN	3985	1700 Dy	716	85	WA9QKP
BWN	3985	1145 M-S	450	299	WA9OAY
WSSN	3662	0100 TTS	26	2	K9KSA
SW2RN	145.35	0139 Dy	-	-	WA9PKM
WI-PON	3925	1701 M-F	519	111	W9EMC

The WSSN presently on summer hiatus will resume in the fall. Happy to report W9UCR as new RM for WIN. W9NGT reports our section has 451 AREC members with 14 local active emergency nets. Lake Delton Hamfest was a big success. A new advisory group, "Wisconsin Assn. of Repeaters" (WAR) had a meeting in Milwaukee June 7. Representatives from all repeater groups comprise the membership and hope to advise on repeater frequencies, etc. WB9DAN has an SB-500 and fifteen-element beam on two. W9NRP reports Wis. RACES had 50 QNI in May and Wis. QCWA 70 QNI. Rib Mountain Repeater group now has 20 members. K9JPS reports 5 stations on the air during some bad weather on the 29th, in Marathon County. It's that time of the year so make sure you're ready to help with emergency communications. Check with your local EC. W9PJT now asst. EC for Winnebago Co. WA9LYY new EC for La Crosse Co. K9OXY operating W9YT worked VE2DFO on 2 meters also Puerto Rico and West Coast simultaneously on 50 MHz. Traffic: W9CXY 428, WA9ZAZ 337, K9CPM 270, WA9SUU 169, W9MFG 127, K9FHI 126, WB9ABF 106, W9DND 87, W9ESJ 77, W9UCR 75, WA9DXW 74, WB9EXO 51, W9DXV 49, K9JPS 38, WA9OAY 33, K9KSA 32, WA9BZW 28, WB9BRF 27, WB9GUG 20, W9BCH 12, W9NRP 8.

DAKOTA DIVISION

MINNESOTA – SCM, John H. Halstead, KØMVF – SEC: KØLAV. RMs: WØZHN, WAØYAH. PAMs: KØFLT, WAØHRM. On



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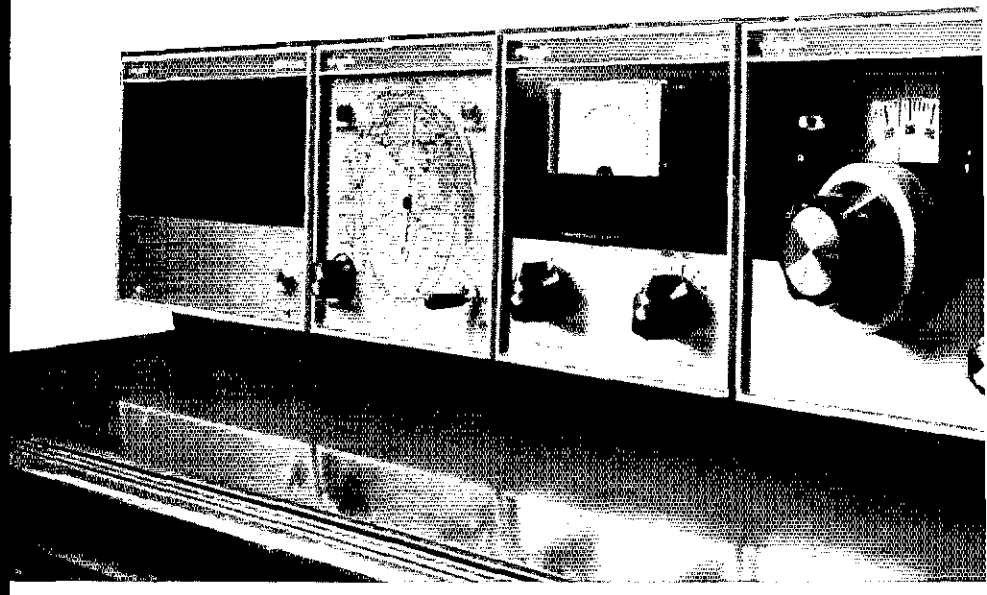
hy-gain 550A



The Hy-Gain 550A is more than precision, professional-quality HAM equipment...*it's a complete communications system.* Each separate piece is an integral part of a matched system, precision designed and engineered toward one goal...ultimate efficiency.

GT-550A Transceiver

Top power, runs 550 watts PEP input / Unmatched dependability, flexibility either fixed station or mobile / Low cost / Upper and lower SB selectable without frequency jump / Frequency calibration and read-out accurate to 1 kc using interpolation / Fast attack—slow release AVC for no-pop signal control / Automatic ALC prevents over-driving and adjacent channel splatter / Constant output through high end of 10 meters / Hybrid construction for low-temperature operation and reliability / Standard of the industry in frequency stability / Outstanding receiver sensitivity and selectivity.

Order No. 855 **Ham Net $595.00**

RV-550A Remote VFO

Solid-state construction / Complete with plug-in cables / Function switch controls Receive-Transceive-Transmit frequency independently.

Order No. 856 **Ham Net $95.00**

RF-550A R.F. Console

Contains precision wattmeter with top accuracy in range of 3.5/30.0 MHz / Switch select forward or reflected power—calibrated scales are 400 and 4,000 watts full scale / 6-position switch selects 5 antennas or a dummy load.

Order No. 857 **Ham Net $75.00**

SC-550A Speaker Console

Matching speaker with headphone jack for the transceiver, complete with cable / AC-400 power supply mounts inside console.

Order No. 858 **Ham Net $29.95**

The Sound System

Phone Patch PR-550 Order No. 812	Ham Net $ 49.00
Crystal Controlled Adaptor XO-550 Order No. 811	Ham Net $ 49.00
AC Supply AC-400 Order No. 801	Ham Net $ 99.95
Mobile Supply G-1000DC Order No. 802	Ham Net $129.95
CW Filter F-3 Order No. 808	Ham Net $ 37.50
Calibrator CAL-250 Order No. 806	Ham Net $ 25.00
VOX Accessory VOX-35C Order No. 807	Ham Net $ 29.95
Mobile Dashboard Mounting Bracket—GTM Order No. 809	Ham Net $ 8.95
Floorboard Adaptor—ZZM (Not Shown) Order No. 810	Ham Net $ 6.00

Get the complete Sound System...550 from Hy-Gain

HY-GAIN ELECTRONICS CORPORATION

P. O. Box 5407-HH Lincoln, Nebraska 68505

Sat. May 6, eight Albert Lea area hams provided communications for the Albert Lea Walk for Development. Two-meter fm was used to provide communications from five mobiles to a portable base station at the walk headquarters. Progress reports, supply requests from check-points and phone calls for walkers were relayed via amateur radio. More than 100 phone calls were relayed. Mobiles kept in contact with the walkers on the 20 mile route to deliver and pick up traffic. WBØDYZ, WAØGFS, WAØYCT, WAØRXM, WAØYGE, WØFIT, K2OPT/Ø and WAØDOT operated during the Walk for Development. WØZSW is a Silent Key. Ned will be sorely missed by all amateurs fortunate enough to have known him and worked with him in his favorite avocation, the Handi-Ham System. Traffic: (May) WAØVAS 792, WØZHN 248, WAØYVT 143, WBØCNM 98, WBØDZA 83, WBØDVP 79, WAØTFC 79, KØZRD 72, WAØNLT 58, WAØONE 54, KØPIZ 52, WAØVYB 51, WØWFA 46, KØMVF 40, WAØYAH 38, WAØIAW 31, KØFLT 29, WAØHRM 26, KØZBI 22, WØBUC 19, WAØDCJ 9, WØOBB 9, WAØUWT 8, WØWAS 7, KØICG 5, WBØCAP 4, WØUMX 4, WBØDDH 3, WØFDM 3, WAØJPR 3, WNØGKT 2. (Apr.) WAØIAW 69.

NORTH DAKOTA – SCM, Harold L. Sheets, WØDM – SEC: WØAYL. OBS: WBØATB. RM: WAØMLE. OO: WØBF. We regret to report the passing of WØLWJ who joined Silent Keys in May. WBØBMH is putting up a tower and beam. The Dakota Feed-Back Club of Grafton-Drayton area elected WBØDSF, pres.; WBØUNA, vice-pres.; WBØEHC, secy.-treas. WAØAYL, WBØBUF, WBØEDT and WØDM from Grand Forks were visitors. Considerable interest was shown in 2-meter activity by those present. A slow-scan TV demonstration was presented by WBØWBU. WØCAQ/m has been putting out a good signal from the Pelican Lake area. OBWBØHJK reports giving four Novice exams in the Lisbon area with more coming up. WA7HQG/Ø will be operating 6 meters for the summer. There are a few more eligible for the PS Award. Why not take a look at the requirements in QST and give it a try? The NDN CW will be closed down until Sept. WAØMLE and WAØELO keeps ND active on TEN.

Net	*kHz*	*CDT/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
RACES	3996.5	1830 M-F	23	526	37	WBØATJ
PON	3996.5	0900 Su	12	298	9	WAØSJB
		1830 S-S				
NDN CW	3642	2200 MWFS	16	78	37	WAØMLE WAØELO

Traffic: WØMLE 178, WØELO 119, WAØSUF 50, WØDM 15, WAØJPT 5, WØMXF 4, WBØBUF 2.

SOUTH DAKOTA – SCM, Ed Gray, WAØKPX – The Prairie Dog Amateur Radio Club will host a ham picnic Aug. 19 and 20. Details may be obtained from KØYIF or on the South Dak. nets as the date draws near. The SDN CW net has been very active the past year. A special thanks to WAØTNM and net controls for doing such a fine job. WAØYAK has a new SB-303. WØENC is on 1296 MHz and looking for schedules. Bob is getting about 100 watts output to a 6-ft. dish using mostly waveguide for transmission line. Net reports: NJQ Noon Net 586 QNI and 9 formals; Early Evening 657 QNI and 17 formals; Late Evening 1080 QNI and 20 formals; Morning Net 500 QNI and 22 formals. Traffic: WAØUEN 126, WØHOJ 76, KØAIE 24, WØOFP 3.

DELTA DIVISION

ARKANSAS – SCM, Jimmie N. Lowrey, WA5VWH – SEC: WB5CEL. RM: WA5TLS. PAM: WA5QMQ. K6KCB/5 hopes to be on 2-meter fm into Jonesboro and Little Rock soon. WB5CEL is now running a new Drake L-4B. Ark. was well represented in the June VHF QSO by the WSDI gang and WA5UMP and friends.

Net	*GMT/Day*	*Freq.*	*Mgr.*
Razorback	2330 Dy	3995	WA5VWH
DX Info	2345 M	3995	WA5VMW
OZK	0000 Dy	3790	WA5TLS
Ark Phone	1100 M-S	3937	W5VFW
Ark Teenage	2100 SS	3975	WA5ZKE
Ark P.O.	2130 M-F	3925	W5OEO
Ozark	2230 M-S	3995	WA5ZKE
CAREN	0100 F	146.34/94	W5RXU

Repeaters: WA5SNO Fayetteville, 52.550/53.020, 146.16/76, WB5FKF Forrest City, 146.16/76; WA5YUT Fort Smith, 146.34/94; W5DI Little Rock, 146.34/94; W5RHI Jonesboro, 146.34/94; W5ZF Hot Springs, 146.28/88. Traffic: WA5ZKE 211, K6KCB/5 188, W5NND 58, WB5FDP 23.

LOUISIANA – SCM, John R. Rivoire, K5AGI – My sincere thanks to all those who worked so hard go make this day possible for me and my hearty congratulations to WA5OLU for his efforts in stimulating ARRL interest in La. Recommendations for any appointments would be welcomed now. Congrats to the BRARC

and Hamfest chmn. WA5OLU for a terrific Hamfest in spite of the rain. Don't forget the CLARC Hamfest in Alex. Aug. 26 and 27. Contact WA5EVU for details. Look forward to seeing you there, too! The Delta DX Assn. entertained WA6FSC at Commander's Palace. The NOVHFC has moved the W5UK repeater transmitter to the top of the Bank of N.O. Bldg. thus accounting for the improvement in range. Members of JARC, DDXA, WARC, OARC, MTA, GNOARC and NOVHFC assisted with the Multiple Sclerosis Drive in N.O.; LARC assisted with the American Cancer Drive in Lafayette; and Twin City hams assisted with communications for the annual Cerebral Palsy telethon in the Monroe area. The N.O. area amateurs now have an impressive newspaper called R.A.T. which is the brainchild of WA5WPV and WB5CUQ and includes news from GNOARC, JARC, NOVHFC, DDXA, WARC, RACES and the SCM. Ask your club pres. to see a copy. The Caravan Club of La. is active in Shreveport. Congrats to elected officers W5ZBC, Caravan mstr.; WA5QYQ, asst. Caravan mster.; WA5MFA, secy.; W5ABA, treas.; W5JAH, K5TAD and W5EKU, board. Inspired by W5SKW at a SWARC meeting, WA5TTH recently gave a presentation on amateur radio to a group of about 40 youngsters in the OARC area. Stimulated quite a bit of interest. Why not try it in your area? W5OCN is sporting a new 2-meter rig. WB5CXJ and WB5CXK are proud parents of a new YL. K5SVD and BRARC have produced an outstanding film on amateur radio. WB5APJ is the new *pres. of MTA. It's true; the Twin City RC pres. WA5YKD really* does have a red carpet that he rolls out for guests. Ruston recently held a "swapfest" and another one is planned for Monroe this fall. A 2-meter repeater is under construction in Monroe. A N.O. Hamfest is in the planning. WA5LTA recently went from Tech. to Advance in one big step. OARC recently held an auction. WA5ZZA received her Section Net Certificate. Since the election I have visited the following clubs: JARC, OARC, DDXA, WARC, SWARC, LARC, NOVHFC and GNOARC. More visits are in the planning stages. Note the reason your SCM and SEC did not participate in the cw portion of the CD activity — an LO meeting was called by your Director for the same date and we had to be in Crossville, Tenn. Traffic: WA5VQE 141, W5TFS 72, WA5QVN 14, WN5FRQ 4.

MISSISSIPPI — SCM, Walker J. Coffey, W5NCB — SEC: WA5JWD. RMs: WA5YZW, WB5DFK. PAMs: W5JHS, WA5KEY, K5MDX. Please remember and participate in the Delta QSO Party Aug. 26-28. Appointments: WA5YZW, WAØGVO/5 as OPSs; WAØGVO/5 as ORS and WB5OGI as EC Harrison Co. Congrats to *WN5EXY now WB5EXY, to WN5DLW* who passed his General and to WB5DFK who passed his Advanced. McComb Centennial station WC5MCB made 317 contacts. Beautiful certificate for each contact if you will send QSL and 8 cent stamp or contact WA5YJA. WB5DFK and WB5EIN made PSHR with nice scores. MSPON is doing a fine job getting started, thanks to WAØGVO/5. Hear that Laurel hams are working on a club organization. Good luck in the effort fellows. See you in the Delta QSO Party.

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
MTN	3665	2345 Dy	110	89	WA5YZW
MNN	3733	2300 MWF	50	26	WB5DFK
GCSBN	3925	2330 Dy	—	—	W5JHS
CGCHN	3935	0100 Dy	1721	126	WA5LZB
MSPON	3970	2345 M-S	146	16	WAØGVO/5
MSBN	3987.5	0015 Dy	1226	128	WA5TWI

Traffic: WA5YZW 173, W5EDT 93, W5NCB 90, W5WZ 74, WB5EIN 58, WB5DFK 48, K5YTA 48, W5AMZ 40, WB5BUE 24, WAØGVO/5 24, K8YUW/5 16, W5BW 8, WA5KFY 6, WB5BKM 2, WA5EIN 2.

TENNESSEE — SCM, O.D. Keaton, WA4GLS — SEC: WB4ANX. PAMs: W4PFP, K4MQI, WA4EWW. RM: W4ZJY.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TPN	3980	1145 M-F 1300 S-Su	31	1505	43	W4PFP
ETPN	3980	1040 M-F	23	515	19	WA4EWW
TCN	3980	0100 Th	5	39	0	WB4MPJ
TN	3635	0000 Dy	31	260	169	W4ZJY
KVHFN	50.7	0100 T	4	20	0	WB4MPJ
MTTMN	28.8	0100 T&F	9	84	0	W4PSN
ETTMN	28.7	0100 &F	5	86	0	WA4QXC
DHARCN	7288	0030 W&F	6	28	0	WB4QNK
ETVHFN	50.4	0000 TTh&S				WB4IOB
ETVHFN	145.2	0000 W&F				WB4IOB
TSSBN	*3980*	*1130 M-S*		*1173*	*64*	*K4MQI*
TNN	3720	1100 Dy	31	106	24	WB4USG
TPON	3980	1130 S				WB4BHZ
TWNN	7170	2000 S	5	14	10	WB4YCV

Everyone plan to attend the 13th annual Cedars of Lebanon on the 27th. TN honor roll for May K4CNY, W4ZJY and WB4NIR. Traffic: K4CNY 133, WB4YCV 115, W4ZJY 93, WB4NIR 91,

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AMECO
- CB-6 (14–18) $ 19
- CN-50 (14–18) 29
- CN-50 (30.5–34.5) 29
- CN-144 (30.5–34.5) 29
- PS-1 AC supply 9
- CSB Selector box 6
- TX-62 VHF Xmtr 89
- 62T VFO 39

BTI
- LK-2000HD table model $695
- console 695

B&W
- 5100B Xmtr $119
- 6100 SSB Xmtr 269
- 51SB SSB adaptor 109

CENTRAL ELECT.
- QT-1 Anti-trip $ 6
- BC-458 VFO/TUM 39
- Model B Slicer 34

CLEGG/ SQUIRES-SANDERS
- 22'er 2m AM Xcvr $159
- 66'er 6m AM Xcvr 149
- 99'er 6m Xcvr 59
- Thor 6 (RF only) 85
- 417 AC sup./mod. 65
- 418 DC sup./mod. 59
- Zeus VHF Xmtr 289
- Interceptor Receiver 229
- Interceptor B Rec. 289
- Allbander HF tuner 75
- 22'er Mk II 2m AM 259

COLLINS
- 75A-2 Receiver $199
- 75A-4 (ser. #2084) 395
- 75A-4 (ser. #2354) 395
- 75S-1 Receiver 325
- 75S-3 Receiver 449
- 75S-3A Receiver 495
- 75S-3B Receiver 549
- R-390 Receiver 995
- 305-1 Transmitter 349
- 325-3 Transmitter 595
- 625-1 VHF conv. 595
- 312B-5 PTO cons. 295
- 516F-2 AC supply 115
- MM-1 mobile mike 16

R. L. DRAKE
- 2A Receiver $159
- 2AQ spkr./Q-mult. 25
- 2AC Calibrator 9
- 2B Receiver 189
- 2C Receiver 189
- 2CQ spkr. Q-mult. 29
- 2NB Noise Blanker 15
- MS-4 Speaker 15
- SC-6 6m converter 49
- CPS-1 Supply 12
- SCC-1 VHF calib. 19
- DC-4 DC supply 95
- RV-4 Remote VFO 69
- T-4X Transmitter 249
- 2NT Transmitter 109
- L-4B Linear 595
- MN-4 Matcher 59
- TC-6 6m Xmit.conv. 179
- FF-1 xtal cont.adapt. 14
- S-NB Blanker 49
- ML-2 2m FM Xcvr 225

DYCOM
- 506C Amplifier $ 49
- 10-D Amplifier 139

EICO
- 730 Modulator $ 39
- 753 SSB Xcvr 129
- 751 AC supply 49
- 752 DC supply 49
- 717 Keyer 49

ELMAC
- AF-67 Transmitter $ 49
- PMR-8 Receiver 79
- PSR-612 DC supply 19

GLOBE/GALAXY/WRL
- LA-1 Linear Xmtr $ 49
- Hi-Bander 62 99
- 5B-175 SSB xmtr 59
- VX-1 VOX 9
- Galaxy V Xcvr 239
- Galaxy V Mk II 269
- GT-550 Xcvr 379
- AC-35 AC supply 65
- DC-35 DC supply 69
- AC-400 AC supply 75
- G-500 DC supply 75
- VX-35 VOX 15
- SC-35 Speaker 15
- DAC-35 Dlx.console 69
- VX-45C VOX 19
- F-3 300cy. filter 24
- 2000 Linear/supply 275
- Economy DC supply 39
- PSA-63 AC supply 65
- SC-530 spkr.console 19
- SC-550 spkr.console 15
- AC-210 AC supply 75
- CAL-25 calibrator 19

GONSET
- Comm I 2m $ 75
- Comm I 6m 59
- Comm II 6m 77
- Comm IIB 6m 89
- Comm III 2m 109
- Comm IV 2m 169
- Comm IV 6m 149
- 14, 2, 6m VFO 59
- 6m Linear II 59
- G-50 Xcvr 169
- 900A AC supply 39
- Thin Pak 19
- G-76 DC supply 49
- GSB-100 Xmtr 169
- GSB-201 Linear 199
- GC-10S 2m Xcvr 129
- 922A 180w Cavitron 2m Amplifier 189

HALLICRAFTERS
- SX-62A Receiver – $169 mod. w/tuning eye
- SX-62A Receiver 219
- S-85 Receiver 69
- SX-101 Mk III Rec. 139
- SX-101A Receiver 189
- SX-110 Receiver 99
- SX-111 Receiver 129
- SX 117 Receiver 199
- S-120 Receiver 29
- SX-122 Receiver 239
- SX-130 Receiver 139
- SX-146 Receiver 175
- S-200 Receiver 69
- WR-600 Receiver 49
- R-47 Speaker 9
- R-50 Speaker 15
- HT-32 Transmitter 209
- HT-37 Transmitter 189
- HT-40 Transmitter 49
- HT-41 Linear 175
- HT-44 Transmitter 199
- HT-46 Transmitter 219
- HT-45 Linear 269
- SR-150 Xcvr 289
- SR-160 Xcvr 169
- PS-150-120 AC sup. 75
- PS-150-12 DC sup. 75
- SR-400 Xcvr 539
- HA-6 Transverter 89
- P-26 AC supply 45
- SR-42 2m Xcvr 89
- SR-42A 2m Xcvr 119
- HA-26 2-6m VFO 59
- HA-1 Keyer 59

HAMMARLUND
- HQ-100C Receiver $109
- HQ-100AC Rec. 149
- HQ-110 Receiver 119
- HQ-110C Receiver 129
- HQ-110AC Rec. 169
- HQ-145C Receiver 149
- HQ-170C Receiver 169
- HQ-170A Receiver 209
- HQ-170AC Receiver 219
- HQ-170A-VHF 259
- HQ-170AC-VHF 269
- HQ-170AC with noise immunizer 299
- HQ-180C Receiver 249
- HQ-180AC Rec. 349
- HQ-215 Receiver 249
- S-200 Speaker 15

HEATH
- GR-64 Receiver $ 59
- GR-78 Receiver 99
- HR-10B Receiver 69
- HR-20 Receiver 69
- SB-300 Receiver 219
- SB-401 Receiver 229
- AC-6 6m conv. 25
- SBA-300-4 2m conv. 19
- SBA-300-3 6m conv. 19
- HS-24 Speaker 9
- QF-1 Q-multiplier 9
- HD-11 Q-multiplier 15
- DX-60 Transmitter 59
- DX-60B Transmitter 69
- DX-100 Transmitter 89
- TX-1 Transmitter 99
- SB-10 SSB adaptor 75
- HX-10 Transmitter 189
- HA-10 Linear 175
- HX-20 Transmitter 125
- HX-30 6m Xmtr 149
- HA-20 6m Linear 89
- HW-12 2m Xcvr 85
- HW-12A 2m Xcvr 95
- HW-22 40m Xcvr 85
- HW-32 20m Xcvr 85
- HW-32A 20m Xcvr 95
- HW-100 Xcvr 249
- SB-400 Transmitter 275
- SB-401 Transmitter 249
- SB-220 Transmitter 349
- SB-620 Scanalyzer 119
- SB-630 cont. monitor 39
- HW-20 2m AM Xcvr 169
- HW-30 (Twofer) 59
- VHF-1 (Seneca) 139
- HP-10 DC supply 24
- HP-13 DC supply 49
- HP-20 AC supply 24
- HD-20 Calibrator 12
- HRA-10-1 Calibrator 8
- HM-10 GDO 24
- QF-1/5 Q-multiplier 15
- SB-310 SWL Rec. 229
- SB-303 Receiver 299
- IG-42 Lab Gen. 49
- HWA-17-2 FM xmit adaptor 25

HEWLETT PACKARD
- HP-410BR rack mount v TVM $ 99

HUNTER
- 72 Station Control $ 79

ICE
- FDAM-3 6m Xcvr $ 89

JOHNSON
- Navigator $ 79
- Ranger I 89
- Ranger II 139
- Valiant II 189
- SSB Adaptor 175
- Pacemaker 149
- Invader 2000 495
- Courier Linear 139
- 6N2 VHF Xmtr 89
- 6N2 VFO 29

KIDDE Douglas-Randall
- Scrubber $ 49

KNIGHT
- R-100 Receiver $ 59
- T-60 Transmitter 34

LAFAYETTE
- HE-45A 6m AM Xcv $75
- 150 Starlite Xmtr 59
- HE-30 Receiver 49

MOSLEY
- CM-1 Receiver $ 99

NATIONAL
- NC-66 Receiver $ 39
- NC-98 Receiver 69
- NC-109 Receiver 79
- NC-155 Receiver 119
- NC-300 Receiver 175
- NC-303 Receiver 199
- HRO-50T1 Receiver 175
- HRO-60 Receiver 199
- HRO-500TS Speaker 35
- NCX-5 Xcvr 329
- NCX-5 Mk II Xcvr 379
- NCXA AC Supply 75
- VX-501 Remote VFO 125
- NCL-2000 Linear 375

P&H
- LA-400C Linear $ 69

POLYTRONICS
- PC-2 2m Xcvr $149
- PC-62 6-2m Xcvr 235

RME
- 4300 Receiver $ 89
- 4350A Receiver 109
- 6900 Receiver 175
- VHF-126 Converter 59

REALISTIC
- DX-150A Receiver $ 89

REGENCY
- HR-2 2m FM Xcvr $169
- AR-2 2m Amplifier 89

SBE
- SB-33 Xcvr $189
- SBI-LA Linear 139
- SB-34 Xcvr 269

SINGER
- PR-1 Panadaptor $ 89

SWAN
- TCU control unit $ 69
- 270B Xcvr 529
- 400 Xcvr and 420 VFO 269
- 406 VFO 59
- 410 VFO 85
- 410C VFO 95
- 508 VFO 95
- 350 Xcvr(early) 249
- 350 Xcvr (late) 289
- 500 Xcvr 349
- 500C Xcvr 369
- 117XC AC supply 80
- 230XC AC supply 90
- 14C DC module 49
- 14X DC module 45
- 117X Basic AC sup. 65
- 117B AC supply 65
- 250 6m Xcvr 259
- 210 VFO 95
- Mark 6B Linear 449
- 17-2 2m Xverter 189

TEMPO
- DC Line DC supply $ 75

TEN-TEC
- Argonaut Xcvr $199
- 210 12vdc supply 19
- PM-3A Xcvr 49
- RX-10 Receiver 49

TRIO
- JR-310 Receiver $129

UTICA
- 650 6m Xcvr-VFO $ 59
- 650A 6m Xcvr-VFO 79

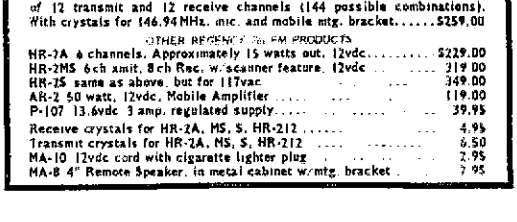
VARITRONICS
- PA-50A 2m amp. $ 89
- IC-2F 2m Xcvr 199
- HT-2 Handi Talkie 159
- FDFM-25A Xcvr 129

7/72

NEW EQUIPMENT SPECIALS & CLOSEOUTS

	reg.	NOW
BTI (mfgd. by Halstrom) LK-2000HD table-top RF section & PS-3000 supply	$916	$732
CLEGG 22'er FM series 25	$384	$284
ETO PA-70V Linear (Demo)	reg. $1795	NOW $1595
EICO 751 AC Supply Kit	$ 79	$ 49
751 AC Supply Wired	109	79
752 DC Supply Kit	79	49
752 DC Supply Wired	109	69
GALAXY PA-210 2m FM Amplifier	reg. $149	NOW $ 49
AC-210 AC supply/booster	49	39
MMB-210 mtg. bracket	6	5
SC-550 Speaker console	29	22
G-95A DC supply	99	79
GONSET GSB-201 Mk IV Linear	reg. $525	NOW $389
900A DC sup. for 900A 2m	62	44
HY-GAIN 2038A 3 el. 20m Beam (shipped in error to a customer)	reg. $139	NOW $ 99
H8257 stacked 2m halos	26	14
5125Z 2 el., 2m J-pole	33	19
LAFAYETTE HA-260 2m Amplifier 12v	reg. $ 99	NOW $ 49
RAYTRACK DX-2000L 80-10m Linear	reg. $699	NOW $499
Regency Monitor Receivers M-40 30-50Mc 12v Receiver	reg. $150	NOW $ 49
M-160 152-174Mc 12v Rec.	150	49
DR-200 HI/LOW Rec. 110v	200	149
DRS-1A Spkr. for above	16	9
AR-136 Aircraft Receiver	99	89
SBE SB2-VOX Accessory unit	reg. $ 38	NOW $ 23
SB2-MA Mobile Mtg. Bracket	12	7
SB2-MIC Mike (dynamic)	16	12
SB3-DCP Mob.sup./SB2-LA W-71 cable for SB3-DCP	249 8	149 6
SONAR 25-50 Mc Tunable FM Receivers FR-101D (110v & 12v)	$114	$ 59
FR-101DX plus 1 xtal ch.	134	69
150-175 Mc Tunable FM Receivers FR-102 (110v)	$ 89	$ 69
FR-102D (110 & 12v)	114	89
SWAN TV-2 2m Transverter	reg. $295	NOW $225
410C VFO	120	95
22B Adaptor	32	25
VARITRONICS FDFM-2 and BP-1	reg. $262	NOW $159*
FM-20M Mobile Amp.	150	59*
FM-20BM Base Amp., supply	235	89*
PA-50A 2m FM Amp. 12v	129	99*
FDFM-25 (mod. for MARS)	110	189*

* with 90-day A.E.S. warranty



REGENCY HR-212 2m FM Transceiver 12vdc, 12 channels, Approx. 20 watts output. Unique mode switch allows paired or independent selection of 12 transmit and 12 receive channels (144 possible combinations). With crystals for 146.94 MHz. mic. and mobile mtg. bracket.....$259.00

OTHER REGENCY 2m FM PRODUCTS

HR-2A 6 channels. Approximately 15 watts out. 12vdc	$229.00
HR-2MS 6 ch xmit, 8 ch Rec. w/scanner feature. 12vdc	319.00
HR-2S same as above, but for 117vac	349.00
AR-2 50 watt, 12vdc, Mobile Amplifier	119.00
P-107 13.6vdc 3 amp. regulated supply	39.95
Receive crystals for HR-2A, MS, S, HR-212	4.95
Transmit crystals for HR-2A, MS, S, HR-212	6.50
MA-10 12vdc cord with cigarette lighter plug	2.95
MA-8 4" Remote Speaker, in metal cabinet w/mtg. bracket	7.95

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DRAKE *gear for the following reasons*

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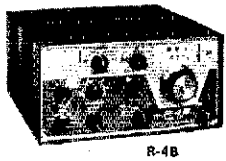
- **Performance**
- **Resale Value**

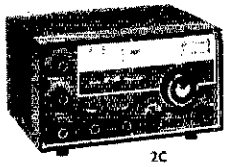
ML-2F "Marker Luxury" 2m FM	$299.95
TR-22 Portable 2m FM Transceiver	199.95
AA-22 Rec/Xmtr Amplifier - 12vdc	149.95
MMK-22 Mobile Mount	9.95
Extra crystals for ML-2F ..... each	5.00
Extra crystals for TR-22 ..... each	7.50
DRS-1 Digitally Synthesized Receiver	2195.00
2C Receiver	255.00
2AC Calibrator for 2C	18.75
2CS Speaker for 2C	22.00
2CQ Speaker/Q-multiplier for 2C	39.95
2NB Noise Blanker for 2C	26.95
R-4B Receiver	475.00
MS-4 Speaker for TR-4/6, R-4B	22.00
TR-4 Transceiver 80-10 Meters	599.95
34PNB Noise Blanker (plug-in)	100.00
RV-4 Remote VFO for TR-4	110.00
FF-1 Crystal Control adaptor	46.95
TR-6 Transceiver - with noise blanker	650.00
RV-6 Remote VFO for TR-6	110.00
AM Plug-in Filter for TR-6	35.00
CW Plug-in Filter for TR-6	35.00
LSB Plug-in Filter for TR-6	35.00
AC-4 AC supply for TR-4/6, T-4XB	99.95
DC-4 12vdc Supply for TR-4/6	125.00
MMK-3 Mobile Mounting kit for TR-4/6	6.95
MC-4 Mobile Console for TR-3/4/6	69.00
2NT CW Transmitter	175.00
T-4XB SSB Transmitter	495.00
L-4B Linear Amplifier	825.00
MN-4 Antenna Match Network	99.00
MN-2000 Antenna Match Network	195.00
W-4 RF Wattmeter (2-30 Mc)	61.95
WV-4 RF Wattmeter (20-200 Mc)	73.50
C-4 Station Control Console	305.00
TC-6 6m Transmitting Converter	278.00
TC-2 2m Transmitting Converter	378.00
SC-2 Receiving Converter for 2m	86.00
SC-6 Receiving Converter for 6m	71.00
CPS-1 Power Supply for SC-2, SC-6	19.75
SCC-1 VHF Crystal Calibrator	26.95
CC-1 Converter Console	49.00
TV-300HP High-Pass Filter	5.45
TV-1000LP Low-Pass Filter	18.75
LN-4 Line Filter 120v 5 amp	8.00
719SRD Microphone with plug	19.95
SPR-4 Programable Receiver	499.95
5NB Noise Blanker	65.00
DC-PC DC Power Cord	5.00
TA-4 Transceive Adaptor	18.00
SCC-4 Crystal Calibrator	20.00
RY-4 Teletype Adaptor	10.00
CRYSTAL KITS FOR SPR-4	
Aeronautical Overseas – 7 crystals	32.00
Amateur Bands – 6 crystals	27.00
Citizens Band – one crystal	5.00
Marine Bands – 11 crystals	49.00
MARS – 5 crystals	22.00
Teletype Commercial – 4 crystals	18.00
Time & Freq. Std., WWV – 5 crystals	22.00
Tropical Broadcast – 3 crystals	13.50

TR-22

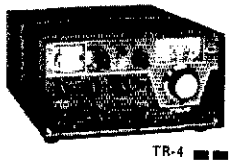
ML-2F



R-4B



2C



TR-4

- TOP TRADES for your good clean equipment
- STAY-ON-THE-AIR PLAN – Enables you to keep your trade-ins until your new gear arrives – Lose no operating time!
- PERSONAL SERVICE from fellow hams who understand your problems.
- SAME DAY SERVICE on most Orders and Inquiries from our Centrally Located Modern Facilities
- Top Notch Service Department
- LARGE COMPLETE STOCK means Fast Deliveries. United Parcel Service available to most parts of the country. – UPS Blue label (AIR) to the West Coast.
- LOW LOW 1% Monthly Service Charge (ONLY 12% per annum) on GECC Revolving Charge Plan. Only 10% Down Plus LOW Monthly Payments – For Example: $10 a month finances up to $300, $20 up to $610. Write for complete information and credit application.

If you purchase any of the new Merchandise listed below at the Regular Price and Without a Trade-In, you may take the "Bonus" Credit indicated below toward the purchase of other merchandise (such as power supplies, antennas, towers microphones, crystals, linears, accessories, etc.)

2NT Transmitter	$10 Bonus	TR-4 Transceiver	$50 Bonus
2C Receiver	$20 Bonus	L-4B Linear	$80 Bonus
SPR-4 Receiver	$40 Bonus	ML-2 2m FM Xcvr	$30 Bonus
R-4B Receiver	$40 Bonus	TR-22 2m FM Xcvr	$10 Bonus
T-4XB Transmitter	$40 Bonus		

SIX EZ-WAYS TO PURCHASE
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4. BANK AMERICARD
5. AMERICAN EXPRESS
6. GECC REVOLVING CHARGE

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To: AMATEUR ELECTRONIC SUPPLY
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I am interested in the following new equipment:

I have the following to trade: (what's your deal?)

Ship me:

I Enclose $_____; I will pay balance (if any):
☐ COD (20% Deposit) ☐ GECC Revolving Charge Plan
☐ Master Charge* ☐ BankAmericard ☐ American Express

Account Number:

Expiration DATE _____ *Master Charge Interbank number _____ (4 digits)

Name:

Address:

City & State:

☐ Send used gear list ☐ Send Drake literature

WB4USG 43, WA4GLS 32, WB4ANX 29, W4WBK 25, W4PFP 20, WN4VZC 19, WA4YFG 14, WB4BZC 13, WB4KZX 11, WB4FEC 10, WB4EKI 8, WB4MPJ 7, K4MOA 4, WA4DYJ 1, K4SJV 1.

GREAT LAKES DIVISION

KENTUCKY – SCM, Ted H. Huddle, W4CID – SEC: K4YZU. Appointments: K4QCO as ORS, WA4FMY as EC Dist. 4, WB4VLH as OVS. Endorsements: K4YCB, K4YZU and WA4MXD as OPSs. *BPL: W4BAZ and WA4JQS.*

Net	*QNI*	*QTC*	*Net*	*QNI*	*QTC*
KRN	395	22	KYN	228	243
MKPN	507	40	KNTN	301	80
KTN	1197	136	KPON	37	10

I am sad to report the passing of WB4KER. Norm was a member of KTN and a fine amateur. He will be missed by all. WB4PSJ has resigned as RM of KNTN. Ky. loses two good traffic men as both he and his son WB4UGU move to Fla. K4UNW will take over as Net Mgr. WA4WWT is frequenting KYN while home on summer vacation. Both Jenny Wiley and Lexington hamfests were successful with good turnouts and lots of visitors from surrounding states. W4EWM has resigned as EC from District 4. Many thanks for an FB job, John! WA4FMY will take over in this hotbed of AREC activity. *Traffic: WA4JQS 337, W4BAZ 295, K4UNW 81,* K4MAN 67, W4CID 63, WB4UGU 62, WN4WCM 60, W4OXM 52, WB4PVC 52, WB4EOR 48, WB4AUN 44, K4QCO 44, WA4GHO 30, K4DZM 26, K4FXN 25, WA4MXD 25, W4OYI 20, K4TXJ 14, K4FPW 13, WA4AVV 12, K4AVX 11, WA4ENH 11, WB4NHO 10, WA4WWT 8, WA4AGH 5, WA4FAF 5, K4LOL 5, W4IOZ 3, WA4TZS 2, WN4YAF 2, WB4GCV 1.

MICHIGAN – SCM, Ivory J. Olinghouse, W8ZBT – Asst. SCM: R. Peter Treml, W8KBZ. SEC: W8MPD. RMs: W8JYA, W8WVL, W8RTN, K8KMQ, W8GLC. PAMs: K8MJK, K8PVC, WA8HKB. VHF PAMs: K8AEM, WA8WVV.

Net	*Freq.*	*Time/Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2300 Dy	703	328	62	W8JYA
WSSB	3935	0000 Dy	699	78	31	K8PVC
BR/MEN	3930	2230 S-F	725	79	28	WA8KHB
UPFN	3920	2230 Dy	339	41	31	K8MJK
GLETN	3932	0130 Dy	659	58	31	W9KHK
PON	3955	1600 Dy	808	331	31	K8LNE
PON/CW	3645	2400 M-S	155	25	27	VE3DPO
Mi.6M	50.7	0000 M-S				WA8DXE
Mi.NOV	3720	2100 Dy	86	30	30	WB8JAD

Oakland Co. AREC Net for May QTC 40, QNI 4, sessions 4, mgr. W8MHQ. W8CVQ reports SW Mich. 2-Meter Net QNI 68, QTC 2, sessions 5. SW Mich. 6-Meter Net QNI 54, sessions 5, K8ZWR, mgr. With regret I report W8BWS, K8INN, K8CBK, W8OTC and WA8BZH as Silent Keys. WA8FLK now has Extra Class ticket. WN8JCG and WN8KWI made the big jump from Novice to Advanced. W8QWN made Advanced Class. With the resignation of WA8PCX the Farmington ARC reports WA8ESP as new pres. and K8RAY was elected vice-pres. K8NGF converted CB transceiver to 10 meters for use in Lansing area 10-meter net. W8LTY is back on the air from Ann Arbor with an SB-34. W8ACW now has a TR-3 in service. GC ARC awarded Ham-of-the-Month award to W8IFK. Congrats to W8SDB, WA8FSN and WA8NBD on new XYLs. SARA again furnished communications for canoe races. W8CUP is again running code class this spring. WN8MEG and WN8MFG are on the air now and doing nicely. WN8MOL is new in the Owosso area. K8HWW has worked 3 states on 220. WB8ADE now is WA7TGB and can be found on 20 meters around 14.250. WB8BJJ has a new 48-ft. tower. K8TAK's XYL is now WN8MWQ. Delta Co. ARS code and theory class graduated WN8MOG, WN8MKM and WN8MOE. Population explosion at K8VOB! His dog had 7 puppies. Traffic: (May) WA8WZF 381, W8IBX 324, K8KMQ 241, WB8JAD 154, W8GLC 152, K8LNE 142, W8TZZ 98, K8DYI 96, W8NDH 84, WA8ENW 79, WB8IMI 77, W8ZBT 65, K8PVC 62, WB8BPY 59, WB8BJP 48, WA8PIM 45, WB8BYB 37, WB8DTJ 36, K8MJK 35, WB8FBG 32, WA8KHB 32, WA8OJI 32, WB8AXI 30, WB8FEU 28, WB8BJJ 27, W8EU 27, WN8JHA 23, W8INC 21, W8MO 19, W8ACW 18, WA8WVV 18, W8DCN 17, W8KBZ 17, K8KCF 16, WA8FXR 15, W8RTN 15, K8WRJ 15, WB8DJS 13, WB8HQS 12, WB8DKQ 10, W8FWQ 9, W8UFS 8, W8NJM 7, WA8CUP 6, K8WLE 6, K8AEM 4, W8PX 4, WA8FLK 3, W8HKC 3, K8HGA 2, K8JED 2, W8SWF 2, WA8LNE 1. (Apr.) WB8ICU 14, K8HGA 8, WA8FLK 4.

OHIO – SCM, William E. Clausen, W8IMI – Asst. SCM: Kenneth L. Simpson, WA8FTX. SEC: W8OUU. RM: WA8WAK. PAM: K8UBK. VHF PAM: WA8ADU.

Net	*QNI*	*QTC*	*Sess.*	*Freq.*	*Time(Z)*	*Mgr.*
OSSBN	3001	970	84	3972.5	1430/2245	K8UBK

HAVE A BIGGER VOICE IN THE WORLD

MAGNUM SIX
R F SPEECH PROCESSOR

Price for HEATH & COLLINS rigs
$129.95*
Postpaid U.S.

*(Add 5% Tax in Washington)

- TRUE RF SPEECH CLIPPING
- 4 TIMES THE SSB POWER ON ALL BANDS (≥6db)
- EXTERNAL CONTROLS - PERMITS ADJUSTMENT TO YOUR RIG

● ATTENTION DRAKE & YAESU OWNERS!

Magnum Six units for your equipment will be available for delivery as follows;

- T4X/T4XB — One side only (upper or lower).. ***$139.95****
  15 Sept. — Selectable sideband ***$149.95****
- TR3/TR4 — One sideband ***$139.95****
  15 Oct. — Selectable sideband..... ***$149.95****
- YAESU FT101 - 1 Nov. ***$139.95****
- YAESU FT200, 400, 560, & 570 ..... ***$139.95****
  (DATES TO BE ANNOUNCED)

● SWAN & Others — coming soon.

Send for FREE Brochure
Communication Technology Group
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Federal Way, Washington 98002

A Division of Bitcil Systems Inc;

BN	647	431	62	3577	2300/0200	WA8WAK
O6MtrN	455	40	62	50.61	2300	WA8ADU
				50.16	0100	
OSN	228	57	31	3577	2225	WA8WAK
RN RTTY	183	80	30	3605	2200	W8SZU

BPLs: WA8ETX, K8NQW, W8QCU and WA8VKF. New appointees: WA8YLW, WB8CSH, WA8FCQ, WB8FNC, K8GRA as OPSs; WA8HVR ORS. W8PO new EC for Richland and Ashland Co. The Ohio Novice Net reports 21 QNI and 3 QTC in 11 sessions; they meet Sun., Tue. and Thur. at 2145Z on 3720, mgr. WB8KKI. Officers at W8UPD are WA8UPI, stn. mgr.; WN8HFZ, chief op.; WB8HTG, tech. supervisor; WB8KSV, secy.-treas. W8LT officers are WB8CEB, pres.; WA8ROF, vice-pres. Don't forget the Ohio Traffic Net Picnic Aug. 6 (contact WA8WAK); the Ohio QSO Party Aug. 26, 27 (K8EHU chmn.); Warren ARA's Family Hamfest Aug. 20 at Yankee Lake, details W8VTD. Look for WO8HIO at the Ohio State Fair, starting Aug. 24, sponsored by Central Ohio AREC and Ohio Council of ARCs. The Milford H.S. ARC, WLWC ARC and Sylvania H.S. ARC are new ARRL affiliates. WB8EEX is the new mgr. of the Ohio Valley Teenage Net which meets on 3965 at 2130Z daily. W8DYF reports the Steubenville ARC participated in a mock communications emergency. The Southwest Ohio AREC provided communications for the Milford Frontier Days Parade and Cystic Fibrosis Drive. The Apricot Net was awarded a trophy by the VFW for dedication to civic and patriotic events and the net handled mobile communications for Cleveland's Memorial Day Parade. Central Ohio AREC/RACES provided communications for TOSRV, a 210 mile bicycle tour with 2100 riders. OVS, OBS WA8KPN spoke to the Moundsville Lions Club on "Amateur Radio Today." The Van Wert ARC installed new antennas. W8QZK top Ohio scorer in the Tenn. QSO Party. WA8EBS attended the YLRL convention in Long Beach. The Lima ARC operated a display station and originated Mother's Day messages. WB8ENY now is CT2BG and working 15 meters. The Massillon ARC's Feedback reports on communications supplied for the Canal Fulton Canoe Races. Greater Cincinnati ARA's Mike and Key reports that copies of W8JDV's "Bits of Wireless History" are available from W8DSR. Repeater changes are WB8CQO to 34/94 and W8WTB to 16/76. W8GRT, in Ham Shack Gossip, reports that the Critical Bias RC assisted in the Cancer Drive, using the K8ALB repeater. Dayton ARA's RF-Carrier reports a club project led by W8DPW to work through OSCAR C. It is not too soon for your club to be preparing for the Oct. 14 meeting of the Ohio Council of ARCs. Contact W8OUU for details. Traffic: WA8ETX 382, WA8MCR 279, W8PMJ 242, WB8JEL 229, K8NQW 212, WA8YLW 194, W8QCU 193, WA8UPI 182, WA8VKF 177, W8IMI 170, WA8WAK 162, W8QZK 130, W8UDG 127, WA8QFK 124, W8CUT 108, K8BPX 105, K8UBK 103, WB8FCT 100, WA8HGH 98, WA2ASM/8 97, WB8KVU 96, WA8DWL 90, WA8ETW 89, W8VIT 86, W8GVX 81, WB8ALU 71, WA8BCX 70, WB8KKI 69, WB8CSH 66, W8MOK 62, WA8NOQ 60, WA8YIB 60, WA8AJZ 58, W8CHT 53, W8JD 49, WB8FXD 47, WB8GED 47, W8WEG 44, WB8AYC 43, W3FAF/8 43, W8SZU 42, WB8HUP 37, WA8VWH 37, K8ZYX 35, WB8EEZ 34, WB8CWD 30, WA8FCQ 30, WB8MKZ 30, W8UX 30, WA8ADU 29, WA8SED 29, WA8YXB 28, WA8ZNC 24, W8DDG 22, W8OE 22, W8SUS 21, W8BHL 18, WB8BLH 18, K8BYR 18, K8JDI 18, K8DHD 17, W8NAL 17, W8PBS 17, W8ARW 16, WB8JGW 15, WA8SHP 15, WA8ORQ 14, WA8LAM 12, W8AJW 11, W8GOE 11, WB8INM 11, WA8KPN 11, WB8FNC 9, WA8STX 9, WB8DNZ 7, W8ETU 7, W8GMC 7, K8CKY 6, W8FGD 6, W8LZE 6, K8QYR 6, WA8FSX 5, K8DHJ 4, WN8KEO 4, WB8DQV 3, W8ZLC 2, WA8HVR 1, K8MLO 1, W8VVL 1.

HUDSON DIVISION

EASTERN NEW YORK – SCM, Graham G. Berry, K2SJN – Asst. SCM/PAM: Kenneth Kroth, WB2VJB. SEC: W2URP. RM: WA2VYS. VHF PAM: WB2YQU. Nets: ESS 2300Z daily at 3.590 (10 wpm); NYS 0001Z and 0300Z daily at 3.675 MHz; NYSPT&EN 3.925 MHz daily at 2300Z; NYR (RTTY) 2330Z nightly on 3.613 MHz. Special AREC notice: Following as indicated are County ECs; get in touch to make your station available for coming season: Albany Co. WA2EAH; Rennselaer Co. WA2SRW; Schenectady Co. W2PKY; Rockland Co. K2CXO; Westchester Co. WA2JWL; ECs are needed for Greene, Columbia, Ulster, Dutchess, Putnam and Orange Counties. Write W2URP – and go! All appointments in effect as of June 10 remain active but many monthly reports not coming in. Schenectady ARA elected new officers and directors in May: WB2YLB, pres.; WB2ILC, vice-pres.; WB2VPE, secy.; WA2BLC, treas.; WA2WFI, WB2OCZ, WA1JKJ/2 and WA2JJN, dir. Overlook RC in Kingston again secured Radio Week Proclamation for New York from the Governor. Schenectady heard J.E. Forbes on radio telemetry use in natural history studies of animals in field.

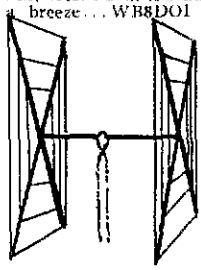
WHICH ANTENNA WINS THE CONTEST ?

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 contests. Ask yourself: Why do Gotham antennas win?

In QST since '53 without missing an issue!

QUADS

Totally satisfied with quad. Worked DK4VJP, SM7DUH, XE1AB, DM4SEE, FL8SK, F6AUM, HK7VB in few hours. Instructions a breeze . . . WB8DOI



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 foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

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' × 1¼" 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' × 1" OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞" 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.

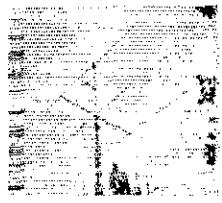
Now check these startling prices — note that they are much lower than even the bamboo-type:

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-El. 15 Beam got me R1 Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx 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; ⅞" 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 El 20.	$21	4 El 10.	$20
3 El 20.	27*	7 El 10.	34*
4 El 20.	34*	4 El 6.	20
2 El 15.	17	8 El 6.	30*
3 El 15.	21	12 El 2.	27*
4 El 15.	27*	*20-ft. boom	
5 El 15.	30*		

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, 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!**

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GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

Harmonic Hills and Communications Club of New Rochelle both had initial visits from Division Director K2SJO in May and W2KGV was HHRL's auctioneer at annual auction in May. Albany ARA met at Hq of State Power Pool. Westchester ARA has a Novice net going Thur. 8:00 P.M. local, 2115 kHz, with WN2s POB and DDB alternating as NCS. New Rochelle's Memorial Day Parade again called on Communications Club for control – *15 years straight for* this assignment. RPI Club (W2SZ) had third annual picnic in May. K2FW wants to hear from any stations interested in Coast Guard Auxiliary. W2SZ down for the summer, back with stations in the fall. WA2JLV transfers to Cornell in the fall, will be on during summer as FØAHE. WA2WGX unhappy about typo in May that changed his call. Sorry, OM. New calls: WN2s GNF, DEV, NZE and DDB. WB2GMN now sgt.-at-arms of New Rochelle Club. Tickets for the Hudson Division Hamfest in Oct. now available – details from any Council member club. See you all in Tarrytown Oct. 20-22. Traffic: (May) WA2CME 116, WA2VLS 106, WA2VYT 74, W2GPH 51, WA2FBI 38, K2FW 30, K2SJN 14, WB2AEQ 10, WA2EAH 5, WA2JLV 4, WB2KCD 4. (Apr.) WB2AJD 7.

NEW YORK CITY AND LONG ISLAND – SCM, Fred J. Brunjes, K2DGI – SEC: K2HTX. RM/PAM: WA2UWA. VHF PAM: WB2RQF.

NLI*	3630 kHz	1915/2200 Nightly	WB2LZN Mgr.
NLS*	3730 kHz	1845 Dy	WA2CXY Mgr.
NLI Phone*	3925 kHz	1900 Dy	WA2UWA PAM
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	W2GE Mgr.
NYSPTEN	3925 kHz	1800 Dy	K2VCZ Mgr.

*Section nets; all times local. With summer now in full swing, activity has rolled into its usual "slump." WB2IGT reports he will be heading for the U.S. Army for training as a Radio Operator following his June graduation from HS. Looks like the Postal Service struck again! Seems WN2FIG was patiently awaiting his "ticket" when the P.O. inadvertently stamped "Return to Sender, address unknown." And you complain of a late QST! WA2SWL has traded in his Novice license for a brand new General Class. Congratulations! W2MON now is K2GC. WA2QJU is again reporting back into NLI after a spell at school, welcome back! It seems even amateur radio suffers from the financial squeeze these days. WB2FJX reports W2DSC the NYU Bronx campus station will either move or dissolve because of the closing of the Bronx campus. One station not dissolved is W2PF, who just received his ARRL 50-year member pin. Congratulations! Also on the receiving end is K2JFF who has received the A.A.A. (Worked All Africa) Certificate! WB2UFG reports trying to get his antenna lead-ins straightened out. WA2VKK is back on the air with a Trio TR-7100 on the local 2-meter fm frequencies from the mobile. Suffolk Co. has been divided into two sections, Eastern and Western, to facilitate a more orderly administration of AREC/RACES activity. Holding down the Eastern sector will be WB2YNK formerly EC for South Hampton, and WA2HMM will handle the Western sector. The dividing line will be the western line of Brookhaven Township (Islip Township). Efforts are being made to reactivate the Babylon Township AREC/RACES activity, but your help is needed. If you are interested and can participate in this community service please contact SEC K2HTX or your SCM for complete information. For you 10-meter amers traveling through Nassau or Suffolk Counties, activity can be found on 28.720 in Nassau and 28.730 in Suffolk. WB2IQG has been appointed as asst. EC for Western Suffolk for vhf activity. Time is getting close for the ARRL Hudson Division Convention in Tarrytown Oct. 21 and 22. Programs will cover every area of activity, with experts from FM, RTTY, antennas, ATV and some special programs of interest. Order your tickets from ARRL Convention, 303 Tenefly Rd., Englewood, N.J. 07631. Special programs will be presented for those newcomers and to those interested but not yet licensed so pass the word. A word about PSHR: If your totals are not listed, they may not be high enough for that months listing. All totals cannot be listed because of space, so don't get up tight if there is no listing! Just work harder, Ha! Traffic: WB2LZN 351, W2EC 135, WA2CXY 124, WB2OYV 83, WA2PLI 57, WB2UFG 54, WA2HMM 32, WB2YNK 25, K2JFF 17, WB2CUN 12, W2PF 9, WA2SAZ 9, WA2PMW 8, W2DBQ 5.

NORTHERN NEW JERSEY – SCM, Louis J. Amoroso, W2ZZ – SEC: K2KDQ. RMs: WA2UOO and WA2BAN. PAMs: K2KDQ and WA2TAF.

Net	kHz	Time(PM)/Days	Sess.	QNI	Tfc.	Mgr
NJN	3695	7:00 Dy	31	367	257	WA2UOO
NJN	3695	10:00 Dy	31	174	172	WA2UOO
NJSN	3740	8:00 Su				WA2FVH
NJEPTN	3950	6:00 Dy	31	581	228	WA2TAF
PVTEN	145710	7:30 Dy	28	150	46	WA2JNQ
ECTN	145800	8:30 Dy	30	120	38	WB2LTW

New appointment: WB2NOM as OPS. Endorsement: WB2LTW as ORS. WN2MND passed the Tech. K2ZIP is now WØNGI. W2IZC

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☐ SN7403	SN7400N w/coll. out. 25V	.25
☐ SN7404	Hex inverter	.27
☐ SN7405	Hex inverter, w/open collector	.27
☐ SN7406	Hex inverter, 30 volts	.50
☐ SN7407	Hex driver, 30 volts	.50
☐ SN7408	Quad 2 input AND gate	.29
☐ SN7409	Quad 2 input AND w/coll. out	.29
☐ SN7410	Triple 3 input NAND gate	.24
☐ SN7411	Triple 3 input AND gate	.27
☐ SN7413	Dual NAND Schmidt trigger	.55
☐ SN7416	Hex driver/inverter 15V	.50
☐ SN7417	Hex driver 15 volts	.50
☐ SN7420	Dual 4 input NAND gate	.24
☐ SN7421	Dual 4 input AND gate	.25
☐ SN7426	Quad 2 input H.V. NAND gate	.32
☐ SN7430	8 Input NAND gate	.25
☐ SN7437	Quad 2 input NAND buffer	.50
☐ SN7438	Quad 2 input NAND buffer	.53
☐ SN7440	Dual 4 input NAND buffer	.24
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☐ SN7445	BCD to dec-driver open c	1.17
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☐ SN7447	BCD to 7 seg dec-driver 15V	1.38
☐ SN7448	BCD to 7 seg decoder-driver	1.38
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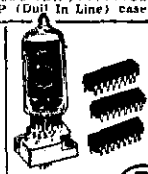

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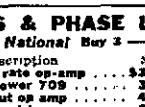

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again active after a long layoff. WB2MFE has a new HW-101. K2ZBR and WB2HXR are trying 2-meter fm. WA2NHH is on ATV. WB2RJI has the new Kenwood twins. WB2CLJ has the new Standard 826 2-meter fm transceiver. WN2EXX is a new ham in Walwick. WA2UDT worked states No. 23 and 24 on 2 meters. WB2DTV will attend NCE in the fall. WB2LTW trying mobile cw operation. WB2KNS has a new Model 14 reperf and keyboard. The K2DEL group is having a Picnic Hamfest on Aug. 12. Check K2KDQ for details. W2IZC and W2SNJ joined QCWA. W2FJK traded off his Drake-4 line for the CX-7A Signal One. Contact WA2CCF for tickets to the Hudson Division Convention in Oct. We hope everyone has an opportunity to participate in the NJ QSO Party. This is your contest and it gets better each year. We will be away the last three weeks in Aug. and would like all July reports in early. K2KDQ again reports he is still looking for ECs. A special note to the clubs in the section. If you plan code classes for the coming season, please inform your SCM. We would like to pass this type of information out to the people who write and request it. A list of new club officers should also be sent along. Traffic: (May) WA2EPI 516, WA2UOO 203, WB2DDQ 169, WA2EUO 134, W2ZEP 107, WB2NOM 102, WA2NLP 57, W2CU 47, WA2CCF 35, WB2LTW 27, WA2CAK 25, W2ZZ 23, W2WOJ 20, WB2KNS 19, W2IGL 18, WA2RYD 12, WB2CFT 11, W2CJC 11, W2CVW 4, K22FI 3, K2EQP 2. (Apr.) W2CU 81.

MIDWEST DIVISION

IOWA – SCM, Al Culbert, KØYVU – SEC: KØLVB. New OPS appointees: WBØDTD and WBØAAM. WNØHNB is a new Novice from Nashua. WNØHMG is a new Novice from LaPorte City and also is the mother of WBØDTD. North Iowa ARC had a well attended steak fry at their Field Day site for a planning session. KØJGI was elected the Wapello County Republican chmn., so imagine he will be a little scarce on the bands. The 75-meter picnic committee reports $250 worth or prizes ordered for the event scheduled for Aug. 20 at the Riverside Park in Marshalltown; be sure and show up to collect your share of the goodies, potluck dinner as usual. The former WAØOTE has moved to Phoenix, Ariz, and is awaiting a W7 call. KØOFX has moved to Fairbanks (KL7-Land) and working as a hunting guide.

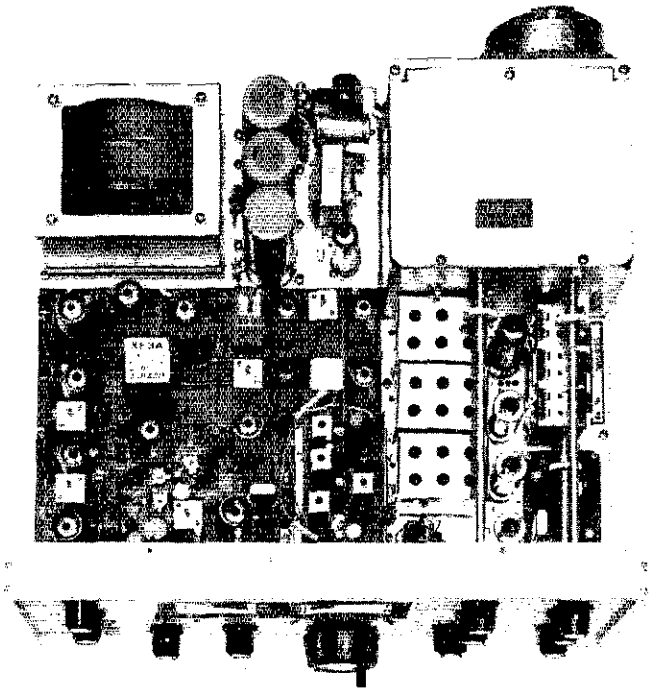
Net	*Local Time*	*MHz*	*QNI*	*QTC*
Ia 75 meter	1230	3,970	1419	82
Ia 75 meter	1800	3,970	1018	38
IUCN (CW)	1830	3,560	126	120

Traffic: WØLCX 453, KØDDA 190, WØMOQ 149, WAØAUX 108, KØAZJ 98, WØIO 18, KØJGI 12, KØYVU 12, WAØVZH 9, WBØAAM 3.

KANSAS – SCM, Robert M. Summers, KØBXF – SEC: KØLPE. RM: KØMRI. PAMs: KØJMF, WBØBCL. VHF PAM: WAØTRO. Our deepest sympathy is extended to the family of WNØCZU who passed away May 11. Mid-States Mobile Monitor Service under the leadership of WBØBCL, recently appointed PAM reports QNI of 1935 for May, 154 of which were mobiles. The service handled 119 QTC and 64 patches or phone calls. The Kans. Sideband Net asst. mgr. WØGCJ reports QNI 879 and QTC 89 in 27 sessions. KPN QNI 236 and 12 QTC in 18 sessions. QKS reports QNI 456, QTC 163 in 62 sessions. KØMRI and WØCHJ keeping the cw gang very much alive despite the summer harvest season. QKS SS will already be in operation by the time you read this. Jump in and give the net a hand by getting your code speed up and the knowledge of traffic handling up to snuff. Let new Novices know of the net as well as all interested persons – 3735 is the frequency. WAØUPA reports Hambutchers net (Apr.) QNI 531, QTC 57; (May) QNI 535, QTC 41. WAØTAS now a 100 QSL card holder for DXCC. WA2HSP/Ø just commissioned Ensign USN and will continue work on Graduate EE at KU; KØMRI on upgrading from Conditional to Extra Class; WAØTRO and WAØSVO on passing Second Class phone. Congratulations one and all. WAØSVO also has been appointed an RO in Lawrence for CD. Last but not least a couple of transfers from the Hiawatha Club – WAØOZP to Salina and WAØGRM to Lawrence. Traffic: WØHI 167, KØMRI 148, WØINH 130, WØBGX 71, WØMA 65, WØGCJ 64, WØCHJ 63, WAØTAS 59, KØBXF 58, WAØLBB 47, WAØLLC 45, WBØBIY 37, KØLPE 30, WAØJFC 26, WØPB 21, WBØCZR 20, WBØBVC 17, WAØYMK 17, WØSOE 16, WAØZTW 15, KØFPC 9, WØMCH 9, WA2HSP/Ø 7, WØBLI 6, WAØOWH 4, WAØNXD 2, WNØGOL 1.

MISSOURI – SCM, Robert J. Peavler, WØBV – SEC: WØENW. New appointments: KØHMN as OVS; KØAEM and KØBIX as RMs.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MNN	7040	1800 Dy	31	93	31	WØGBJ



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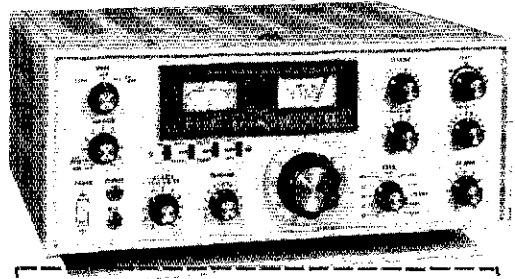

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MON2	3585	0245 Dy	23	73	33	KØAEM
PHD	50.45	0030 T	5	98	10	WAØKUH

New officers of the *Missouri Single Sideband Net* are KØHNE, mgr.; WØQMF, asst. mgr.; KØPCK, treas. Congratulations to: WAØDGG and KØKUD, both recently married; WAØUOX and WAØVBG, who graduated from Northeast State College; to WNØERI, who passed General exam; new Novices WNØHGW, WNØHOH, WNØHHOI, WNØHOJ, WNØHOK and WNØHOL, who received their licenses with the help of the Mid-Mo Amateur Radio Club in Jefferson City. KØKWJ and KØKWL, between them have held NCS for the Jefferson Barracks ARC Social Net for 416 Thur. in a row (that's eight years, folks). WBØFMV received WAC certificate. WAØUOX now in England as G5AZJ. Several moves have taken place recently: WAØQLN now WA3SDE, WØLKB is W4OPE, WØLKC is W4OMM; also, KØDBN now K4HLT, XYL KØJVV is K4HLU, and son WNØCHT is WA4AIR. Fla. seems to be popular with Missourians. KØRPH has restored the beam which blew down in Dec. Traffic: KØONK 633, KØAEM 112, WØBV 80, WØOUD 72, WØGBJ 39, KØBIX 33, WAØWOC 26, KØSGJ 21, WAØKUH 10, KØPCK 6.

NEBRASKA – SCM, V.A. Cashon, KØOAL – Asst. SCM: Velma Sayer, WAØGHZ. SEC: KØODF. Endorsements: WAØGHZ as asst. SCM; KØODF as SEC; WØTQD as RM; WØFQB as OPS; WØTQD and WØDMY as ORSs.

Net	*Freq.*	*GMT/Days*	*QNI*	*QTC*	*Mgr.*
NSN I	3982	0030 Dy	983	25	WAØLOY
NEB	3590	0215 Dy	106	23	WØTQD
NMN	3982	1230 Dy	1314	31	WAØJUE
AREC	3982	1330 Su	159	0	WØIRZ
CHN	3980	1730 Dy	1054	63	WAØGHZ
DEN	3980	2000 M-F	250	4	WAØAUX
WNN	3950	1300 M-S	587	11	WØNIK
NSN II	3982	2330 Dy	1118	16	WAØLOY

With regret I report that WAØPIF has joined Silent Keys. WØFQB is eligible for 50-year award, he received first ticket in 1922. Can anyone top it? WØMW is moving to North Platte. WØYPY moving to Lincoln. WØGEQ operating new Tempo. WAØJOI graduated from Boulder with BS degree in Aerospace Engineering. Saunders Co. ARS now affiliated with ARRL and Northeast Nebr. ARC made 100% ARRL affiliated club Honor Roll. Congrats to WØBUR and WAØRKU on 35 wpm endorsement stickers, WBØFZL on new General ticket, WNØGUA and WNØHOA on Novice tickets. 160-Meter Net suspended operations for summer months. WAØAUX reports Dead End Net will be operating irregularly for next three months. Box Butte Co. 2-meter AREC Net QNI 17, QTC 1. Smoke Signal Senders and Pine Ridge ARC had very good attendance for their activities. Traffic: WAØSCP 114, WØLOD 70, WAØCBJ 28, WAØYGZ 27, WØIOP 26, WØFQB 25, WØTQD 22, WØNIK 12, WØSGA 11, WØDMY 10, KØJFN 10, WØMW 8, WAØPIF 8, WAØGHZ 7, KØDGW 6, WAØJKN 6, WØGEQ 5, WAØCHN 4, KØECH 4, WBØGAK 4, WØHTA 4, WAØJIH 4, WAØLOY 4, WAØYGI 4, WAØEFI 3, KØHNT 3, WAØPCC 3, WØAGK 2, WBØCAU 2, WAØJUF 2, WØLWS 2, WAØOQX 2, WBØCWD 1, WAØHAL 1, KØOAL 1, WAØQFX 1.

NEW ENGLAND DIVISION

CONNECTICUT – SCM, John McNassor, W1GVT – SEC: W1HHR. RM: K1EIR. PAM: K1YGS. VHF PAM: K1SXF.

Net	*Freq.*	*Time/Days*	*Sess.*	*QNI*	*QTC*
CN	3640	1900 Dy 2200	62	570	326
CPN	3965	1800 M-S 1000 Su	31	583	197
VHF 2	145.98	2200 M-S	22	116	49
VHF 6	50.6	2100 M-S	23	118	17

High QNI: CN – W1KV, WA1GFH, WA1GGN and W1CTI. CPN – K1SXF, W1BFY, W1GVT, WA1OPB and K1YGS. SEC W1HHR still without antenna for CN-CPN nets but very active mobile and 2-meter fm – ECs are requested to plan and report on fall AREC activity. Director W1QV Club Letter should be filled in and answered by all clubs – your comments will better enable him to represent you at ARRL Board Meetings. The 19th Annual CN-CPN Dinner Meeting was another enjoyable success, thanks to K1EIR and K1YGS for the excellent arrangements and thanks to the many net members who attended. A wonderful "Eye-Ball" QSO Party that was much too short. Murphy's Marauders provided members with extensive FD plans. Meriden ARC was host to the 10-10 Club

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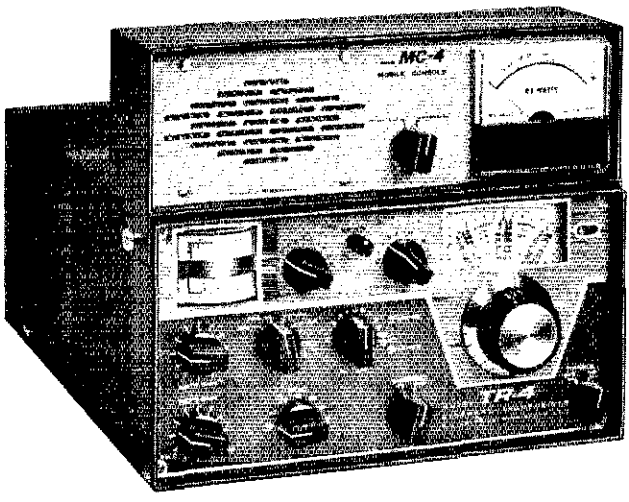

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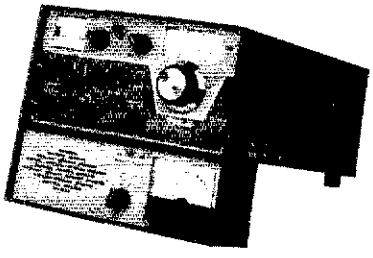

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Northern Conn. ARC includes ARRL films at meetings. Southington ARA Newsletter provides much information to all members. Tri-City held their annual Homebrew Contest. Congratulations to: WA1HOL for 35 wpm sticker; WA1OTY for General Class; WN1QFT new Novice; East Granby High School ARC for ARRL affiliation; and to WA1GFJ for promoting Official Proclamation of Conn. Amateur Radio Week! ARRL has movies, slides, quizzes and tapes all available for club meetings; plan now to use them at your fall meetings. Traffic: W1EFW 364, WA1KVI 166, K1SXF 118, *WA1NTR 109, W1NJM 103, W1CTI 99, WA1GFH 79, W1MPW 70,* WA1NYU 67, K1YGS 55, WA1OPG 53, W1GVT 48, WA1GGN 45, W1KV 44, W1AW 43, WA3JRY/1 23, W1QV 21, WA1PHF 20, G3XPM/1 20, W1BDI 16, WA1NLD 12, W1RML 12, W1DQJ 11, WA1OPB 9, W1ARR 7, W1CUH 3.

EASTERN MASSACHUSETTS – SCM, Frank L. Baker, W1ALP – SEC W1AOG received reports from ECs W1s BAB, LE; K1s ZUP, DZG, NFW; WA1DXJ. WA1QEK is new EC for Lawrence. W1ALT helped W1ARU get back on the air – he received his old call after 40 years! W6BJR/1 back on the Cape. W1GM back home with new wife. WA1OAM is on 2. WA1PIT passed General and Advanced. W1MGP has call WA1QFC. W1FUR is overseas. W5DTQ/1 now in Carlisle. W1JCX home from Ariz. G3DKK/9 in Lannon, Wisc. T9 Club met at W1KGH's. WA1DFL, W1DOM worked W7-Land on 6. W4KT/1 cousin of W1BIO back in Chatham. K1DZG in hospital. WA1QHM is a new YL. Cape Cod & Islands ARA held annual family picnic in Falmouth. W1AOG says with the Hurricane Season near, everyone should monitor 3945 MHz for any emergency, also 14320 Hurricane Watch Net. W1LIT sends his regards to all from Nursing home in Brockton. WA1EYY has a new QTH. W1UX has an NCX-3, going mobile. WA1NRT has an SB-102. WA1AKR working DX on 10. WA1QEJ in EM2MN. W1AEC has new HA-460. K1JNQ Sharon ARA now on the air. WA1DJC says school is over. W1EUJ worked W5CYZ for his 47th state on 6, also VEs on 2. W1DAL got married and moving to Sudbury. K1QDR moved to Ala. W1VYS is again home. W1AIQ has retired. K1OJO worked WØMJS on 2. W1FJJ on 160 and chasing DX. Capeway RC met at K1NDA's QTH. W1MV spoke about antennas at the Massasoit ARA. W1LJH reports ZS1IM a Silent Key. W1GLF's son is now in RI. WA1QAG has new gear on 2. W1MPP and K4RO/1 are in Waterford, ME. WA1MXF spoke about a club repeater and W1SPU spoke on "Radio Controlled Airplanes" at the Middlesex ARC. Norwood ARC had a hidden transmitter hunt won by K1HRV. K1EEG spoke about "The Marco Net" at the Quannapowitt RA. W1PL is on 6. W1EED and W1MGP have worked each other on 10 bands, the final one on 220. WA1MSK is new OPS/ORS/OVS. WA1NRT new ORS. Endorsements: K1DZG, W1RM as ECs, W1s DAL, FJJ, WA1BYM as ORSs; WA1MHJ as OBS, OPS. New officers of Quannapowitt RA: W1PL, pres.; W1FJ, vice-pres.; WA1ERY, secy.; K1NKA, treas.; W1s HBB, IKR, OKB, EED, K1s ZTA, NFW, dir. W1BHD has a nice VXO 2-meter fm adapter. WA1KGS's repeater came in very handy for the Charles River Clean-Up day providing communications for the Waltham area. WA1LSD was NCS with W1HGT, K1IOE, WA1LAG, WA1NVC, K1RAN mobile at clean-up sites. K1QZO is home from the hospital.

Net	*Freq.*	*Time/Days*	*QNI*	*QTC*	*Mgr.*
EMN	3660	1900/2200 Dy	556	297	W1QYY
EM2MN	145.8	1900 Dy	185	92	WA1OWQ
NEEPN	3945	0830 Su	81	7	K1EPL
6MCBN*	50.85	1930 M-F	19		K1OKE

*April. Traffic: (May) WA1EYY 274, W1OJM 270, W1PEX 179, W1CE 152, WA1MYA 152, W1EMG 73, WA1OWQ 70, WA1MYK 41, W1DOM 36, W1UX 35, W1AEQ 31, W1AOG 22, W1ABC 20, WA1NRT 15, WA1FNM 12, WA1AKR 8, WA1MHJ 7, W1PJ 7, K1UAF 7, WA1DJC 5, WA1QEJ 5, W1AEC 4, W1MNK 4, K1JNQ 2, W1LE 2. (Apr.) K1GNW 163.

MAINE – SCM, Peter E. Sterling, K1TEV – SEC: K1CLF. PAM: WA1PEN. RM: W1BJG. W1UE (well known to many hams) has been in the Park Davis Veterans Hospital in Providence since last winter. W1FBJ is operating 2-meter fm from his summer QTH at Sebago Lake. WA1FCM and XYL WA1JCN left Maine for Conn., will be working for the League. We wish them the best on their new jobs. Ex-K1MZB is now WN1QHU and hopes to get his old call back soon. The Northeast Area Barnyard Net reports 27 sessions and 682 check-ins. WA1CED stricken with Bell's Palsy is progressing very rapidly through electrotherapy. K1RQE is building a new home in Scarborough. K4BSS/1 is leaving Brunswick and going to Fla. New hams in Maine are WA1QDN, WA1QEZ, WN1QFF, WA1QFX, WN1QGO, WN1QHU. Congratulations fellows. K1MTJ is back home from the Navy and is active on 2-meter fm and also 6-meter cw and ssb. Traffic: WA1FCM 200, K4BSS/1 71, WA1JCN 9, K1TEV 8, WA1PHE 5.

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NEW HAMPSHIRE – SCM, Robert C. Mitchell, W1SWX – SEC: K1RSC. RM: W1UBG. Endorsements: W1UBG and K1ACL as ORSs. WA1JTM moved to Guam and now is KG6JBS. Welcome to WN1QFH, WA1QGS, WA1QFY, WN1QGA and WN1QHC. This report is originating from Dallas, Tex. My thanks to all who participated in the 1972 SET. Special thanks to SEC K1RSC, RM W1UBG and FCs WA1MAR, K1BCS for their excellent activity and reports. NH was not last in the listings this year. DJ1US/W1 has 93 countries worked for DXCC and needs only Utah for WAS. W1UBG now works DX on 20. WA1FSZ is planning operation through the upcoming Oscar VI Satellite. K1YSD has a two-element V antenna on 80, 40 and 15 meters. W1BYS is camping in North Dak. and operating 2-meter fm. W1UBG reports the NHVT Net had 148 check-ins and 130 traffic. K1ACL is very active with traffic. W1DXB is OSL mgr. for KG6JBS. Traffic: DJ1US/W1 99, W1UBG 96, K1YMH 49, K1GMW 35, WA1PTF 32, K1ACL 7, W1SWX 4, W1DXB 2.

RHODE ISLAND – SCM, John L. Johnson, K1AAV – SEC: W1YNE. PAM: W1TXL. RM: W1YKQ. RISPN reports 31 sessions, 442 QNI, 71 traffic. The Newport County Radio Club, W1SYE, participated in Rhode Island Amateur Week on June 3 and 4 from Kings Beach on Newport's historic Ocean Drive. The club operated on emergency power for 24 hours under the direction of club pres. W1GAM. Operators were WN1POH, WA1OSL, W1WLG, WA1AUL, WA1KUU, W1JFF, W1TXL, K1VPK, W1GAM, W1NEC, WA1CSO assisted by log keepers and maintenance personnel. Many local and DX contacts were made on the Novice bands, 6-meter phone band on the 20-meter ssb and cw bands. The club used this as a practice session for FD and all equipment was checked out and found to be operable. W1YNE is now building a new SB-200 linear amplifier. Traffic: W1YNE 131, WA1POJ 14.

VERMONT – SCM, James H. Viele, W1BRG –

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
VTPO	3909	2100 Su	24	8	W1BQR
Carrier	3945	1300 M-S	450	16	WA2FAN
VTSB	3909	2200 M-S 1130 Su	421	45	K1YGI
NHVT	3685	2300 Dv	148	130	W1UBG

W1KOO planning Mt. Mansfield repeater for near future on 444.4 MHz in and 449.4 MHz out. W1VSA, W1DQO and W1BRG attended Western New York hamfest recently at Rochester. The beautiful center spread in summer issue of Vt. Life magazine is QTH of "Bing" Day, formerly W1URU from Morrisville, now W1CTF in Johnson. Thanks W1KJG. W1FKF, formerly of Burlington, now back to Vt. from New Hampshire and teaching French at Vermont Academy. K2SFO has acquired a pair of transceivers for 450 MHz. Traffic: K1BQB 76, WA2COO/1 54, K1OXD 45, K1YGI 35.

WESTERN MASSACHUSETTS – SCM, Percy C. Noble, W1BVR – SEC: WA1DNB. CW RM: W1DVW. VHF/UHF PAM: W1KZS. WMEN held 4 Sun. sessions with QNI 32 and handled 2 messages. WMN held 31 sessions with QNI 162 and handled 94 messages. Top 5 in attendance were W1BVR, W1TM, W1DVW, WA1LNF and W1STR. WA1LNF has new Heath SB-650 frequency counter. W1ZPB built a 350-watt dummy load in a one gallon paint can. He also has completed a TT-L/2. West Boylston High School ARC is now an ARRL affiliate. Congrats. OO WA1LPR sent out 24 notices during May! Six fine club bulletins received here. Many thanks! CMARA reports new Generals are WA1OAU and WA1OAT. The 2-meter fm repeater now runs 60 watts. W1IHI has a new TR-22. WA1NVS is writing fm articles for the FM Repeater Bulletin of 73 magazine. HCRA reports W1MTV has a repeater in service covering the greater Springfield area. The American Red Cross is looking for emergency communications volunteers. Contact K1DJU or W1ALL. MARC reports WA1JCK, WA1MWF, K1WMN and K1JHC assisted Leominster CD during their annual disaster drill. NOBARC says repeater K1FFK will soon be on 220 (along with the present 2 and 6 meters). The club now has 76 members! K1VPS and WA1KFN aided Becket police communications during a motorcycle "Endura." W1KZS, WA1HSO, WA1KMW and W1YBT put on a fine demonstration of ham radio at the Hobby Fair at North Adams State College. WM ARFC Repeater Assn. reports all officers reelected for another year. New members: K1QQH, WA1IDU, W1JUM and W1DVW. A one-watt walkie-talkie will operate repeater WA1KHC within a radius of 20 miles. Your old SCM now has a 50-year ARRL membership pin. Traffic: (May) W1BVR 63, W1DVW 52, W1TM 39, WA1LNF 35, W1KK 23, W1STR 12, W1ZPB 9, WA1MJE 5. (Apr.) W1ZPB 13.

NORTHWESTERN DIVISION

IDAHO – SCM, Donald A. Crisp, W7ZNN – The FARM Net meets each day at 0200 GMT on 3935 kHz. The Idaho RACES Net

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meets week days on 3990.5 kHz at 1415 kHz and Mon. at 0130 GMT on 3990 kHz. The WIMU Hamfest is scheduled for Aug. 4, 5 and 6. K7ZQG moved to Idaho Falls, K7NHV moved to Pocatello. Al just received his PhD at Michigan State University and will start teaching at Idaho State University. New Eagle Rock club officers are W7VSS, pres.; K7PGG, vice-pres.; WA7SJW, secy.; WA7BGK, treas. The club is sponsoring a Novice code and theory class. WA7QIG is building a new linear. A new South East Idaho net meets each Tue. at 9 P.M. MST using the K7ENE repeater on 146.34 in and 146.94 out. Traffic: W7GHT 135, WA7BDD 46, W7IY 31, W7ZNN 18.

MONTANA – SCM, Harry A. Roylance, W7RZY – Asst. SCM: Bertha A. Roylance, K7CHA. SEC: W7TYN. PAM: WA7IZR. K7BMT is moving to Douglas, Wyo. WA7HZY is the new Mont. Navy MARS coordinator. WA7HDD was involved in a traffic accident in Europe. WA7OBH is a new Advanced Class licensee. WA7PDC is the manager of the Travelers Inn at Conners. K7LTV has opened a new radio supply center in Billings. K6MDL has returned to Mont. and is residing in Great Falls. K7IEJ has transferred to Detroit, Mich. W7OIO has been in the hospital in Butte. Butte Radio Club is enlarging their club room. Hope to see you all at the WIMU Hamfest in Aug. Mont. PON net had 29 formal sessions with 389 check-ins. The annual directors meeting will be held in Seattle on Aug. 18, 19 and 20. If you have anything that you wish discussed, notify the SCM or SEC. Traffic: WA7JQS 122, W7LBK 30, K7EGJ 8, WA7IZR 8.

OREGON – SCM, Dale T. Justice, K7WWR – SEC: W7HLF. RM: K7GGQ. PAM: K7RQZ. New appointment: WA7JKX as OBS in the Grants Pass area. W7LT copied the Armed Forces Day message and worked AIR, WAR and NPG. W7TGR is on 220 MHz with 75 watts. Two new Tech. licensees are WA7OFN and WA7OFQ from Central Ore. The Central Ore. Radio Amateurs call is WA7TPD. New Novices are WN7TEE and WN7TSJ. WA7GCE still runs the novice code practice net on 3710 kHz at 9 P.M. Tue. and Thur. nights. In May WN7BMY received a 13 wpm certificate and WN7RVA 20 and 25 wpm certificates. WA7OVP received his Tech. and WA7REA is a new General. WA7DAC has returned from Houston on a more permanent basis as a graduate of Rice. The Portland area AREC net now meets on 146.64 MHz fm as an additional frequency. The AREC group had two mobile hunts and an antenna raising party at the Red Cross center during May. May AREC Net check-ins were 175, traffic 5. Traffic: (May) K7OUF 116, K7QFG 78, K7WWR 17, WA7MOK 16, WA7KRH 10, W7LT 8, W7MLJ 7, W7IWN 4. (Apr.) K7NTS 140, K7OUF 122, W7CPK 15.

WASHINGTON – SCM, Arthur Henning, W7PI – SEC: W7UWT. RM: W7GYF. PAMs: W7GVC, W7MCW. VHF PAMs: K7BBO, K7LRD. New appointments: WA7FIC as OBS and W7IEU as EC for Snohomish and Skagit Counties. The Northwest Technical Net will resume operation at 1500 PDST Sept. 10 on 3970 kHz. Congratulations to W7BUN on obtaining his Advanced Class ticket. W7BA reports traffic way down.

Net	*Freq.*	*Time(Z)*	*QNI*	*QTC*	*Sess.*	*Mgr.*
WSN	3590	0145	282	105	31	W7GYF
NSN	3700	0200	322	87	31	WA7OCV
NWSSB	3945	0130	956	47	31	K7KPC
NTN	3970	1830	917	105	31	K7VAS

Governor Evans has designated the week of Sept. 10-17 as Washington State Amateur Radio Week. The Wash. State QSO Party sponsored by the Boeing BEARS will be the week end of Sept. 16,17. K7OZA has the Heath combo 301 and 401 now on the air with good reports. WA7HCL has new sideband equipment and still fighting power line QRM. K7JRE leaving for graduate school in Mass. for nine months this fall. W7FN worked his 50th state on 6 meters when he worked Delaware. K7BBO has new 6-meter kw final in operation. Northwest DX Convention will be at the Doubletree Inn, South Center (Seattle) Aug. 5 and 6. For details contact Western Wash. DX Club % W7AUK. The Hamfest sponsored by the Radio Club of Tacoma will be Aug. 19 and 20. Further details may be obtained by contacting W7BUN. K7GGD added SSTV monitor and camera to station, and first contact was SURINAM. W7AIB recuperating from knee injury. Wash. State AREC Net had 44 check-ins during 5 sessions and handled 4 messages in May. Dir. W7PGY and SCM W7PI attended two different meetings in Spokane during May with the Inland Empire amateurs. W7FXD in Burien hospital recuperating from heart attack. Skagit salmon Bar-B-Que scheduled for Sept. 9 at Oak Harbor City Park. Traffic: W7BA 517, K7VAS 217, W7KZ 144, W7BQ 119, W7PI 81, W7GYF 75, W7DZX 67, WA7OCV 65, K7CTP 59, K7OXL 53, W7APS 40, W7AXT 33, K7OZA 33, W7BUN 27, W7IEU 24, WA7KNW 23, W7FQE 17, W7AIB 14, K7NZV 8, WA7HCL 6, K7BBO 5, WA7LVQ 5.

PACIFIC DIVISION

EAST BAY – SCM, Paul J. Parker, WB6DHH – WA61YB having rig trouble. W6ZF reports W4TV coming for a visit. Many hams from this section were seen at NPG for Armed Forces Day. Thanks go out to all who worked there for another successful year at beating NSS. W6RGG again OOing for E. Bay. K6PJ has enjoyed extended vacation. WA6JUD, K6KLY and W6YKU sure had fun this VHF SS with over 400 contacts, 32 states and 39 sections, all on 6 meters! We have a new SEC in this section, WB6RPK. New AREC and RACES activities are now under way with area Red Cross and U.S. government agencies. All interested are urged to contact WB6RPK. The Travis ARC is back on the air after a long absence – WB9GUN/6, pres.; WB6YXQ, vice-pres.; WB9ACF/6, secy.; WB5EEG/6, p.r. Traffic: W6IPW 238, WB6VEW 33, W6ZF 4, WA6IYB 1.

HAWAII – SCM, Lee R. Wical, KH6BZF – Asst. SEC: KH6BZF. RM: KH6AD. PAM: KH6GJN. VHF PAM: KH6GRU. QSL Mgr.: KH6DQ. SRC: KH6FOX. ECs: KH6s GPQ, BAS, GLU, HHG and BZF.

Net	*Freq.*	*Time(Z)/Days*
Confusion (Patches)	21.400	0001 All
Friendly	7.290	2030 M-F
Pacific Interisland	14.335	0830 M-W-F
Micronesia	14.335	0800 T-Th-S-Su
Pandora Box	14.277	0430 All
S.E. Asia	14.320	1230 All
Pupule	7.288	0630 All

VE3WL was recently in town for some sun and surf as was W6MAV. KH6CU is on with a new Swan 600T/600R rig from Henry Radio. KH6GGR is on with a new Drake line. KH6GLU was on the Apollo 16 ckt with SSTV. KH6HCM/W7UXP finished up with DXCC 305/WAZ/5BWAS/33 states on 160 meters. KH6HCM will be surfacing soon from a unique DX locale and will be in with some big guns as an avid contestor! K4BOV/KH6 is on from his new home at Makakilo. W5QQQ/7 who's been known to operate from W7RM in contests was recently through the islands. K5CIT/KH6 reports he's worked close to 100 countries on the Pandora's Box net. Joe recently applied for Life Membership. KH6BXY has TTY equipment for anyone who contacts him. KG6JAR reports working fine DX. KH6HHG reports looking for VT on 10 meters for WAS. WH6HJF reported he snagged HB9AMZ for a new one. KH6EWA is again active from his Kaneohe Bay QTH. WB2BRB/KL7 was in the islands visiting DCA-PAC. KH6IW recently retired from CGUSASTRATCOM-PAC. Last month's Honolulu Star-Bulletin had a nice feature article on KH6BIH of Captain Cook, Hawaii. KH6GDR now is mobile on the 2-meter repeater. KH6GRG is stationed in Hilo on the USCG ship Cape Small. KH6GPV left for Calif. and new job. KH6HJF is ex-K6KUF. Ex-KH6AFD was in town visiting KH6BB and XYL. KH6HC has been running his FT-101 barefoot but has added an FL-2100B. Ted plans a Tri-EX W-51 to support his TH6DXX soon and he also passed his Extra Class exam. Traffic: (Mar.)KH6HHG 11, WH6HJF 7. (Feb.) KH6HHG 10, KG6JAR 2. (Dec.) KH6GPV 1.

NEVADA – SCM, Leonard M. Norman, W7PBV – SEC: L.L. Mike Blain, WA7BEU. W7ILX reports the National Post Office Net meeting will be held at the 1973 SAROC. W7DNX graduating from Univ. of Reno with a B.S. degree. W7NVY has an fm repeater ready to go from Boulder City. K7ZOK still looking for NH 6-meter contact to complete his second WAS on 6 meters. Code & Theory classes have been approved for the Washoe County Schools in the adult education program. WA7GVF, WA7QPX, WA7OZS and WA7RPS hiked up Slide Mtn. to correct an antenna problem on the K7UGT 2-meter fm repeater. W7OOF has the 28/88 fm repeater with auto-patch ready to put on high Potosi Mtn. about 9K MSL and 25 miles south west of Las Vegas. WA7SVI won the SNARS May hidden transmitter contest, with WA7QPX getting the white elephant. Want to talk horses, contact W7TVF or WA7JVC. WN7QKE reports activity in the Novice bands. Mobiling in the west try WCARS-7255 and WPSS-3952 plus 34/94 fm. Traffic: W7ILX 58.

SACRAMENTO VALLEY – SCM, John F. Minke, III, W6KYA – SEC: W6SMU. SCM W6KYA and XYL attended a dinner at Susanville on May 20 and presented a charter of ARRL affiliation to the Lassen Amateur Radio Club. A total of 18 were at the dinner, which is quite a large amateur radio turnout for a town that size. Those of you who live in the northeastern part of the section and want more information about the club contact W6WMF, P.O. Box 186, Janesville, CA 96114. Officers of the newly formed John I. Sabin Pioneer Radio Club are W6TEE, pres.; W6JAC, vice-pres.; K6FWE, secy., W6VD, treas.; and K6FO and W6GDO. Membership

is restricted to employees of the telephone company. WN6RIF is a new Novice in the Sacramento area. OK1WC still looking for those rare counties, especially Alpine, Colusa, Glenn, Sierra and Yuba. Look for him on 14.076 kHz at 0500 GMT daily. Communications for the "Walk for Development" between Placerville and Rancho Cordova was provided by the El Dorado ARC and the RAMS. Those participating were WB6WBP, K6HDP, W6KDJ, WN6AHV, WB6FBN, WB6HGH, WA6IQK and WB6KZN. New Novice in Chico is WN6RIJ. W6LNZ hopes to complete DXCC this year and has received his A-1 Operators certificate. Congratulations, Ross! Start planning now for the Calif. QSO Party and the Pacific Division convention. Oct. isn't that far off. Traffic: (May) WA6FGU 28, WA7KZL/6 24, W6LNZ 6. (Apr..) K6YZU 17, WA7KZL/6 12.

SAN JOAQUIN VALLEY – SCM, Ralph Saroyan, W6JPU – On June 2, 1972, the first fm oriented Hamfest was held in Fresno, with approximately 150 in attendance. The ARRL forum, technical talks and program were excellent and everyone attending had a good time. All those who worked on the Hamfest, "FM West" are to be congratulated. W6ZRJ and W6VZT were present at FM West as was W6PDD, past pres. of FARC. Those attending from Fresno and vicinity were WB4DHA/6, WA6WXP, WA6BUH, W6OWL, WB6OGO, WB6OSH, WB6GVQ, W6WME, WA6PRU, WB6EZR, WB6RLX, WA6FBL, W6AJU, WB6JRL, K6RPH, W6JPU and WB6KUO. W6DPD, W6JUK and K6ZMW attended the vhf conference in Santa Clara. WB6RLX lost his entire antenna system because of lightning. WA6WXP has a new five-element 20-meter beam. WA6EXV is active on 432 MHz. WA6EXV also attended the vhf conference in Santa Clara. WA6QKE is pres. of WCARS. W6YKS is trustee of W6SF. W6YKS worked KØUDZ on 6 meters RTTY. K6QAX contacted his 50th state on 6 meters. The FARC has a repeater on 2 meters operating on 146.20 and 146.80 MHz. All members of FARC are invited to use it. Traffic: WA6CPP 6.

SANTA CLARA VALLEY – SCM, James A. Hauser, WA6LFA SEC: WA6RXB. RM: W6BVB. Palo Alto ARA furnished communications for the Powder Puff Derby in early July. The Redwood City CD gang furnished communications for the July 4 Parade, NCN had 557 QNI and handled 358 messages in Apr. W6KZJ is back in harness again on NCN and RN6. W6AUC is active with nets and OO work. WA6HAD is active on NCN and RN6. W6OII reports net activity on MTN. W6IQU is active on NCN and with QCWA. W6NLG is moving so will be off the air for a while. W6ASH is busy with AREC activity. W6EJ has submitted cards for his DXCC 300 sticker. Congrats Bob. WA6UAM reports that the West Coast UHF Conference in Fresno was a success.

SPECS	AREC	Mon. 7:45 PDST	146 MHz
NCN	NTS	Dy 7-8:30	3630 kHz

Bulletins Thur. nights: W6ZRJ; CW 7:45 PDST, 3590 kHz 7129 kHz - SSB, 8:30 PDST, 3815 kHz – RTTY, 9:00 PDST, 3615 kHz. Traffic: (May) W6RSY 409, W6BVB 166, W6YBV 154, W6NW 131, W6AUC 98, W6DFF 91, W6KZJ 49, WA6HAD 19, W6OII 10, W6IQU 9, W6EJ 7, WA6LFA 6. (Apr.) W6ASH 16. (Mar.) W6NLG 9.

ROANOKE DIVISION

NORTH CAROLINA – SCM, Chuck Brydges, W4WXZ – SEC: W4EVN. PAM: WB4JMG. RM: K4GCN. The 1972 LO meeting had an attendance of 60 at Greensboro and our Roanoke Division Dir. W4KFC will go to the Board Meeting with lots of info. WB4PNY and G3KSN/W4 now are Mr. and Mrs. residing in Tappahannock, Va. We lost Joyce as RM. She was presented a letter of appreciation at the LO meeting. Congrats to K4GCN our new RM. The Rowan ARS completed a 14 week Novice Class. After a fine job of passing 9 the Rowan group is after new prospects. WA4KWC reported from newsroom on election returns assisted by W4GOQ/WA4NUO/K4HCU. K4HCU is a new OBS for Asheville area. Congrats to K4CKA on receiving coveted 5BWAS at Pfafftown. The Mecklenburg ARS started Novice classes with 12 or so and also had large group covering election returns. Congrats to new ARRL affiliates – the Holding Tech Club, Raleigh and the Eden ARC. The Raleigh ARS continues active with a wide range of programs and also report W2GHK/4 moving to Wash. We all wish you the best, Stu and good DX! Now, net listings:

Net	*Freq.*	*Time(Z)*	*Mgr.*
THEN	3923	2330	K4HE
JFKN	3923	2230	WB4JMG
NCSSBN	3938	2330	WA4OPI
CNE	3573	2300	K4GCN
CNL	3573	0200	WB4ETF
NCNN	3725	0000	WB4TNC
CNCTN	Salisbury Rpt	0200	K4GHR

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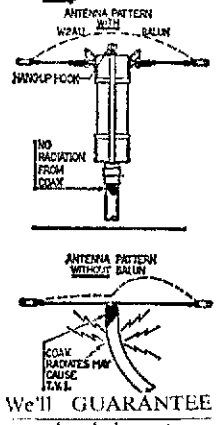

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Traffic: K4GCN 378, W4EVN 209, WB4PNY/4 81, WB4TNC 47, W4WXZ 40, W4OFO 31, K4VBG 27, WB4JMG 19, WB4HDS 14, WA4KWC 12, K4MC 11, K4GHR 10, WB4HGS 8, K4EZH 4.

SOUTH CAROLINA – SCM, Elizabeth Y. Miller, WA4EFP – SEC: WA4ECI. Asst. SEC: W4WQM. RM: K4LND. PAM: WB4KNB. The Greenville Hamfest in May was well attended. WB4SAO of Sumter was graduated from High School and will attend USC this summer. WB4DFW is working at a local Rock Hill radio station. W4FVV looks very trim after having lost some 164 pounds. Don't worry, there's still enough Jerry left. K4VVT is relaxing at his Easley home after college. W4NTO was QRP operation in May from Cameron College, Lawton, Okla. with a wet string antenna thrown from the 8th floor dorm window with which he kept daily sked with K4LNO in Spartanburg. Looking forward to seeing all of you at the Camden Ham picnic on Aug. 13.

SC SSBN	2300Z Dy	3915 kHz
CN	2300Z&0200Z Dy	3873 kHz
SCPN	1600Z M-S	3930 kHz
	1230& 1930 Su	

Traffic: K4LND 263, K4OCU 67, WB4PDQ 52, WB4RKU 45.

VIRGINIA – SCM, Robert J. Slagle, K4GR – Asst. SCM: A.E. Martin, Jr., W4THV. SEC: WA4PBG. Asst. SECs: WB4JJF, WB4CVY. RMs: WA4EUL, WB4NNO, KØPTV/4, W4SHJ. PAM: WA4FGC. Congratulations to New River Community College ARC, Dublin; Woodbridge Wireless Society; and Ole Virginia Hams Radio Club, Inc., in Manassas on ARRL affiliation. Eastern Shore ARC still looking for living quarters. Tidewater ARC meets 10:00 A.M. local on 2nd and 4th Sat. at Central Radio Co., 1080 W. 39th St., Norfolk. WB4KBJ has an SB-200 in line. WN4WLK passed General. K2HBA repairing antennas. LO meeting at Greensboro the best yet. W8VDA/4 reports summer static back. State meeting at Roanoke particularly fine this year; came home with an IM-17. WB4OXD received DXCC. WB4MZT says SEVWA promises a spectacular for the next Azalea Festival. W4KAO closing store earlier to be on the air more. K4LKQ reports would rather be on VRN than teaching nights. K4GTS reports busy month. WN4UPO found 15 wide open in early May and chalked up some beauties. K4FEY got a Mod 19 from W4SQQ. W4MK back from Fla. vacation. WB4JTT passed second class radio-telephone license. K4FSS Germany bound. Director, W4KFC busy administering, mostly on 2 fm. WB4DRB fired up on VRN. VRN QNI 167, QTC 74. VSBN QNI 923, QTC 283. WB4RZW has SB-102 nearing completion. WB4PWP hampered on VSBN with laryngitis. W4JUJ back from Europe; has 2587 counties to WA4WQG's 3008. W4HIR has rig problems. Virginia Salt Mine Net 3947 kHz at 0715 and 1630 Mon.-Fri.; VSBN 3935 at 6 and 10 P.M. daily; VSN and VN on 3680 at 6:30 and 7:00 P.M. respectively; VFN on 3947 at 7:30 P.M. daily; VRN on 3625 at 8:00 P.M. daily; VPON on 3905 at 2215Z Tue. Traffic: (May) K4KNP 307, W8VDA/4 256, W4UO 245, W4YZC 170, WB4KIT 67, K4FSS 65, WA4JJF 65, WA4FGC/4 62, WB4KBJ 59, WB4SIK 59, K4LKQ 56, K4FEY 51, K4GR 45, W4KFC 37, WB4PWP 34, WA4PBG 30, K3V1V/4 26, WA4EUL 21, W4TE 21, WB4PCK 20, WA2BFX/4 18, WB4RZW 18, K4GTS 17, WB4RDV 15, K4KA 14, K4VIG 11, W4LQO 10, W4THV 9, WB4DRB 7, K4JM 7, WA4WQG 7, W4MK 6, K2BHA/4 4, WB4YAH 3. (Apr.) WA4EUL 38, W4HIR/4 35, WA4WQG 19, WA2BEX/4 9, W4LQO 7, WB4PWP 3. (Mar.) WA4WQG 13. (Feb.) WA4WQG 11.

WEST VIRGINIA – SCM, Donald B. Morris, W8JM – SEC: WA8NDY. RM: WB8BBG. PAMs: W8DUW, W8IYD, K8CHW. Phone Net Mgr.: WA8POS. WA8CRW won first prize at the Huntington Hamfest. Officers of the Tri State ARC of Huntington are WB8AQU, pres.; WA8HVM, vice-pres.; WN8FIN, secy.; W8EIJ, treas.; WA8POS, trustee. WVN CW Net with 63 stations handled 9 messages. WVN Phone Net with 281 stations passed 26 messages. WN8CGH and WA8YCD are now Advanced Class licensees. Opequon Radio Club of Martinsburg operated FD from mountain top fm radio site. Tri-State ARC won the Field Day Award presented by the State Radio Council. W8DUV and W8DUW attended the YL International SSB Convention at Treasure Island, Fla. Several state clubs were represented in the Governors office for picture taking and signing of "Amateur Radio Week Proclamation." Pres. Harry Dannals, W2TUK, attended the West Va. State ARRL Convention at Jackson's Mill. Black Diamond ARC Hamfest Bluefield, Aug. 27. WB8BMW and K8OFQ operating Aeromobile on 2-meter fm. Traffic: WA8POS 111, WB8CYB 61, W8JM 19, WB8BMV 12, WN8III 12, WA8YCD 9, W8DUV 8, WB8IJW 6, K8QEW 6, WA8NDY 5, WA8WCK 4, WB8DQX 3, W8CKX 1, WA8CRW 1, WB8DXF 1, WB8IHA 1, WA8KAN 1, W8KBM 1, WA8LFW 1, WA8OKG 1, WA8OSZ 1, W8VOI 1, K8ZDY 1.

ROCKY MOUNTAIN DIVISION

COLORADO – SCM, Clyde O. Penney, WAØHLQ – SEC: WAØQOY. RM: WØLRN. PAMs: WBØAWG, WØCXW, WØLRW, WAØWYP. KØJSP is enjoying signal monitoring with his new SB-610. WBØBSS is now asst. Net Mgr. for CTN. WAØZPP has received his RACES license. WBØCCB received WAS in Apr. WBØBOE, WAØZWA and WBØCGJ received their Advanced Class license in May. Newly elected officers of the Empire Radio Club are WBØAWB, pres.; WAØYOB, vice-pres.; WBØAAZ, pro. chmn. Our best wishes go with WAØYNP on his retirement as Net Mgr. of CCN, and our congratulations and best wishes for every success go to W2PTV/Ø who takes over the duties of Net Mgr. for CCN. Net traffic May: Hi-Noon QNI 1138, QTC 37, informals 117, 942 minutes. SSN QNI 219, QTC 100, informals 23, 644 minutes, 31 sessions. Columbine QNI 1001, QTC 83, informals 149, 26 sessions. CCN QNI 239, QTC 92, 31 sessions. CTN QNI 313, QTC 36, informals 68, 27 sessions, 597 minutes. Net traffic Apr.: Hi-Noon QNI 1026, QTC 43, informals 107, 30 phone patches, 859 minutes. CTN QNI 336, QTC 64, informals 87, 699 minutes. Traffic: (May) WØWYX 358, WØLQ 113, WØLRN 109, WBØCCB 104, WØIW 67, WBØAXW 65, WAØZWA 48, WØLRW 46, WBØDNY 43, KØJSP 37, WAØWYP 34, WØSIN 32, WAØTMA 14, WBØDRG 13, WAØNFO 13, KØSPR 12, KØIGA 7, WØBY 6, WØLAE 4. (Apr.) WAØWYP 64, WAØZWA 10, WØBY 8, WØKFH 2.

NEW MEXICO – SCM, James R. Prine, W5NUI – Plans have been completed for the big hamfeast in Albuquerque Sept. 15-17. The EC meeting in Denver May 20 was attended by your SCM. WØKVX has been appointed as fm advisor to the Division Director. K5CQH has been appointed as section coordinator to assist KØKVX in frequency coordinating and related functions. In the early fall an effort will be made to staff a phone session of the twelfth regional net. Bulletins will be issued on the Roadrunner Net 3940 kHz as soon as time and frequency are established. Traffic: W5UH 123, K5DAB 100, K5MAT 89, W5RE 27, W5DAD 8, WA5OHI 8, WB8JNI/5 7, WA5BLI 2.

UTAH – SCM, Carroll F. Soper, K7SOT – SEC: W7WKF. RM: W7OCX. Twelve amateurs furnished communications on the Friendship cruise, May 28 and 29, from Green River, Utah down the Green River to the confluent of the Colorado River to Moab, Utah. W7WKF was mobile on his boat accompanied by WA7ARK. They were of great assistance to many boats in trouble on the rivers. These amateurs furnished the only communications available in this area. WN7RNZ now WA7RNZ, tech. W1KLK gave a very interesting talk, June 6, on League headquarters and vhf fm receivers, with approximately 50 amateurs from Salt Lake Ogden and Provo area in attendance. WA7JUW back on the air in St. George. W7NIB, Fremont, Wayne County back on the air. Traffic: W7EM 138, W7OCX 68, W7IQU 22, WA7LFS 19, W7GPN 4.

WYOMING – SCM, Wayne M. Moore, W7CQI. – SEC: K7NQX. RM: W7GMT. PAMs: W7TZK. K7YUG. OBSs: K7NQX, W7SDA, WA7FHA, K7YUG. Nets: Pony Express, Sun. at 0800 on 3920; YO daily at 1830 on 3608; Jackalope Mon. through Sat. at 1215 on 7260 (alt. 31920); Wx Net Mon. through Sat. at 0630 on 3920; PO Net 1900 Mon. through Fri. on 3950. We lost another active ham – WA7RKA has moved to Spokane, Wash. WA7FKD challenged all single operators on Field Day. Will let you know later how he came out. We did gain one ham – K7BMT is again back in Wyo. WA7HFY was married in May. Ex-WA7OHL now is KL7HKH and looking for some Wyo. hams. During the first part of June, W7TVK, W7TSM and others were active passing welfare messages and emergency traffic into the Rapid City area which was deluged with a flood. Another new ham in Casper is WN7TOV. Hope all you new Novices are studying for your General Class. Traffic: K7VWA 132, K7NQX 71, W7HNI 26, WA7NHP 18.

SOUTHEASTERN DIVISION

ALABAMA – SCM, James A. Brashear, Jr., WB4EKJ – Congratulations to the section SS winners – WB4SPK for cw and K4HPR for phone portion. New officers of Tuscaloosa ARC are WB4BAP, pres.; W4IICV, vice-pres.; WB4SVH, secy.-treas. Auburn Univ. ARC new officers are WB4WBJ, pres.; WB4LNM, vice-pres.; WBØBOM/4, secy.-treas. Huntsville ARC – K4OWV, pres.; WA4WED, vice-pres.; WA4RBH, secy.-treas.; WB4SON, asst. secy.-treas. K4ZZE is the new NM of AENR. WB4WUS, NM of AENO says his G50 has improved his net operations considerably. He reports a band opening on 6 and some members worked up to 20 states on May 12, 13 and 14. Some of the AENO members are interested in working Oscar-6. K4JK reports he was 98 cycle low on 40 meters on the May 12 FMT and 132 cycle high on 80 using a Kenwood. He heard lots of amateurs calling on commercial

frequencies during the "Armed Forces Day" program and recommends a "bigger" announcement in QST for the next one. Pretty summer weather is taking its toll on the nets. WB4SON is NM of SFTN which meets Mon.-Fri., 2100Z on 3.975. WB4SVH is acting NM of AENT while WB4KDI vacations in Canada. K4HJM reports he is having a ball with DX. Congratulations to W4BMM and XYL who celebrated their 50th wedding anniversary on May 20. He is a charter member of AENP. Congratulations also to WN4YQX on making BPL. As usual, the Mobile ARC put on another big Hamfest. The North Ala. Hamfest will be held in Huntsville at The Mall, Aug. 20. Welcome to new hams: WN4s ZPW, ZQD, ZQE, ZQF, ZQR, ZUC, ZUD, ZUT, ZUV, ZVV, ZVZ, ZWA, ZWB, ZWC, ZWD, ZWF; WB4s ZPD and ZTN. Appointed K4ONF as EC, Cullman Co. Traffic: WB4SVH 302, WN4YQX 136, WB4SON 131, WB4KDI 92, WB4FKJ 80, WB4NLK 46, WB4JMH 35, K4AOZ 29, WB4THU 24, WB4LTD 9, WA4VEK 6, K4HJM 4, WB4WUS 1.

EASTERN FLORIDA – SCM, Regis K. Kramer, W4ILE – SEC: W4LYT. Asst. SEC: W4SMK. RM: WB4OMG. PAMs: W4SDR 40, W4OGX 75. The Dade Co. ARPSC will operate special events station WR4USA from the Republican National Convention at Miami Beach, Aug. 21 - 24. Watch for them on 7072, 14072, 7272, 14317. QFTN, the All Fla. CW Traffic Training Net meets daily at 9 P.M. on 3715 kHz. A QFTN Crystal Pool is one of the recent inovations of this FB training net. Contact Net Mgr. WB4PNG or RM WB4OMG if you are a WN4 and interested in learning how to handle traffic. WB4SQA sends slow-speed Offical Bulletins on 3715 Mon. through Fri. The Fla. Amateur Teletype Net meets daily on 7125 kHz at 11 A.M. EDT. Traffic outlets are available including out-of-state messages. The Sociedad Internacional de Radio Aficionados (SIRA) ARC for the South Fla. Spanish speaking amateurs elected WA4ZZG as pres.-coordinator who reports they now have over 70 members. Talking about ARPSC, the SIRA group ran over 300 phone patches on Mother's Day between the U.S. and the Antilles, Central and South America. WB4NCH TPTN Net Mgr. reports 4 of her traffickers, WB4s SOA, UOC, ICD and OAA have earned Net Certificates for May. BPLs: WA4IJH and WA4NBT. Renewals: W4EH as ORS; WB4HKP, ORS, OPS, OBS; WA4EYY, W4WHK ECs; KØECG/4, OVS. New appointments: WB4SOA as ORS, OBS; W4LDM, ORS; W4FIQ, EC Lake Co. W4BKC and XYL K4UIZ are retiring and going to do some traveling. W4SDR, pres. of Hambone College and Mgr. of the Fla. Midday Traffic Net attended the Orlando Hamfest and was greeted by his many friends and net members. W4CVO, now /6 in El Cajon, CA., misses the Knights of the Kilocycles. W4MML is working with RACES/AREC in Belleglade. W4OZF has DXCC-180. KØECG/4 from JAX meets ssb nets. W4VLK is asst. EC Duval Co. The Fla. Amateur Sideband Emergency Net meets each Wed. on 3940 at 7:30 P. Keep those SAR's coming – also send in your PSHR reports to me each month. Traffic: (May) WA4IJH 797, WA4SCK 263, K4SCL 230, W4ILE 167, WA4NBT 156, WB4PTH 148, W4PFF 145, WA2AFL/4 124, WB4OMG 119, WB4PNG 111, W4NGR 107, W8BZY/4 101, W4SDR 100, W4DVO 85, WB4HJW 85, W4IJK 72, W4BM 61, W4DQS 58, WB4HKP 57, WB4AID 49, WB4SQA 49, K4GJ 43, WB4WHK 41, WB4AIW 33, WA9JSX/4 33, W4KRC 33, WB4SKJ 33, WB4TPJ 33, K4QG 32, W4YPA 32, WA4BGW 31, WA4HDH 31, WB2NGI/4 29, W4IAD 28, W4SMK 27, WB4ADI 25, K4BLM 25, WB4HKP 25, W4IA 25, W4LSR 25, W4ZAK 25, K4EJW 24, W4IYT 23, K4EYN 21, W4LDM 19, WA4BRJ/4 17, WA4FJA 17, W4RHA 17, W4TJM 17, WA5ALN/4 16, WA4CIQ 16, WB4ONR 16, WB4OXA 15, K4EBE 14, WN4UNV 14, W4EH 13, W4OGX 13, W4DFP 12, K4EZE 12, K4LEC 12, WB4SYL 12, W4GUJ 10, K4FLV 9, WA4VZF 9, W4YPX 9, W4NTE 8, WB4RLU/4 8, W4VLK 8, W4YOX 8, KØECG/4 7, W4MML 7, WB4SZS 7, WB4FJY 6, W4DDW 5, W4FXH 5, W4OQH 5, W4OVE 5, WB4UOC 5, WB4EGL 4, WA4BMG 3, K4OER 3, W4LK 2, WB4MIQ 2, WN4RGQ 2, WN4ZSE 2, WN4WBI 1. (Apr.) WB4HKP 94, WB4SQA 32, WN4UNV 17, WB4SZS 6, WA4EYY 2.

GEORGIA – SCM, A.J. Garrison, WA4WQU – Asst. SCM: John T. Laney, III, K4BAI. SEC: WA4VWV. RMs: K4BAI, WB4SPB.

Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
GSN	3595	1050/2300/0200 Dy	751	225	K4BAI
GTN	3718	2200 Dy	168	27	WB4SPB
Ga. SSB	3975	0000 Dy	–	–	WB4DMO

Congratulations to The Bill Gremillion Memorial Radio Club of Newnan, Ga. on becoming an ARRL affiliate. WB4REJ reports her OM WA4NMU recently passed his Extra Class exam while on R and R in Hawaii. The following Atlanta area hams had a most exciting time recently on a DXpedition to Navassa. W4GFK, W4GTS, K3PGM/4, K4TMA, WA4VWV, WB4SST, WB4UPC and WB4WMG. They operated KC4DX. WB4OGN reports he will be QSY out of the country until Dec. He will be missed on the cw nets. Traffic:

WB4RUA 109, K4BAI 81, W4EEP 74, W4PIM 54, W4RNL 45, W4CZN 41, WA4WQU 40, W4AMB 31, W4FDN 18, W4JM 14.

WEST INDIES – SCM, Pedro J. Piza, Jr., KP4AST – KP4QV bought a Galaxy 55D and a linear. KP4RD put up a high tower vertical antenna. KP4GN is heard every morning on 14270 working the far East. Remember that KP4WT and the Antilles emergency and weather net meets every day on 3915 at 7:00 AST. KP4DJE has a CX-7A Signal One and he loves it. KP4s DDS, AEW and DLC are heard on 7260 daily at noon. KV4AD is heard active on 21 MHz with his stacked array. KP4FZ is very active 160 meters. KP4AST and KP4ES are busy putting up antennas. KP4DLW has a five-element inverted "V" beam on 40 meters. KP4AN is active on 3805 every evening chasing DX. Fitz has nearly 200 countries worked on 80 meters. Congratulations. For an appointment, please contact me. Note: Silent Key is KP4CU.

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	2230 Dy	31	570	40
QFN	3651	0000/0300 Dy	62	–	–

Pensacola: KØBAD/4 is serving as Net Mgr. of RN5; he recently passed Extra Class exam. WB4WQB is building fm "Pipsqueak" transmitter/receiver from QST. WB4ZIX, WB4ZPC and WN4ZUW are new calls. ZUW is looking for some Novice crystals. WA4JNA has a flea-power homebrew rig on 50.4 MHz. K8VCP/4 completed a 6-meter quad. WB4PKR and WB4KUF helped spruce up the FFARA club house. The FM Assn. sponsored a tune-up clinic, to measure frequency, power and deviation. Ft. Walton: New hams are W1SWT, WN2SJB, WA3BNI and WN4YZH. WB4NHH practicing cw copy on a mill. W4CSS looking for 6-meter ssb contacts. EC K4CLM arranged for support agreement between local hams and police authorities. Defuniak Springs: K4VWE working 75-meter mobile from Madison and Jacksonville for several weeks. K4KHV trying 160-meter cw along with W4GGU of Panama City. Panama City: WN4ZHR is a new Novice. WB4GAO and WA4VIY are active on 224.0 MHz fm and looking for out-of-town contacts. WA4ZLS put up a tri-band beam. Marianna: WB4ZJC is a new ham here. Tallahassee: W4MOQ back on 75 meters was reappointed EC for Leon Co. Madison: K4WOI is new EC for Madison Co. Traffic: KØBAD/4 138, W4RKH 18, WA4ZLS 13, WB9FUZ/4 11, WB4NHH 2.

SOUTHWESTERN DIVISION

ARIZONA – SCM, Gary M. Hamman, W7CAF – SEC: K7GPZ. PAM: W7UXZ. RM: K7NHL. It is with deep regret that W7OUE was added to the list of Silent Keys. Rose contributed many hours of public service while on the air the last twenty years in Ariz. She always cheerfully handled messages and phone calls despite her physical handicaps. Communication was provided for the Explorer Olympics in the Mesa area on May 28 by WA7CNP, WA7FIK, W7GFE, K7JWB, WA7NMJ and W7UXZ. The CODAC organization was provided communication between Phoenix and Tucson for fifteen hours on June 3 and 4 by the Old Pueblo Radio Club and the Arizona Amateur Radio Club. The Bash-Hal-Ne-Ae Amateur Radio Club (K7UGA) was presented the George Washington Honor Medal by the Freedom Foundation of Valley Forge in recognition of all the hams who donated their time to running patches for Service personnel in Vietnam and Thailand. The club has completed over 110,000 patches. Stations earning Section Net Awards in May were WA7HIT, WA7IXC, WA7JCK, WA7KQE, K7NTG and WA7QVN. Traffic: K7NTG 150, K7MTZ 67, WA7MAD 52, W7PG 46, K7RLT 29, W7CAF 27, WA7QVN 21, WA7TFU 15, WA7JCK 6, W7DQS 4, WA7KQE 4.

LOS ANGELES – SCM, Eugene H. Violino, W6INH – I was very happy to meet the gang at the recent Director called meeting in Riverside. Many important matters were discussed and information exchanged. WB6BBO, W6MLZ and W6PXH were on a local TV show with a very fine ham radio demonstration. W6BHG still recuperating. The LARC hamfest was its usual fine event and many attended. W6WKN active with Novice group. K6ICS going to Baja, Calif. for the road races with group of local hams for communications purposes. Santa Clarita Club reports that new member W6OQZ has printed the club stationery and also planned Field Day. TRW Radio Club has purchased a new HW-16 Novice transceiver for the club station. WB6WPO also repaired the club's tape machine. Any station working 5 TRW members can receive a special certificate. You certificate hunters can also work 5 Antelope Valley Club members and receive the famous "Jackalope" award; this club also holds transmitter hunts once a month. Those of you

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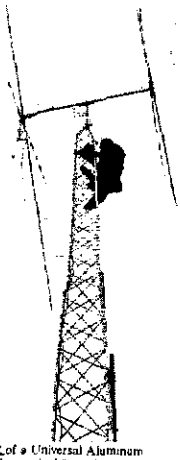

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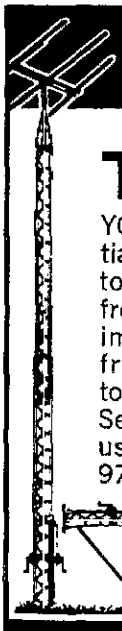

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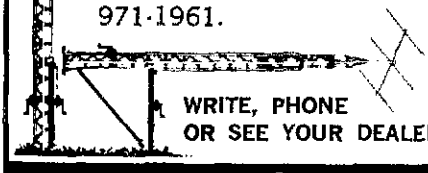

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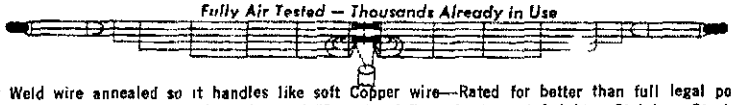

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interested in a live wire vhf club should contact WB6YVP or WA6BFH; they had a VHF QSO party in June. WA6MEM planned a mountain top 1200 MHz venture. K6AEH representing the PARC at all the various hamfests and club events. The Ramona Radio Club is planning a City "Simulated Emergency" operation between the hospitals and various city agencies. K6KRA is in San Gabriel Community Convalescent Home; might like some cards. K6CL received a letter of thanks from a grateful ham in connection with Eds OO observations, he helped said ham from being cited by FCC. The YLRL had a large turnout at their hamfest in Long Beach. There were 120 licensed YLs and over 200 attended the banquet. K6DDO took PY1DVG on tour of local 160-meter shacks of W6RW, W6DGH and W6AM mobile. W6AM working lots of DX with kw mobile rig. W6OAW reports 34 attended WPSS breakfast at Fresno. We are going to miss K6THM, he was one of the originators of the SOCON Net. SOCON had annual picnic at San Dimas Park July 16. SOWP Net discontinued for summer, starts again Sept. 7. WB6OLD having freqeuncy meter problems so is spending more time on SCN. Bob operator of W6UE at Caltech leaving for home during summer. He has been a great help on SCN. WB6PKA is collecting old type transmitting tubes with free pickup, here is chance to clean your garage. The AREC group were very active; they handled four Walkathon "Walk for Hunger" events through control station W6NRY and repeater W6FNO, May 13. WA6MOD active on RACES RTTY. WA6AAW now has 100 countries confirmed, and received his Advanced Class license. Traffic: WB6BBO 447, W6INH 357, K6UYK 261, W6LYY 102, WB6PKA 84, WB6OLD 33, WA6ZKI 33, W6HUJ 27, WB6KGK 27, W6OEO 26, W6USY 26, WA6AAW 24, WB6YIZ 21, K6EA 16, WA6DHM 9, W6OAW 6, W6DGH 5, WB6HDJ 5, W6AM 4, K6ASK 4, K6CL 4, WB6TPO 4, WA6MOD 3.

ORANGE – SCM, Jerry L. VerDuft, W6MNY – Asst. SCM: Richard W. Birbeck, K6CID. SEC: WB6CQR. PAM: K6YCI. RM: WB6AKR. WB6AKR is now OPS in addition to RM and ORS. Renewals: W6BAM as OBS, WA6TVA as EC, WB6RAL as OVS, WB6VTK again made BPL. WA6TVA is conducting ARFC training sessions in traffic handling and emergency preparedness procedures. WB6ZOK has moved to Laguna Hills and once again is employed. Section Net Certificates for SCN participation have been issued to W6ISC, WA6TVA and WB6VTK. WB6JOT has his tower and beam up after high winds blew them down. W6FB worked Marconi Memorial Station, WM2GK, commorating the anniversary of William Marconi's communication across the English Channel 75 years ago. New hams are WN6JFW in Lucerne Valley and WN6QXP in Independence. EC WA6YWS has prepared a very FB directory and alert system information for the Inyo Emergency Net (IEN). OVS K6YNB displayed his entire station at the West Coast VHF Conference and is off on a major uhf expedition to Utah, Ariz. and Nev. Autonetics Radio Club MARS station AFC6YPX completed 100,000 phone patches after 4 years of operation. The WA6ALV AREC repeater group of San Bernardino County supplied communications for the "Walk for Mankind" to raise money for a public park project in Redlands. As a result of a job promotion and relocation to Albuquerque, New Mex., I am forced to resign as SCM effective Aug. 1. PSHR: WA6TVA 49, W6MNY 48, WB6AKR 38, WB6JOT 25, WA6BJO 5. Traffic: WB6VTK 181, WB6AKR 149, W6MNY 81, WA6TVA 49, W6ISC 39, K6GGS 22, W6QBD 22, WA6YWS 16, W6CPB 12, W6WRJ 12, WA6BJO 11, W6FB 1.

SAN DIEGO – SCM, Paul C. Thompson, W6SRS – Asst. SCM: Art Smith, W6INI. SEC: W6TAI. With Field Day having drawn to a close for another year a hard look should be taken at the emergency operations in the section. Were you as prepared as you should have been? How about that portable power equipment? As a prelude to Field Day there was the Dakota floods. Would you have been able to assist in the necessary communications in this section. If not join your local district AREC activities for that added training emergency procedures. Club activities: The El Cajon and SOBARS clubs hosted demonstrations by a local manufacturer of ham equipment. North Shores provided many FD contacts from Fiesta Island. SDDX holds their meetings at the Convair Gun Club. SDFM has been busy with the San Diego Humane Society during the fire season. Red Cross communications was the subject for the SDCARC. New meeting time for Palomar is 3rd Thur. of the month in Carlsbad. IVARA still meets during the summer in spite of the heat. W6TAI discussed AREC activities with them. Station activities: New ORS is WB6VKV. K6EC shows a good score for FMT. W6SO has returned from JA-Land. W6LRU/6 through the summer. WA6AMK is taking regular RN6 sked. Lots of fun by all at the AREC picnic. WA6KZN has new 2-meter fm gear. PSHR: W6LRU 49, W6BGF 43, WB6VKV 34. Traffic: W6VNQ 223, W6BGF 206, W6JOU 203, WB6VKV 185, W6LRU 90, WB6HMY 73, W6YKF 46, W6DEY 25, K6PM 6, W6SRS 2.

SANTA BARBARA – SCM, D. Paul Gagnon, WA6DEI – SEC: W6JTA. RM: W6UJ. PAM: K6EVQ. WA6MBZ is active on SCN and MTN and helping with liaison between the two. K6TFU has a new Swan fm rig and is on 2 meters maritime mobile while sport fishing out of Channel Islands. WN6MLJ has worked 41 states from Newbury Park and built a 2-watt transistor rig. WA6TMQ is active on the Confusion Net and AF MARS. New Novice in Explorer Post 2902 is WN6RPU. W1KLK from the ARRL staff was honored at a dinner hosted by the Estero club; he installed their new officers: WB6YCH, pres.; WA6INZ, vice-pres.; WB6PGK, secy.-treas. New AREC members WB6IMM, WB6SLW, WA6GFB. WB6FDG passed his Advanced Class exam. W6SUN flew to Mex. to help provide check point communications for the Mexican 500 race. W6OAL, W6MZC, WB6IMM, WB6LLT and K6LBV operated the VHF contest from 8837 Ft. Mt Pinas. The Tri-Counties Council of ARCs has been organized. Secy. W6BTO advises the Paso Robles ARC meets the first Mon. of each month at 8 P.M. at the fire dept. W6MSW and WA6RTM are holding code classes in Paso. The Paso and Estero clubs plan a joint picnic for Aug. 20 at Cuesta Park. W6MSW has a new TH6 beam and is building 2-meter fm gear for the new repeater WA6RTM has put up. W6MSG and W6BTO are working on 432 MHz gear using Varactor triplers. W6FYW is building a 220 MHz converter. K6PHT is building 2-meter transverter for use on the Oscar satellite. K6GHI is designing the logic for function control of repeater WA6SIN. Don't forget the SW Division Convention in Santa Maria in Oct. See you on the section AREC net on Wed. at 8 on 3935. PSHR: WA6DEI. Traffic: WA6DEI 163, WA6MBZ 10, WA6PFF 6, WN6MLJ 2, WA6TMQ 2.

WEST GULF DIVISION

NORTHERN TEXAS – SCM, L.E. Gene Harrison, W5LR Asst. SCM: Frank A. Sewell, Sr., W5IZU. SEC: WA5VJW. RM: W5QGZ. PAM: W5BOO. Report this month is again by W5IZU, Asst. SCM as W5LR is enjoying a vacation. The Murval Hamfest was a big success this year and was enjoyed by all along with W5LR, W5HT, W5BGC, W5AJ. Do want to thank W5HMQ, K5ILL and all others who worked so hard to pull it off. Remember TYLRUN, Nov. 3 and 4 at La Quinta Motor Inn, 4023 S. Walton Walker in Dallas. Contact K5GMI for further details. We have a report that the planning committee with W5TI as head is making excellent progress regarding tentative plans for an ARRL West Gulf Division Convention for next year. The Arlington Radio Club has a new Novice class in operation with W5BCW as instructor. WN5GRZ is on the lookout for a 15-meter crystal. W5JAX has applied for OBS. We learned from W5LR that W5EMZ has over 2000 confirmed in the county hunters dept. Word comes that Ex-5ZC, Frank Corlet of Dallas is doing nicely and sends 73 to his many friends. We hear that Frank is the proud owner of QST copy No. 1. Good luck Frank. OO WA6SLU/5 is on the ball and sends in report of 8 observations this month. W5FBX reports he will be research participant this summer at UT of Dallas. Also we note that WA5PPF went through a series of skin grafts in May and we sure wish him well. Our thought for the month – we note while working in many traffic nets that the stations in the small cities are scarce on the net. I would like to say to them that they are needed on our nets. We have many stations from the large cities but a lot of traffic dies that is destined for the smaller places. It has been my pleasure to report (such as it was) these past two months. Traffic: (May) W5TI 211, W5SHN 105, W5BFX 54, W5GY 47, W5IAR 19, W5IZU 13, W5BPN 6. (Apr.) W5TI 106, K5ABV 38.

OKLAHOMA – SCM, Cecil C. Cash, W5PML – Asst. SCM: Joseph M. Schlosser, WA5IMO. SEC: WA5FSN. RM: W5RB. PAMs: W5MFX, K5DLE, WA5WHV and WA5ZRU. WA5NZM SSTV monitor working fine but no transmitter as yet. WA5WRC is the proud owner of a new Tri-x crank-up tower with a new TA-33 Jr. and also supporting his 75-meter inverted V. WA5IMO and WA5FSN report a real fine meeting in Tulsa on May 31. Asst. SCM WA5IMO reports quite a bit accomplished both for the W.G. Div. as well as the League. Dir. W5EYB and Vice-Dir. W5GM were there along with W1KLK from ARRL. I guess WB5AXH/5 and WB5GYT set the ragchew record the other night from 2350 to 0650, if that isn't the record please let me know. Thanks to WB5AXH/5 for standing by and picking up the OTWXN when the regular NCS does not show. Yours truly just returned from a short vacation, visiting in Tex. and Ark., was mobile and worked all amateur and MARS nets along the way. W5HXL realy knows how to hurt a guy just to keep talking about his 22-ft. Silver Streak Porta-shack. W5TVU has moved to Guyman. WA5OVO, Tulsa is in Minn. for the summer with the Boy Scout camp. Net operation is holding up real good considering it is vacation time for most people. The CW Net OLZ on 3682.5 kHz at 1900 CSDT is still lacking operators and especially an

I would like the following League publications shipped to me postpaid. I am enclosing payment of $_____. (These prices apply only to the USA.)
Ship to this address:

NAME ..... CALL .....

STREET .....

CITY ..... STATE ..... ZIP .....

- ☐ **ARRL HANDBOOK** $4.50 — The standard comprehensive manual of amateur radiocommunication
- ☐ **UNDERSTANDING AMATEUR RADIO** $2.50 — Written for the beginner—theory and how-to-build it.
- ☐ **VHF MANUAL** $2.50 — A new and thorough treatment of the amateur v.h.f. field
- ☐ **LICENSE MANUAL** $1.00 — Complete text of amateur regs, plus Q&A for amateur exams
- ☐ **HOW TO BECOME A RADIO AMATEUR** $1.00 — All about amateur radio and how to get started
- ☐ **A COURSE IN RADIO FUNDAMENTALS** $1.00 — Use this in conjunction with the Handbook
- ☐ **ANTENNA BOOK** $2.50 — Theory and construction of antennas
- ☐ **SINGLE SIDEBAND FOR THE RADIO AMATEUR** $3.00 — The best s.s.b. articles from QST
- ☐ **THE MOBILE MANUAL** $2.50 — The best mobile articles from QST
- ☐ **HINTS AND KINKS** $1.00 — 300 practical ideas for your hamshack
- ☐ **OPERATING MANUAL** $1.50 — The techniques of operating your amateur station—DXing, ragchewing, traffic, emergencies, etc.

(Please see the other side of this page for an application for membership in ARRL and 12 issues of QST)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

QS-8-72

NCS. Traffic: K5TEY 600, W5RB 50, WB5AXH/5 38, WA5IMO 31, W5MFX 30, WA5ZOO 28, W5FKL 23, W5PML 22, K5OCX 16, WB5AZS 11, WB5CWX 10, K5OTM 10, K5WPP 9, WA5NZM 7, K5LUJ 6, K5OOV 6, WA5FSN 3, WA5WRC 1.

SOUTHERN TEXAS – SCM, E. Lee Ulrey, K5HZR – SEC: K5HXR. PAM: W5KLV. RM: W5SSE. Congratulations to new OPS WA5YXS. Renewals: W5AC as OPS, ORS; W5ABQ OBS, ORS and filling in for RM W5SSE until he gets rig back on the air. W5EAO, W5FY, WA5PRJ and WA5TLO became Silent Keys in May. W5EAO will be remembered for her cheerful quips in Stenscope and TSARC bulletins. ORS WB5BWV reports new Valley Novice Net (VNN) now active and TSARC soon to have 2-meter fm repeater. Members of El Paso ARC participated in recent Cerebral Palsy Telethon. Congratulations to WA5JFZ, WA5MUM and Austin ARC W5KA on making BPL. K5ROZ again on PSHR. EC WA5MUM says Austin ARC W5KA soon to be operational from Red Cross. EC's W5QMH and WA5KYX report AREC quite active in floods in San Marcos, New Braunfels and Seguin with extensive use of local vhf repeaters. W5HWY reports 7290 Tfc Net had special sessions for entire disaster period. EC W5ICL advises TEXLA Golden Triangle Chapter QCWA elected W5MKX chmn. and W5MOO secy. OO K5SBR says gift of furniture displaced him from new shack. OPS W5ZDU has new eleven-element beam for vhf. OPS K5RVF just returned from tour of Europe. Received OO reports from WA5MIN and W5RJY.

Net	*kHz*	*Sess.*	*QNI*	*QTC*
TTN*	3961	31	1450	189
7290 Tfc	7290	48	2013	701

*NTS. Traffic: (May) WA5JFZ 422, WA5MUM 343, WA5YEA 217, W5ABQ 132, WB5CUR 127, K5HZR 125, K5ROZ 107, WA5YXS 71, WB5BWV 57, W5VW 55, WA5FJN 45, W7WAH/5 37, W5QO 36, W5HWY 35, W5NNK 34, WA5LNV 28, WA5TJI 28, W5ZDU 27, K5EJL 26, W5TFW 24, K5HVI 22, W5KLV 18, W5EZY 10, WB5BGV 8, WA5CTJ 7, K5HUA 5, WA5CBT 2, K5FNI 2, W5UKN 2, K5RVF 1. (Apr.) W5KA 104.

CANADIAN DIVISION

ALBERTA – SCM, Don Sutherland, VE6FK – Asst. SCM: Donez Booth, VE6YL. SEC: VE6XC. PAM: VE6ALQ. I regret to report the passing of VE6AND. QSL Mgr. VE6TK has had a heart attack. The CARA held a successful 50-year anniversary banquet, combined with the annual Old Timers' Night. VE6CW, the first licensed amateur in Calgary and first club pres. was in attendance. The NARC also celebrate their 50th anniversary with the Golden Jubilee Hamfest Sept. 16 and 17 at the Silver Slipper Saloon in the Edmonton Exposition grounds, pre-registrations should be mailed before Aug. 15. I understand former Calgarian and Edmontonian Ex-VE6KX now VE3CPA may attend. Look for the Edmonton anniversary station VA6NC. Special QSL cards will be sent. This is our first summer of DST. The QNI on the APSN is down possibly because we stayed at 0130Z or again perhaps the usual summer activities are the cause. Congrats and welcome to New Medicine Hat hams VE6ASZ and VE6APZ. Traffic: VE6YL 51, VE6FK 39, VE6AGU 34, VE6AFO 10, VE6FV 10, VE6VE 6, VE6YW 6, VE6FS 4, VE6SS 3, VE6AWK 2.

BRITISH COLUMBIA – SCM, H.E. Savage, VE7FB – BCEN 3650 cw is looking for Vancouver check-ins nightly. Also Trans-Canada Net Sat. and Sun. are always looking for a Victoria contact. The clubs are to be congratulated on the number of new amateurs they have produced and passed the RI's exams this spring. (Over 20). Twometers bring out the OTs VE7EF, VE7OT and the tall tales of the past. VE7AS mentioned the Vanalta ARRL Convention 1931 and the VE5 calls. (Sept. 5, 1931). The SCM has his tower and TH-3 in action. The Net on 3755 kHz meets 1900 PDT or 0200 GMT. I wish to say thanks to the NCSs and net members for keeping this net one of the best. Walt who looks after swap and shop is a white caner as is VE7CC but you would never think it, when you hear them on the net. K7LPZ is now VE7AAR and looking for the girls in B.C. Traffic: VE7LL 92, VE7SE 9, VE7QQ 8.

MANITOBA – SCM, Steve Fink, VE4FQ – SEC: VE4WC. Our net managers report the usual summer lull in activity, so if you've yet to take vacation, please do take the rig with you! Your SCM attended the May BARC meeting, and we really enjoyed meeting the Brandon gang. VE4ST attended the YLRL Int'l. Convention in Calif., while VE4XD is currently operating as HM1BK in Korea. A tip of the VE4 hat to VE4MG and VE4SW on their graduations from U of M Education. WARC saw "Ham's Wide World" at its June meeting. MTN reports 23 sessions, 58 QNI, 24 QTC, MEPN 31

sessions, 683 QNI, 33 QTC. Let's hear some suggestions from you, and don't forget those reports at the same time! Traffic: VE4RO 44, *VE4CR 25, VE4PG 10, VE4FQ 9, VE4LN 8, VE4JA 4, VE4XN* 4, VE4HA 3, VE4OJ 3, VE4RRC 3, VE4HR 2, VE4NE 2, VE4WT 2, VE4OL 1.

MARITIME – SCM, W.D. Jones, VE1AMR – ROs: VO1CA, VE1RQ. PAMs: VE1YO, VO1FX. Congratulations to VE1QM on receiving his two-letter-call-WAS, the first in VE1-Land. Welcome to *new White Caners in the Halifax area VE1AKP, VE1ALD, VE1ALE* and VE1ALF. Congratulations to instructors VE1AGX and VE1RO. The Prince Edward Island Amateur Radio League held their annual Banquet Meeting with VE1BZ as guest speaker. Their new executives includes VE1ADV, pres.; VE1AQZ, vice-pres.; VE1ATP, secy.-treas. Welcome to new amateurs VE1s AWM, AWN, AWO, AWR and AWT; all from Prince Co. PEI. The special station VB2KOC set up at Labrador City during week end of May 20 managed almost 2000 contacts, understand a lot of stations looking for Zone 2 missed out VO1EJ has a new antenna for 20 meters and has reached the 100 country confirmed mark. VO1NP quite active now with a KWM-2. Glad to hear VO1BT is active. APN reports QNI 73, QTC 120, sessions 31. Traffic: VE1ARB 141, VE1RO 133, VE1AMR 90.

ONTARIO – SCM, Holland H. Shepherd, VE3DV – PAM appointment has been issued to VE3EWD with specific responsibility for OPN. PAM appointment also has gone to VE3AGN for his fine work with the Champlain Minnet, one of the very few repeater groups which is an NTS member net. VE3SB as OPS; VE3GT as ORS. On June 4 VE3EWD PAM of OPN took a bold step forward *by putting the net on a daily basis and changing the meeting time to* 2100 local for the summer. All Ont. nets provide a service for their users but the OPN, GBN, OQN and ECN are the only nets that handle formal traffic on a regular basis through the facilities of the NTS. *It is hoped that more amateurs will take advantage of these* nets by bringing their traffic to its various sessions. Under VE3EWD and his capable NCSs VE3s GT, NO, AKQ, BCQ, BOF, BTZ, CEW, CFI, CQT, CRW, CXB, ETM, FQQ, FQZ, FWB, FXA and FZQ there is great potential so give the OPN your full support. It is with deep regret that I report the passing of ex-VE3AZM, VE3WI, VE3AG. Our sincere sympathy to their families. On June 1 ORS VE3ASZ (BPL) took over from VE3BBO as pres. of Canada's foremost YL/XYLs club – The Ontario Trilliums. VE3CLT resumed her *former duties as Editor of their bulletin "Tot Topics." VE3CQS* takes on pres. of KWARC and the big job of running the 1972 RSO Convention Nov. 3,4. Get your registrations in early to avoid disappointment. The VE3DV QTH was scene of get-together when ORS, OPS, RM VE3GFN of OQN visited Capital. Hosts were VE3SB, VE3CRX and VE3ARS. Traffic: (May) VE3SB 205, VE3DPO 119, VE3FQZ 111, VE3AIA 99, VE3GFN 87, VE3LHF 84, VE3EWD 78, VE3CYR 67, *VE3EHL 66, VE3ASZ 42, VE3GT* 33, VE3FRG 25, VE3GJG 21, VE3FGV 15, VE3ATR 14, VE3GBR 13. (Apr.) VE3CYR 97, VE3ERU 74.

QUÉBEC – SCM, Joe Unsworth, VE2ALE – The following have passed exams through the efforts of MARC code and theory classes this spring: VE2s ACG, BGT, AHT, BFL, BLC, AJV, ARP, BTK, ATQ and M. Potter. New ticket holder to VE2AXY by efforts of VE2TD. Congrats to VE2DR forty years anniversary. VE2UY reports that Hydro QRN now fixed at his QTH. VE2OJ has been very busy with garden and new ham shack. VE2XW was off the air *for a short time – fire destroyed hydro line. VE2s WY, AYY, CN,* YU, looking for the rare DX early morning hours daily. VE2DM has homebrew 20-meter beam and results very good, hopes to make it into a tribander. VE2BCB new OBS appointment. VE2BPF and VE2CN working on the setup of mobiles on snowmobiles during severe winter storms to help stranded motorists. Many mobiles calling in to the daily QR net on 3.775 MHz. A number of Montreal *area VE2s visited the Rochester NY Hamfest, and enjoyed* themselves. The AREC network for the province is at an all time low, contact your area EC and give him your support. The section requires an SEC, there must be someone who will accept the appointment! Is your ARRL membership up-to-date, please check and renew as soon as possible. Traffic: VE2DR 51, VE2BP 42, VE2DLG 22, VE2OJ 18, VE2EC 14, VE2ALE 9, VE2UY 4.

SASKATCHEWAN – *SCM, Barry Ogden, VE5BO – The Lake* Net daily at 1830Z on 3780 is again on the air under the able supervision of VE5XG assisted by VE5IR. The Hamfest in Moose Jaw is pleasant history with many new faces noted as the VE5 training program seems to be on the upswing. FB. The increase in White-Caners is evident with the first gal obtaining her license in Prince Albert. Many of the northern region VE5s are installing GRS *gear in their mobiles so that communication can be enjoyed with* the rest of their family. So far VE5s JD, EB, IP are enjoying their auxiliary rigs. This should tie-in with the local Skidoo Patrol who carry on rescue practices each winter in conjunction with the RCMP in the Emma Lake area. Several GRS have attended ham classes and are hopeful of passing their ticket. Increased activity on 7.175 proves a good alternate VE5 frequency. Field Day participation was enjoyed by many newcomers. Thanks to all who have volunteered to hold down ARRL appointments and do an FB job to boot! Remember; keep the RF gain up full and an ear out for all mobiles operating in the lake areas. Bon Voyage to VE5YR who retires to *VE7-Land. Traffic: (May) VE5BO 18, VE5SC 15, VE5HP 8,* VE5KZ 3, VE5PD 1, VE5SE 1. (Apr.) VE5SC 28.

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters, be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 50 cents per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 15 cents per word will apply to advertising which, in our judgement, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 15-cent rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 50-cent rate. Provisions of paragraphs (1), (2) and (5) apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc., Box 394, Mamaroneck, NY 10543.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police, etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For information contact Rose Ellen Bills, WA2FGS, Secretary, 17 Craig Pl., Pennsville, NJ 08070

HAMFESTERS 38th Hamfest and picnic Sunday, August 13, 1972, Santa Fe Park, 91st and Wolf Road, Willow Springs, Illinois, Southwest of Chicago. Exhibits for OMs and XYLs, famous Swappers Row. Information and tickets, Joseph W. Poradyla, WA9IWU, 5701 So. California Ave., Chicago, IL 60629

PEORIA Hamfest — September 17, Peoria, Illinois, same place as last year. For details, see September issue of QST, Hamfest Calendar. Banquet Saturday, Sept. 16 at V Junction, $5.50 per person. Cocktail hour 5:30 to 6:30, dinner 6:30. Two motels within walking distance. Reservation deadline Sept. 4, cancellation Sept. 11, 150 maximum so get those reservations in early. Hamfest ticket registration $1.50 advance. For either banquet tickets or advance Hamfest tickets write: Wendell McWilliams, WN9DVJ, Box 1, Rome, IL 61562.

FOUNDATION for Amateur Radio Annual Hamfest Sunday, 22 October, 1972, at Gaithersburg, Maryland Fairgrounds.

CINCY Stag Hamfest: The 35th Annual Stag Hamfest will be held on Sunday, September 24, 1972, at the all new Stricker's Grove, on State Route 128, one mile west of Ross (Venice) Ohio. Check local area map for new location. Lots of food, flea market, model aircraft flying, and contests. $5 cost covers everything. For further info, contact: John Bruning, W9DSR, 6307 Fairhurst Ave., Cincinnati, OH 45213

AMERICAN Red Cross emergency R.C. annual hamfest and auction — Sept. 17 at 10:30 A. M. Talks on ATV, fm, and RTTY. Guest speakers and manufacturers reps. $2 registration. Flyer available. WB2QBP 90-07 Merrick Blvd., Jamaica, NY 11432

ANTIQUE Wireless Association National Historical Radio Conference, Smithsonian Institution, Washington, D.C., Sept. 22, 23, 24. Specialized programming for old time operators, historians and collectors. Information write: Lincoln Cundall, W2QY, 69 Boulevard Parkway, Rochester, NY 14612

QSLs??? Samples 25c, DeLuxe 50c, Religious 25c. (Deductable). Salkers, W8DED, Box 218, Holland, MI 49423

TRAVEL-PAK QSL Kit — Send call and 10c; receive your call sample kit in return. Samco, Box 203, Wynantskill, NY 12198

QSLS. Second to none. Same day service. Samples 25c. Ray, K7HLR, Box 331, Clearfield, UT 84015

PICTURE QSL cards of your shack, etc. from your photograph. 500, $12.50. 1000, $16.25. Also unusual non-picture designs. Generous sample pack 25c. Half pound of samples 50c. Raum's, 4154 Fifth St. Philadelphia PA 19140.

QSLs, samples 10c. Fred Leyden W1NZJ 454 Proctor Av. Revere MA 02151.

CREATIVE QSL cards. Personal attention. Imaginative new designs. Send 25c. Receive catalog, samples and refund coupon. Wilkins Printing Box 787-1, Atascadero CA 93422.

SAMPLES 20c. Harry Sims, 3227 Missouri Ave. St. Louis MO. 63118.

QSLs 3-color glossy 100, $4.50. Rutgers Vari-Typing Service. Free samples. Thomas St. Riegel Ridge, Milford, NJ 08848.

QSLs 300 for $4.65, samples dime, W9SKR, Ingleside, IL 60041

RUBBER stamps $1.50 includes tax and postage. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, NJ 07044.

QSLs "Brownie," W3CJI, 3111 Lehigh, Allentown PA 18103. Samples 10c. Catalog 25c.

3-D QSLs — Hallmark of discriminating operators. Samples 25c (refundable). 3-D QSL Co., Monson 2, Mass. 01057

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Bolles, Little Print Shop, Box 9848, Austin TX 78757.

QSL, SWL, WPE cards. Samples 25c. Log books, file cards, decals. Malgo Press, Box 375 Toledo OH 43601.

QSLs, SWLs, WPE samples 15c. Nicholas & Son Printery, PO Box 11184, Phoenix AZ 85017

FRAME Display, and protect your QSLs with 20 pocket plastic holders. 3 for $1, 10 for $3. prepaid and guaranteed. Tepabco Box 198T Gallatin TN 37066.

QSLs — Thin dime brings samples. Alkanprint, Box 3494, Papago Station, Scottsdale, AZ 85257

QSL, SWL cards that are different. Quality card stock samples, 20c. Home Print, 2416 Elmo Ave., Hamilton, OH 45015

Excellent QSLs, reasonable. Samples 25c, W9CL Press, R.R. 1 Box 811, Carmel, IN 46032

QSLs, 3 color glossy, globe, eagle, straight key, ham with earphones on front, report form on back, 100 - $4.75 postpaid, Rusprint, Box 7575, Kansas City, MO 64116

POST card printers $19.95. L. M. Hamilton, Box 4373, Torrance, CA 90510

QSLs — custom QSLs, brochure 25c. W1FLX QSL Designs, 20 Britton St., Pittsfield, MA 01201

QSLs — See our new leatherfinish cards before you buy. Samples 10c. Practical Products, Box 1365, Pittsfield, MA 01201

1000 adr labels, 4 lines, $1.25. L. M. Hamilton, 19509 Flavian Ave., Torrance, CA 90503

GORGEOUS QSLs. Rainbows etc. Top quality! Low Prince! Samples 10c. Refundable. Joe Harms, W4BLQ, Box 158, Edgewater, FL 32032

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200 two color QSLs $5.20, stamp for samples, Mark, WB6NKO, 2534 El Tonas Way, Carmichael, CA 95608

QSLs business card size 100 $7.95. Ellison Printing, 24330 Main, Perris, CA 92370

PROTEST! Picket! Write your congressman! Let nothing prevent you from attending the ARRL Hudson Division Convention, Oct. 21-22, Hilton Motor Inn, Tarrytown, N.Y. Exhibits, 2-meter fm, RTTY, lectures, contests, gabfests, banquet, N.Y. City sightseeing. Fun! Plenty of free parking. Write Dave Popkin, WA2CCF, 303 Tenafly Rd., Englewood, NJ 07631

17th Annual hamfest by four York County Clubs again sponsored at Elicker's Grove, 1/2 mile west of York Airport or 10 miles west of York, Pa. on Sept 3, 1972. Rain or shine. Watch for signs. Registration begins at 0900 hours. Talk-ins 50.62 + 146.62 a-m also 146.34-146.76 (repeater) 146.94-146.94 fm (remote via 450). Registration fee is $3. XYLs and children free. No charge for flea market sales (end gate). Transmitter hunt 2 & 6 meters. Plenty of picnic tables. For information write K3POR, LeRoy Frey, 170 S. Albemarle St., York, PA 17403

INDIANAPOLIS Hamfest — Sept. 17, 1972. Gas Co. Recreational area on Thompson Rd., East of Five Points Rd. and west of Franklin Rd. Easy access from I-465 & I-74. Vendors free, picnic facilities. 12 Indianapolis radio clubs participating. QSL — P.O. Box 19449

HAMFEST in Memphis, September 17, State Technical Institute, Interstate 40, east of city. Flea market, tech talks, MARS meeting, XYL activities, food. 8:00 A.M. to 5:00 P.M. Talk-in on 2M .34-.94, .22-.76, 75M 3.980. Write Evin, WB4VDH, 239 Kenilworth, Memphis, TN 38112

WARREN-RAMADA-Overnite Hq for big Warren, Ohio Free hamfest is Ramada Inn, I-80 interchange with Rt. 193; 10 minutes from hamfest at Yankee Lake, Aug. 20. Warren Fly in airfield one mile from Warren, Ohio Free hamfest. Obermyer Airport, no field fees, free transport to/from hamfest.

WANTED: All types of tubes. Top prices paid for Varian & Eimac. Jaro Electronics Corp, P.O. Box 414, Orlando, Fla. 32802. For fast action call Toll Free: 800-327-7799. Ask for Bob Hoffman.

WE buy tubes. Maritime international, 834 Hemlock St., Franklin Square, NY 11010

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NY 10012.

WIRELESS sets, parts, catalogs, bought, traded. Laverty, 118 N. Wycombe, Lansdowne PA 19050.

COLLINS KWM-1 complete $500. Central Electronics 20-A, VFO $100. Mobiltrans 40 $50. All mint. Aaron D. Solomon, VE1OC, 8 Crichton Park Rd., Dartmouth, NS Canada

WANTED: An opportunity to quote your ham needs. 33 years a ham gear dealer. Collins, Drake, Galaxy, Tempo, Kenwood, Ten-Tec, Hy-Gain, and all others. Also $25,000 inventory used gear. Request list. Chuck, W8UCG, Electronic Distributors, Inc. 1960 Peck St. Muskegon MI 49441. Tel: 616-726-3198

HAM ticket - Amateur radio license course for Novice, General, Advanced, Extra Class. Write for information. Clayton Radio Co. 220 Mira Mar Av. Long Beach CA 90803.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antennas, 1339 So. Washington St., Kennewick, WA 99336

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductors and resistors. Astral Electronics, 150 Miller St., Elizabeth NJ 07207. Tel. 201-354-2420

WANTED: Teletype machines, parts Models No. 28, 32, 33, 35, 37. Cash or trade for Drake equipment. Alltronics-Howard Co., Box 19, Boston MA 02101. (Tel: day or night 617-742-0048)

VERY in-ter-est-ing! Next 6 big issues $1. "The Ham Trader," Sycamore, IL 60178

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando, FL 32806

WANT wireless (early) magazines and equipment for W4AA historical library. Wayne Nelson, Concord, NC 28025

CAPACITORS — Brand new aluminum electrolytics, 275ufd at 500wvDC. Ten for $19.50. R4IHP, 6835 Sunnybrook Ln., NE, Atlanta 30328

TV camera kits, plans, parts. Go ham TV the easy, economical way. Catalog 25c. ATV Research, Box 453-Q, Dakota City, NE 68731

CASH or trade for pre-1925 radios for personal collection. Carl Osborn, W6RXP, 13816 Calvert St., Van Nuys, CA 91401

NOVICE Crystals. Free flyer. Nat Stinette Electronics, Umatilla, FL 32784

TELETYPEWRITER machines, parts, bought, sold. S.a.s.e. for list. Typetronics, Box 8873, Ft. Lauderdale, FL 33310

NOVICES: Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, PO Box 6015, Norfolk VA 23508.

WANTED: tubes, transistors, equipment, what have you? Bernard Goldstein, W2MNP, Box 257, Canal Station, New York, NY 10013

TOWER climbing safety belt/lanyard $21.50, prop pitch rotor $65, T/S 175 frequency meters $45, 2M handitalki $50, coax rf switches multiposition $16-$48. Free list. Link, 1000 Monroe Tpk., Monroe, CT 06468

WANTED: SB303, SB401, SB220, HM102, SB610, Hy-Gain TH6DXX. W2UGM, 66 Columbus Ave., Closter, NJ 07624. 201-768-1884.

WANTED: Collins 136A-1 noise blanker. Excellent condition with manual. Joe Patterson, W7MG, 8011 North Washburne Ave., Portland, OR 97217. Telephone: (503)285-3477

PREPARE for ham exams! Use Posi-Check. Original, expertly devised, multiple-choice questions and diagrams covering all areas tested in FCC exams. Keyed answers, explanations, IBM sheets for self-testing. All newly revised and up-dated. General Class $4.25, Advanced Class $4.50, Extra Class $4.75. Each applies to its own class only. First class mailing included. Add 25c per copy for air mail. Send check or money order to Posi-Check, P.O. Box 3564, Urbandale, Des Moines, IA 50322

BUYING? Selling? Trading? Don't make a move until you've seen our 24 page bi-weekly bulletin with hundreds of ads. Free sample copy! Six issues $1. Ham Ads, P.O. Box 46-653B, L.A., CA 90046

AMATEUR paradise vacation, Livingstone Lodge, Masesma Lake, N.H. Cosy cabin for two weekly $55. Swimming, fishing, boats, sports, ham radio, hot showers, fireplaces, light housekeeping, children half, camp sites, literature. A. Q. Livingstone, W2LA

2-meter fm, brand new, Inoue IC-20, 1&10 watts, 12 channels, w/mike, cable, mobile mount. $259.50. Bob Brinkow, 15112 S.E. 44th, Bellevue, WA 98006. Phone: 206-747-8421

TOROIDS 88, 44, and 22 mhy — can of five for two ($2) dollars post paid. M. L. Buchanan, P.O. Box 74, Soquel, CA 95073

SELL: Hammarlund HQ-170AC, $180; Valiant I, $75; with manuals, F.O.B. All offers considered. Greg, WB2ZSH, 108 Valley Dr., Watchung, NJ 07060

HEATH SB-100, HP23 power supply, in perfect condition, $295 prepaid. Trade for 2 meter equipment. Cline, WB6LXI/7, Box 8127, Salt Lake City, UT 84106

LAF, HA410 $75. Jackson 5" scope, wide band high sens. $75 W3FYC, P.O. Box 108, Plymouth Meeting, PA 19462

NEW components: transistors; 2N2222A, 2N2907A; Trimpots-Bourns 3292P-5Kohms, all $.75 ea. (Have about 500 of each). Circuit board drill press: Dumore 16-011, like new $95. E. C. Reich, W5FQA, 9 Eastport Pl., Plano, TX 75074

WANTED: Collins 312B-5, K2QDE, Martin. 2011 Ocean Ave., Bklyn, NY 11230. 212-998-2029

OMEGA-T noise bridge headquarters 1-100 MHz $29.95; 1-300 MHz $39.95, ppd. Miss. add 5% tax. MPQ Industries, PO Box 217, Hernando MS 38632

GREENE Center Insulators, with or without balun — a tough number to beat — free flier. Kaufman Industries, Box 817Q, Reeds Ferry, NH 03054

TOROIDS — facsimile — teletype — Lowest prices anywhere! 88mhy. toroids 30/$10 Postpaid. (5/$2.50). Deskfax 6500 facsimile transceiver (see May '72 QST) $15, (2/25). Model 14, 15, 19, 28, 32, 33, 35, Mite, Lorenz, Kleinschmidt. Gears, parts, machines, stamp for list. Van's W2DLT Electronics 302Z Passaic, Stirling, NJ 07980

DISCOUNTS! Standard, Sonar, Clegg, Robyn, Mosley, Cush, Craft, Others. Also Marine Gear. Write stating needs. Arena Communications, Dept C 1169 N. Military Hwy., Norfolk, VA 23502

ST. LOUIS hams: Drop by and see me at the Warwick Hotel, especially if you know of three bedroom unfurnished house for rent (might consider sale). Just returned from Germany and will QSL all contacts for 3A0FN, HB0s XKW and XJG, F0UG, and DL4VA if sent to home: Vandegrift, 1318-15 St., Huntington, WV 25701

CONTACT us for new or reconditioned Collins, Kenwood, Tempo-One, Drake, Galaxy, Hy-Gain, Mosley, Henry linear, towers, antennas, rotators, other equipment. We try to meet any deal and to give you the best service, best price, best terms, top trade-in. Write for price lists. Try us. Henry Radio, Butler, MO 64730

SWAN 500, 117XC power supply, Vox, Turner +54C microphone, Hy-Gain 2BDQ trap dipole. Excellent condition. All for $425. Jonathan Levine, WA1IEG, 34 High Path Drive, Wilson, CT 06095

FOR SALE Clegg Venus SSB six meter transceiver matching power supply speaker cabinet manual spare final amplifier clean good operating condition. $200. Plus shipping. George Konnick, 64 Cynthia Lane, Center Moriches, NY 11934

FOR SALE: 30S1, spare new 4CX1000A, $850, 75S1, 32S1, 516F2, 312B4, $750, SPR-4, 3 xtal kits, $395, 51J4, 3 filters, $295, R 389, $300, R390, $350, R390-A, $500, TR4, NR, AC4, RV4, $700. Millen GDO (new), $70, 204-B Long-John, Telrex TS435 Rotator System, 100' Telrex PVC Control cable, $400, Leece-Neville alternator System (new), 28V/100 amp, complete, $125. James W. Craig, 29 Sherburne Ave., Portsmouth, NH 03801

SELL: Swan Cygnet 260, $250 plus shipping. WB4EKJ 3002 Boswell Dr., Huntsville, AL 35811

WANTED: Collins 312A-1 control unit. Vernier for KWS-1. Thomas Gunther, 2911 Washington Apt. 44, Bellevue, NE 68005

100 GUMMED photo stamps, send photo and $2.50 to L.M. Hamilton, Box 4373 Torrance, CA 90510

WANTED B & W transmitter model 5100 or 6100 with ssb generator in good condition. Contact W. L. Palmer - WN4WOV, P.O. Box 283, Andalusia, AL 36420. Night telephone number 205-222-5758

FOR SALE: Gonset G6R-201, Mk. 4 2 KW linear amplifier. Brand new. Never on air. $275. You pay freight. Should go pretty fast. If really interested, make offer. Best offer gets it. $275 is base price. Contact WA0WRU, Dennis Heinen, St. Cloud, MN 56301 R.R. #4

FOR SALE: Hallicrafters SR42a and HA26 with four crystals, mike, antenna and handbooks. Complete two meter station. Mint condition in original cartons. Will pack to ship freight collect. $155 certified check or money order. K6UQC, 6028 Ellenview, Woodland Hills, CA 91364 (213)888-1522

SB401 WITH crystal pack, SB301 with cw filter like new condition $485 ppd. WB4ONS Rt. 2, Box 105, King George, VA 22485 703-775-4915 (After 6:00 pm)

ANY reasonable offer accepted for: DX100 SX100 DX40 TBS50 Globe 90 BC348 S506B 8503 88LF Box 8352 Savannah, GA 31402

COLLINS 75S3 10784 with 200 Cycle Crystal filter $3.85, Speaker $20, 3283 10107 516F2 $525, Automate T.O. Keyer, $45. All excellent original cartons. Edward Flynn, 3118 North Francisco Chicago, IL 60618

TEN-TEC PM2B 80/40/20 $49; matching AC4 SWR $10; Heath Tunnel Dipper G.D.O. $16; Knight KG-625 Deluxe Bench VTVM $25; all mint, will ship, WB4PUE, 4855-B Hickman Dr., Charleston, S.C. 29405

MUST sell Yaesu FT-101 and FL-2500 (2KW-SSB) linear both have less the 5 hours air time. Will sell only as a package deal for $850. T. M. Weist, 1221 11th St., N., Bismarck, ND 58501

SELL: HW32A complete mobil ng. Just install and operate. All manuals $165, plus shipping. WB2UYJ, 196 Pines Lake Dr., Wayne, NJ 07470

WANTED: HQ-215 or SPR-4 or any transistor RCVR WA5AAO Box 335, LaGrange, TX 78945

HAVE 11 years QST for sale, January 1927 through December '37. Best offer. Contents perfect, covers waterstained. Mrs. Irwin Sobil, 6536 N. Campbell Ave., Chicago, Ill. 60645

SELL Drake RV4 $70; ML 2&6 extra xtals $240; Hickock 6000 A tube & transistor checker $125; RCA WV500 Series Voltohm YST solid state $45; stereo pair of 2010 portable ampex speaker-amplifiers 20 watts with Shure stereo pre-amp. $145; dual stereo automatic turntable with pickering stero cartridge $60; thirty current stereo record albums $1.75 each; Collins 189A2 phone patch $45. Jones Micro Match VSWR coupler and meter $30; Waters Kodax automatic Keyer and AC power supply $60; all items mint condition. Ed O'Brien, W2IW, 8610 34 Ave., Jackson Heights, NY 11372

MANUALS for Govt surplus gear, only $6.50 each: R-388/URR, R-390/URR, R-390A/URR, R-220/URR, 7T-63A/FGC. Hundreds more. S. Consalvo, W3IHD, 4905 Roanne Dr., Washington, DC 20021

GONSET IV - 2 meter transceiver, $135; Gonset III, $75; Gonset II, $55; Poly Comm IV, $130; Clegg 22er, $135; Gonset III, 6 meter, $80. 120VAC and 12VAC Operation. WB2GKF Stan Nazimek, Jr., 506 Mount Prospect Ave., Clifton, NJ 07012

HEATHKIT lab Osc 0-12 $18 Audio Generator AG-9A $45 SB-620 scanlyzer $60 Vacuum tube voltmeter U-7A $18 Dummy load HN $8 Station console SB630 $25 Sony tape recorder TC103 $60. W6UCJ 213-342-5654

SALE: SB301, SB401, SB200, SB600. J.H. Fuller, WB4MWB, 214 Tolbert St., Cumming, GA 30130

WANTED: Straight keys and bugs for collection. Give make, model, condition, price. John Elwood, W7GAQ/6, Box 1243, Lancaster, CA 93534

WANTED: So. CA area. TR 4 and AC 4 to $350, Heath HW-16 to $75, HG10B to $25. Also, have Digit-Migit 27.145 MHz R/C Tricycle Monoplane, excellent flyer, trade for linear or two meter fm. Ralph WB6PCZ 7015 Waring, Los Angeles, CA 90038

MINT DX-20 with homebrew power supply WN4VVP 2735 McKinney St., Burlington, NC 27215

COMPLETE 2 meter SSB station, Drake 2C Receiver $150; Drake 2m Rcvg conv with AC supply $60; Gonset GSB-2M transceiver with separate AC and DC (mobile) PS $260; Comdel CP-11 Speech Compressor $70; D-104 Microphone $20; Homebrew (ARRL Design) 2M-1200W Amp, 4CX350A (spares) in Rack containing 2.3KV PS (solid state) in base, Vacuum CO-AX Relays, 3 inch Millen Scope- etc. Must be seen. $600; TR-44 Rotor $25; 8 X 8 J Slot Antenna with Rohn 10 ft. top roof mount tower $25; many extras, station must go, package deal available. S. Leben, 19 Yarmouth Ln., Nesconset L.I., NY 11767 516-265-0755

SIGNAL one CX-7 less than two years old. Excellent condition. Might consider other equipment in trade. $1400 K7GRE, 2315 NE 104 WAY, Seattle, WA 98125 206-522-4993

TEN-TEC PM2B, AC4, AC5; excellent condition. $65.00. WB4POG, 11203 Birchcrest Road, Richmond, VA 23233. Telephone 703-285-2954

SWAP SX101 for SX100 or equivalent W4UYH, 11421 SW 40 Ter, Miami, FL 33165

SELL: Hammarlund HQ 170, $200; HT-40, $35. Also Cesco Reflectometer CM-52-2, Drake TV-100 Lo Pass, HG 10B VFO, Vibroplex Semiautomatic Key. Make offer. K2EEB, 41 Gardiner Place, Walton, NY 13856

NEW! Dust off, Blows everything clean, desolders, etc. Uses 15 oz freon refills. Satisfaction guaranteed! $9.95 ppd. Protect your equipment. New, compact fire extinguisher. Highest quality 10 B:C UL, FM, CG approved. Satisfaction guaranteed! $16.95 ppd. Send today. Fire Safety Equipment, 232 Windsor Parkway, Hempstead, NY 11550

AEROTRON 100W 2M amplifier, also 220 MHz 100W, $45 each; 6M transverter $50; Hallicrafters HT-18 fm/cw $50. Swap vhf/uhf gear, list sase. W4API, Box 4095, Arlington, VA 22204

SELL: HW-32, HP-23, $100; DX-60B, $50; all in excellent condition. WA1LNQ J.B. Rusgrove, 80 Boy St., Bristol, CT 06010

FOR SALE: B & W 6100 transmitter new condition $350 RCA 2m fm xcvr with vfo $100 Boonton sig gen 65-B $75, Millivac MV-73 b $75, C. Courtney Old Lyme CT WA1FOK 06371

FM gear swap. Swan FM2X 12V./110VAC; Motorola. T53 60W, P33 5W. Nicad/ac, U44 on 449.5MC; antenna, control boxes; Collins filters F455CO8, F455B31; Model 15KSR Perfect; want 28ASR; 28KSR and 28LRXB. W2CY, 48 South Lake Street, Hamburg, NY 14075

STANDARD SR-C806M, fm with ac power supply. Like new $150 WA6DET 27031 Grayslake Rd., Palos Verdes, CA 90274 Telephone 213-377-6266

FOR SALE: Heathkit HX-20 and HR-20 complete with 12 volt power supply $100, Vibroplex serial +98233 $10. Charles C. Hay 1735 Sky Road, Sidney, NB

FOR SALE: Super power UTC-LS-185 and CG-309, new guaranteed. Make offer. Swap for SSB transceiver. No junk. George W. Smith, W5HIP Rt. 1. Box 137, Pottsboro, TX 75076 214-786-2713

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 Collins KWM-2, amateur net, $1,248; 32S-3, $938; 75S-3B, $862; new Drake TR-4, amateur net $599.95; R4-B, $475; T4-XB, $495; will take your used equipment in trade on new Collins and Drake. 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; R4-B, $345; Ham-M, $85; 2B, $175. Moory Electronics Co., P.O. Box 506, Telephone 501-946-2820, DeWitt, AR 72042

WANTED: BC-348 must be in excellent condition, with a-c power supply, instruction book, and schematic diagram. John Adams, 312 E. 4th St., Metropolis, IL

HELP! Garage-full of unused aluminum alloy masts, 9-1/2 ft by 3 in. o.d., 20 lbs. each. Cost government $155 each. Extremely strong and rigid. Perfect for mast, boom, patio/lamp/fence-post. $5.25 each. K3MNJ, 8361 Lan on St., Philadelphia, PA 19152

SELL QST May 1963 to December 1971 CQ June 1963 to November 1965. WB2QFA, P.O. Box 13, Hopewell Jct., NY 12533

FOR SALE: HQ170, HT32. W2UGM, 66 Columbus, Closter NJ 07624. 201-768-1884

COLLINS KWM2 with plug in Relays $575. Drake TR3 with noise blanker $315. Both mint. Marty, Box 11235, Elkins Park, PA 19117

SELL: Hallicrafters HT-37 transmitter with mike and antenna relay, $180. Hallicrafters HT-41 1200 watt linear with Xtra finals, $175. Hallicrafters SX-101 mk3. Good receiver, $75. Heathkit DX-60 transmitter, $50. Johnson phone patch, $18. New Swan three element tri-band beam with AR-22R rotator, coax and cables, $80. All in perfect condition with manuals. Dave White, WA1NDM, 617-784-5613, 55 Huntington Ave., Sharon, MA 02067

KRACO KS-800 car stereo cassette player needs adjustment. $20. 1 ship. Bob Craig, 8 Hollis Pl., Huntington Station, NY

TOO much gear, must sell, almost new British KW2000 B, and AC $575. Real nice Hallicrafters SR150. Transceiver with matching AC, DC, and mobile mount $325. New Swan Mark II linear amplifier $500, real sharp Drake L-4 amplifier just back from factory after modified to L-4B $500, mint Hallicrafters HT45 Loudenboomer linear amplifier $275. Will take trades on above. Richard Schark, 417 North Ferry Ottumwa, Iowa 52501. Phone 515-682-5741

DON and Bob guaranteed buys. SBE144 2MFM 199.95; Gladding 25, AC 255; write quote SBE450 MHz; Motorola HEP 170 Epxy Diode 2.5A/1000IV 39c; Ham-M $99; TR44, $59.95; Mosley CL33 $114; TA33 $105; Hygain TH6DXX $139; HYQUAD $99; 400 Rotor $148; TRIEX W51, $339; MW50 $229; low quote Rohn 20-25G tower, accessories. Prices collect. Full warranty. BAC, Mastercharge. Madison Electronics, 1508 McKinney, Houston, TX 77002 713-224-2668

FOR SALE: Hallicrafters SR-400 new, $525, PS-500DC new, $75; Hallicrafters SR-400 like new, $475; HA-20 split vfo console, with built-in vswr relative output meter like new $100; mercury tube tester model 1101 compact type, $20; 2 element 40M beam, Mosley M-402, $85; 3 element interlaced 15 & 20M beams, $55. W9HOG, Alan Kogerup 703 Huntinton, Schaumburg, IL 60172 Phone 312-894-1328

SWAN 350, power supply, excellent condition. Turner mic. Heath Swr. meter. Low pass filter cable. Vibroplex bug. Best offer. Marty Lesser, 566 Rockville Court, Oceanside, NY 11572 Phone 516-766-0027

SELL B & W 6100 transmitter. Crystal controlled frequency synthesizer. Dan McPherson, 419 Fairview, Abbeville, LA 70510

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, Hy-Gain, Regency, Standard, Galaxy, TenTec, CushCraft, Hustler, plus accessories. Write today for our quote and try our personal, friendly Hoosier service. Hoosier Electronics, R.R. 25, Box 403, Terre Haute, IN 47802

SALE: all equipment in good shape. HQ180A. Mint box used less ten hours, $275; SB301, $200; RME4300, $75; RMEVHF152, $25, needs little work; VF-1, $15; BC455 with pwrsply and extras, $30. You pay shipping, I insure. Write or call WA3NON, 537-1/2 North Front St., Allentown, PA 18102 215-435-0960

WANTED: Johnson tuning capacitors (2) 155-4 Type F, (2) 155-5 Type F, (2) 154-7 Type E. Charles Brand, WN2DXJ, 242 Highland Ave., Haddon Heights, NJ 08035, phone 609-546-5827. Pse advise price and condition.

WILL sell SR-150 with speaker and power supply. Very clean, and excellent condition. $375. You pay shipping. W9OZJ, Connersville, IN 47331

GREATER Washington DC area Foundation for Amateur Radio offers an Information Hospitality service. Special consideration is given to visiting foreign amateurs and a volunteer staff of linguists is available. Contact Hospitality Chairman, Bill Parrott, W4URL, 8548 Georgetown Pike, McLean, VA 22101. Phone 703-893-8383 between 8 am and 8 pm

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DRAKE TR-3, AC supply, MS-4, manual, $350. Roger Kaul, 18 Fox Den Rd, Glastonbury, CT 06033

ESTATE K2MDJ — Heathkit SB 300 receiver, SB400 transmitter, SB200 amplifier. Mint condition, $500. No ship. Firm J. Masheck 19 Arbutus, Chelmsford, MA 01824

SWAN 500c with noise blanker $350, Standard SR-C806M with 9 pairs Xtals $275. Cashiers check or money order. K6RIR, G. Apgar, 5612 Mason, Woodland Hills, CA 91364

COLLINS 32V3 clean with manual $150 Kim Bottles, WB6ZGL, 2761 North Marengo, Altadena, CA 91001

FOR SALE: Drake MN2000, $110 QST, 1926 through 1971, $225 QST shipped at your expense, I pay other. Ed Schneider, K2RCO, P.O. Box C, Brooklyn, NY 11204

SELL: Lafayette HA-410 Ten meter transceiver with D-104 mike, ac and dc cables, manuals, etc, $100, Elmac PMR-8 Rec with ac power supply. 8c through 6 meters $60 or all for $150. Firm, you pay shipping. Jim Stagg, 3641 Hyway 19 So. Perry, FL 32347 Phone 904-584-5155

COLLINS: complete, like new, original owner, KWM-2, 516F, 312B4, SM-1, $950. No shipping. K2YBQ, 169 Walnut Ave., Bogota, NJ 07603 Phone 201-488-8092

WANT cw transmitter — W3DGU

SELL DX-60B $50. Want HW-16. WA3LFU J. Price, Millington, Maryland 21651

COLLINS, mechanical filters. New F300Z-4, F300Z-5, 300X-68. Make offer. Need 455 KHZ/2.1 KHZ filter. WB2QFB, 35 Howard Ave., Copiague, NY 11726 Phone 516-842-9284

50 FOOT plus self supporting steel tower for sale best offer. Already erected. You remove it. Murray, Box 1, Montchanin (near Wilmington), DE 19710 Phone 302-774-7150

7289 (3CX100A5) CERAMIC sub for 2C39A. Few choice ones left. Surplus. Checked at 449mc and guaranteed 1CAS, $5 each; $50 dozen postpaid. J. Howell W4SOD, Box 73, Folly Beach, SC 29439

CLEANING out the shack. Several good items for sale including teletype equipment. Send S.A.S.E. for list. W8VGG, 320 W. McClellan, Flint, MI 48505

HAMMURLUND receiver HQ100, $75. Heathkit DX35, transmitter $75. Courier 5 watt transceiver with extras, $50. Realistic Pocket Recorder with charger and batteries, $25. Kenneth Hand, WN2EUF, Bridgehampton LI NY 11932

NATIONAL Amateur Crystal Bank** A central receiving, testing and matching service for exchanging 2 meter fm crystals. Send sase for details. National Amateur Crystal Bank, Post Office One, *Wykagyl Station, New Rochelle, New York 10804*

SELL: Heath SB-300, SSB, cw, am filters with SB-600, $225; SB-401, crystal pack $225. Operate transceive or separate. All excellent condition. Wanted: Collins 51J4, state condition, price. W4SVX, 306 W. Amherst, Melbourne, FL 32901

CRYSTALS Airmailed: August QST Novice Special – Dodge QRM with plenty crystals done economically with active-accurate FT-243 c-w crystals. Five or more (band mix ok). 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, $1.25 each, 80M, $1.65. Less than five, 40M-15M, $1.50, 80M, $1.75. Novice QRM Dodger Package. Three FT-243, plus and minus three kilocycles center frequency, 80M, $4.95, 40M-15M, $3.95. Airmail, 15c crystal, 1st. class 10c. General purpose: FT-243 .01% 3500-8600 Kilocycles $1.90 (five @$1.75 each). .005% add 50c crystal. Free info-order sheet. Crystals since 1933 Bob Woods, WØLPS. C-w Crystals, Marshfield, MO 65706

MOTOROLA H23DCN/Den, H24DCN wanted, operational or for parts. WA7GWV, V.A. Center, Boise, Idaho 83707

QSTs 1952 thru 1970 good condition, $3 any year, single copy .75, Postpard. J. Wilhite, 402 South Jefferson Iola, KS 66749

COLLINS KWM-2†10,144, beautiful, best audio on bands, $650, 30 day money back guarantee. Whitsett, 2009 Cliffmanor Cir., Huntsville, AL 35801

SELL: Drake TR4, RV4, AC4, with manuals $450. Drake R4 $225. All excellent condition. K1ZJA/2. Bill Morrison, 5700 Arlington Ave., Bronx, NY 10471 Phone 212-796-2670

HEATH DX-60B, $65; allied A-2516, $100. Both excellent condition and guaranteed 1 month normal usage. John Looby, WB9GRA, 2019 Cleveland,

WANTED Schematic and/or instruction manual NC-101X and any available data for modifications same. Accept verifax or other copy and pay any reasonable fee. Also need tested product detector and other modification data HRO-60. George Smith, Rt. 1, Box 137, Pottsboro, TX 75076

HQ-170AC – Mint, recently aligned $125, AMCOO PT preamp, mint $40 Heathkit Laboratory Generator LG-1 cost $69.95, *make offer. Electrovoice microphone 674 with stand, mint $40.* Army J-36 hug, excellent $8. 75A4 Speaker $8, Hallicrafters R-50 Speaker, mint $8. BN-86, $10. Bob Ensminger, 11388 Campus St., Loma Linda, CA 92354

COLLINS 51J4 with matching speaker, perfect condition, serial 4053, with product detector modification. $650 Hycon Oscilloscope Mod †622A, like new perfect condition. $200. Motorola two way 2 channel 12V radio Mod†D43GGV 2 meter, also 3 channel Compu Station in 30 in. high cabinet. Also 3 monitors 2 meter Motorola Eqpt. is never used. $500. Packing and shipping can be arranged but extra. Earle B. Davis, Sr., 3025 No. Valley View St., Orange, CA 92667, AC 714-637-3505

FOR SALE: from the estate of W1ATP. BC221 A J 125 to 20,000 KC, $60; Hammarlund HQ-180C, $375; Waters-Hybrid Coupler Model-3001, $40; Millen Grid Dip Model-90651, $50; TG-34-A Keyer with tapes, $25; G.E. Model MM2, $100; Swan 500C, $375; Heathkit SB220, $370; Heathkit HW-17A, $95. All prices F.O.B. William Kimball, 61 Hartford Ave., Hopedale, MA 01747

SEND sase for list of panel meters. Pair of unused 4X150As with cooling fan $10. Samkofsky, 4803 Brenda Dr., Orlando, FL 32806

HEATH HR-10B. Like new, $55. WNØHIY, Edgewood, IA 52042

WANTED to buy: Sensibly priced Measurements Corp. Model 80 signal gen., and Boonton Model 160-A Q meter. Must be clean and in good working order. Also desire to buy RCL impedance bridge. Please state firm price. W1CER, ARRL, 225 Main St., Newington, CT 06111

SELL: Used Hy-Gain TH4 on ground partly assembled, $50; HAM-M with control, $50. No delivery. Ed Greene, W1CHX, Avon, CT 203-673-2213

COLLINS R 391 Rcvr, Perfect. Ask $495, also Swan 240 with ac supply $175. BC- 312, mint condition. Ask $75. Will ship, will bargain. WA2EFQ, George Mowbray, 14 Washburn Rd., Mt. *Kisco, NY 10549 Telephone 914-666-3486*

SALE: HW22A, HP13A, $140; 1B 101 counter, $170, new, W2WHK, 210 Utica St., Tonawanda, NY 14150 716-692-5451

4CX250Bs – $5.50 EACH, 4X150As $3 each 2N3632s $2.50 each, 3 for $5.50, with spec sheet. WA2KOI, 207 Woodlawn Ave., Williamstown, NJ 08094

TEMPO One & ac one p/s, excellent condition, $325 Mike Brooks, E6YYR, 5134 Anaheim, Long Beach, CA 90815, 213-597-3196

SELL: National NC300 Receiver, $115, Hallicrafters HT32A transmitter, $215 or both $300. Good condition. Ray, WB4-IKL, Box 160, Gum Spring, VA 23065

SELL: Heathkit HW-16, 4XTALS $90. Vibroplex champion bug $15. HG-10 vfo with supply $20. WNØEOV, James Upham, 1733 Topping Rd., St. Louis, MO 63131 Tel. 314-822-7069

SELL: Drake TR4, RV4, AC4, mint, $535, or will trade for mint Argonaut plus $200 cash. 75A2 with Central Electronics Model B. Slicer, $135. FOB, W. Dale Marshall, WTDJU, 3208 Plymouth Drive, Bellingham, WA 98225

SELL: HT-37 AND HQ-170 with both noise filters, each in mint condition, price per pair $298. Boonton Square Wave Generator, $25. Also Ranger II, mint condition, $100. W.A. Strayer, 531 S. Russell St., York, PA 17402

BIRD dummy load DA-412A/U, DC-3000 MC, 600 watts continuous duty, $75. Bird Termaline RF Absorption Wattmeter TS118A/AP. Same as †693, with all adapters, $175. Both like new, K6UWD, 110 Olive Ave., Piedmont, CA 94611

HEATHKIT HR10B amateur receiver and *HRA 10-I* crystal calibrator in perfect condition plus headphones $60 plus postage. David Green, W8ZS, Jester Austin, TX 78784

YAESU FTDX 560 mint condition. Factory cartons; also SX-101A, SB-10. WA8SWM 418 Seymour. Flushing, MI 48433

WANT: Heath DX-100 in operating condition. Doc W5GY care 7290 net or box 128, Naples, TX 75568

CV-253/AIR FREQUENCY coverter, 38-1000 MHz. Continuous tuning, 30 MHz out. New, unopened carton. $165. K4EPW, 1230 Briar Hills, Atlanta GA 30306

SELL or trade SBE-SB34, Mic, AC cord, instr. $200 or Collins 516F2 and 136B2. Sid Kress W2CTZ/3 7401 New Hampshire Ave., Hyattsville, Maryland 20783

HW-16, PERFECT condition, $95, Steve Knapp, Corunna, MI 48817

FOR SALE: SB-401 with xtal pack, never used, factory aligned. $275. IB-101, IB-102 factory aligned, both $225. Wm. S. McFadden, 29 Vernon Ave., Wheeling, WV 26003 304-242-3655

WANTED: Lafayette HA-410, WBØFZL, Overton, NE 68863

COLLINS 75S3B, $450. New condition. One owner. Used as stand-by receiver W3W1P

SCHOOL expenses. Sell Heath HX-10, $130, R4-A, $240, both mint, Home brew 2kw linear 2 4-400s, gc, $150. WA9IQY 312-489-2641

COMPLETE Novice Shack: $150, HT40 xmtr, NC155 rcvr; matching spkr; manuals; TR switch; Drake TV42LP filter; 80-40-15 meter xtals; coax connections. WN5FBS, 125 Florence, Hammond, LA 70401

WANTED: Technician with access to lab bridge to build 2.1 kHz audio filter for me. Technical Correspondence Nov. '67 QST. *Write Jesse Newton, 1071 Prosser Ave., Prosser, WA 99350*

FOR SALE: Heath SB-303 rcvr, and SB-401 xmtr. Like new excellent condition factory cal, $525; SB-600 $15; HDP-21A Ham mike $25; HD-10 Electronic keyer, $30; HN-31 Cantenna, $6. Robert E. White, K9LWA, 300 N. Salisbury Rd., Richmond, IN 47374

FOR SALE: 1 Beckman 7361R counter, $125; 2 GE 25W, 2 freq. TPL Mod., RE53JC6 (S/S Rec., Hybrid Trans.), $200 ea., 1 BC-221-Q, 125 KHz-20 MHz, $65; Morrow MB-6 Rec. $50 and MB-560A Trans. $50, $75 pr.; Viking II with vfo, $75; Heath HG-10 vfo, $25. D. Marshall KØBKD/5, 1117 June St., NE, Albuquerque, NM 87112

MINT condition guaranteed: SR-150 with matching A/C, $295; D/C, $50; NCX-3 with matching A/C, $150; Swan 500C with matching A/C, $385; 32V3, $149. W9HF, 5005 Indiana, Fort Wayne, IN

WANT two 4-400A tubes for my Thunderbolt. J. Wintermute, 1362 Birch Hill Road, Mountainside, NJ 07092

HT37, $175. HQ170, $160, with speaker. Good condition. K4ENP, 2 Ephyr Hills, 303 Central Ave., FL 33599

QSTs, 10/58 thru 9/61. Murphy, 13103 Larchdale, Laurel, Maryland 20810

HEATH DX-60A, HR-10, HG-10, $120. DX-100 with SB-10 for SSB, $115. All manuals; make offer. WBØFLM, 2941 Josselin, Springfield, MO 65804

WANTED: Quality made printed circuit board for a low noise 144 Mc. converter as described page 410 of 1969 Radio Amateur's Handbook. Marshall Schaffer, 54 Fairfield St., Montclair, NJ 07042

SELL: Modified National N.C. 300 receiver. Includes 2.1 KC Collins mechanical filter, fast attack AGC and 2nd conversion crystal oscillator for increased stability. $125 plus shipping. Bob Ruffer, 4013 Cleveland Place, Metairie, LA 70003 Phone 504-887-2967

FOR SALE: Standard SR-C801S, 2m fm transceiver, with mic, manual, 4 xtals, $200; Sony TC-230 tape recorder, with manual, need play back head, $65 M. Maruya, JA7DBG/W2, 149-01 Barclay Ave., Flushing, NY 11355

COLLINS R-390A receiver, excellent condition $625. Want teletype Model 33 ASR. T. Howard 46 Mt. Vernon St., Boston MA02108 617-742-0916

SSB station for sale. Galaxy V MkII, HyGain 14 AVQ/WB, Heathkit wattmeter, other accessories, best offer. Mathew Grossman WA2PCS 13 Stonehenge Rd., Upper Montclair, NJ 07043 201-744-1395

TELETYPE 28ASR excellent condition, 6 manuals. TT/L-2 TU. $1,100 for lot. Pick-up only. Henry Rainville, 106 S. Cornwall Ave., Ventnor, NJ 08406

NCX-5 MARK II digital readout transceiver with power supply, EV 600E mike, XCU27 xtal calibrator. Sacrifice, need money now. $325 ppd. Ken Bauer, 6358 Lyric Ln., Falls Church, VA 22044

WANT old KWM2 at realistic price, cash ready. Write WØBNF

FOR SALE: National receiver NC 303 with xtal calibrator and speaker in excellent condition. Best offer. Mike Herbstman, WA2PHB, 245 East 19th St., New York, NY 10003 212-473-4808

HEATH GC-1A solid state all band receiver $45. Terado Trav-electric portable ac supply $50. W2KOY, 850 Richmond Rd., East Meadow, NY 11554

SELL: QST 1931-44 incl., 1951-70 incl. CQ 1948-70 incl. W1RO, 30 Lake St., Shrewsbury, MA 01545

HEATH sideband station complete. Will deliver within 200 miles of Kalamazoo. SB-101, HW-32A, HA-14 and fan, HP-23, HP-24, speaker, patch, mike, dummy load, and coax switch. C. Paterson, 710 S. Rose, Apt. 8, Kalamazoo, MI 49007

SIGNAL/ones: CX7 factory modified to CX7A, $1350. Mint CX7A, three months old, $1595, new $2195. Brochures, big trades. Payne Radio, Box 525, Springfield, TN Six Days 615-384-5573, nites, Sundays 615-384-5643

ANTIQUE radio parts discovered in San Francisco warehouse, untouched for 50 years. Sase for list. W6RXW, 341 La Mesa Dr., Menlo Park, CA 94025

RECIPROCATING detector parts kit. Write Peter Meacham Associates, 19 Loretta Rd., Waltham, MA 02154

HEATH DX 60B, HR10B $110. Will ship. R. D. Price, 1112 Rockwood, Burlington, NC 27215

WANTED: Gonset or Telrex tribander in good condition. K2CX, Rte 1, Box 173, Ancram, NY 12502

DRAKE: R4B receiver. Brand new, $350. LeRoy R. Swayze, 138 Burnham Rd., Morristown, NJ 07960. Tel: 201-267-9692

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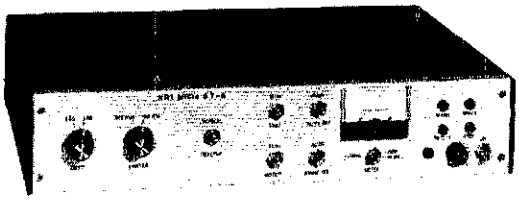
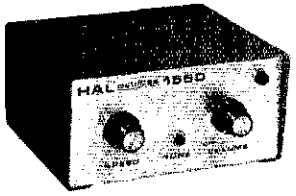


TOP QUALITY RTTY...WITH THE HAL MAINLINE ST-6 TU. Only 7 HAL circuit boards (drilled G10 glass) for all features, plug-in IC sockets, and custom Thordarson transformer for both supplies, 115/230 V, 50-60 Hz. Kit without cabinet, only $135.00; screened, punched cabinet with pre-drilled connector rails, $35.00; boards and complete manual, $19.50; wired and tested units, only $280.00 (with AK-1, $320.00).*



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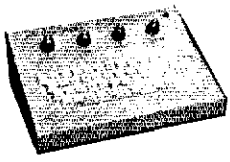

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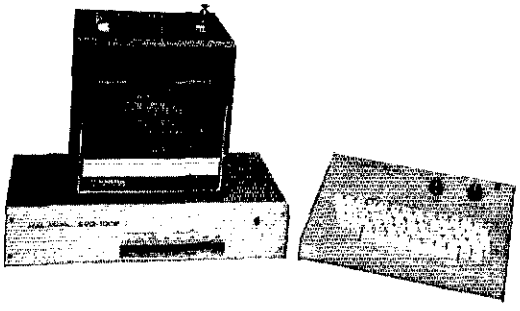

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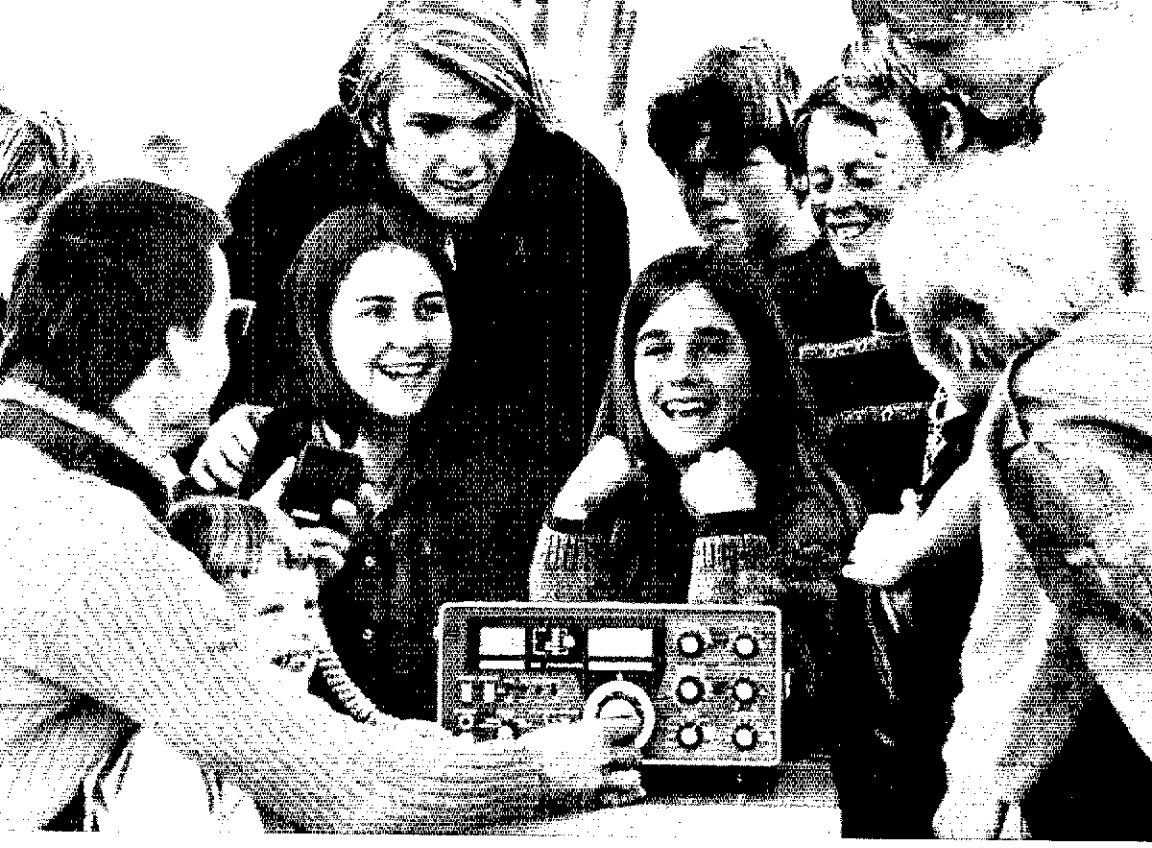

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