

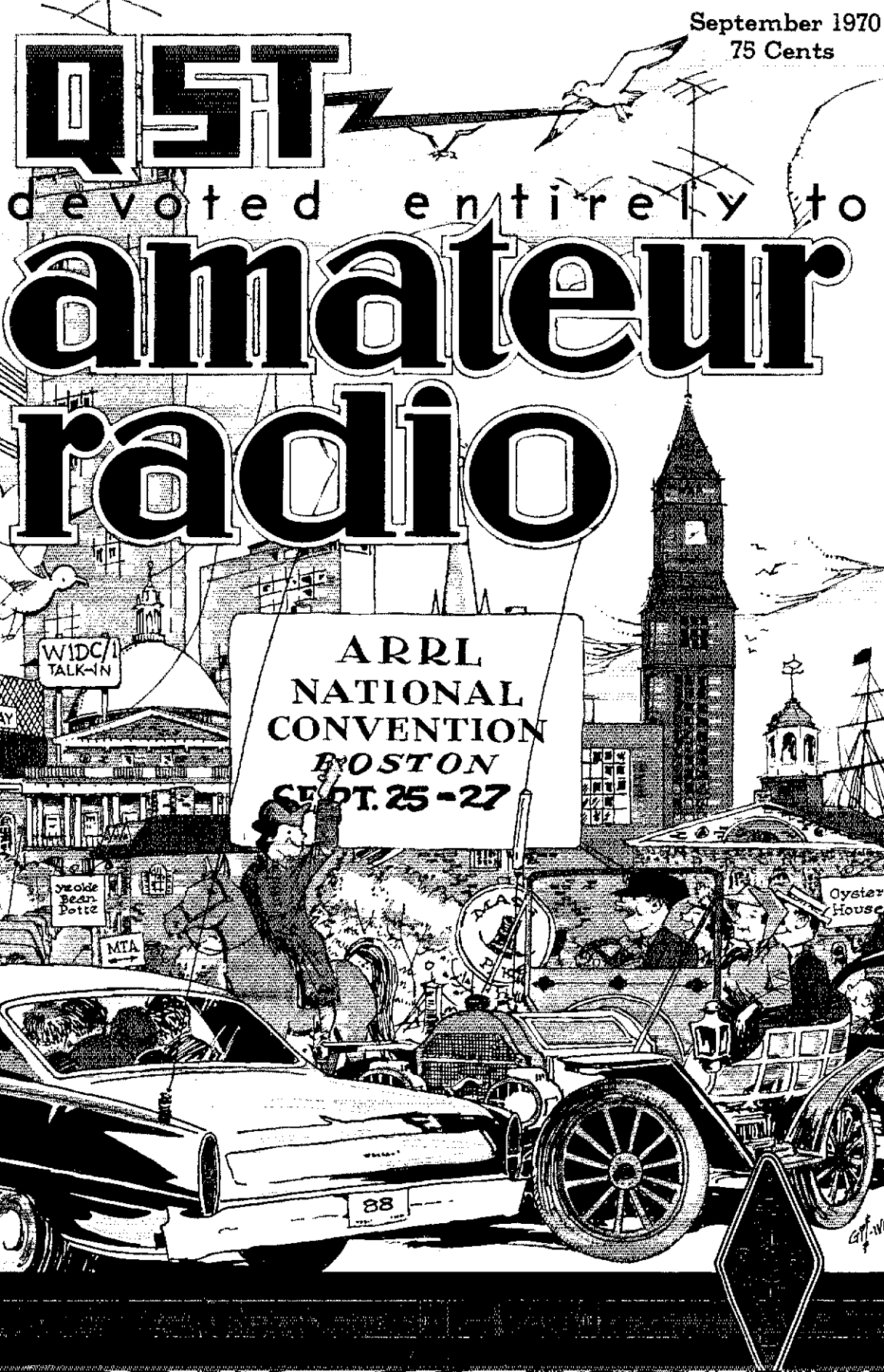
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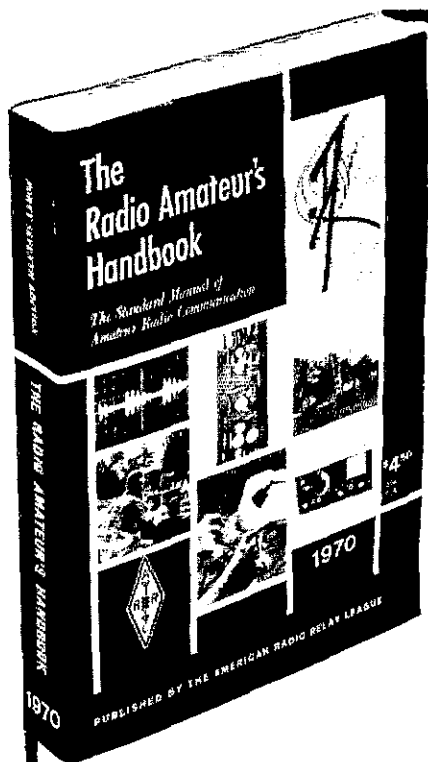
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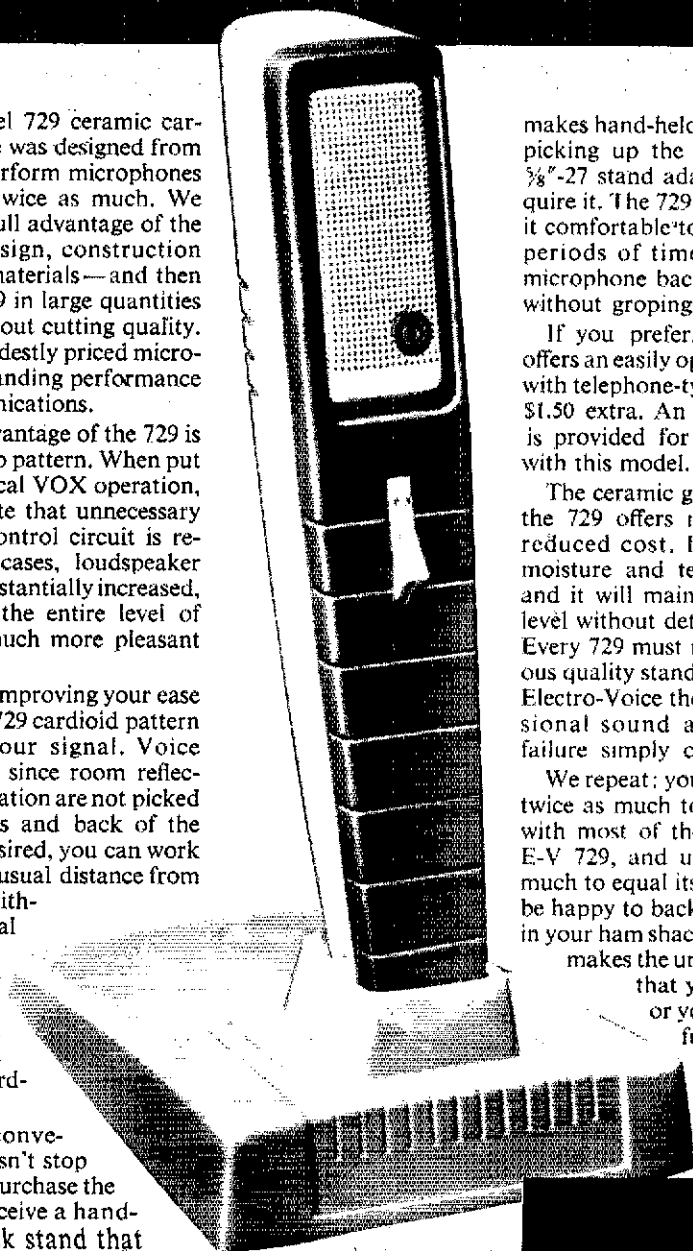
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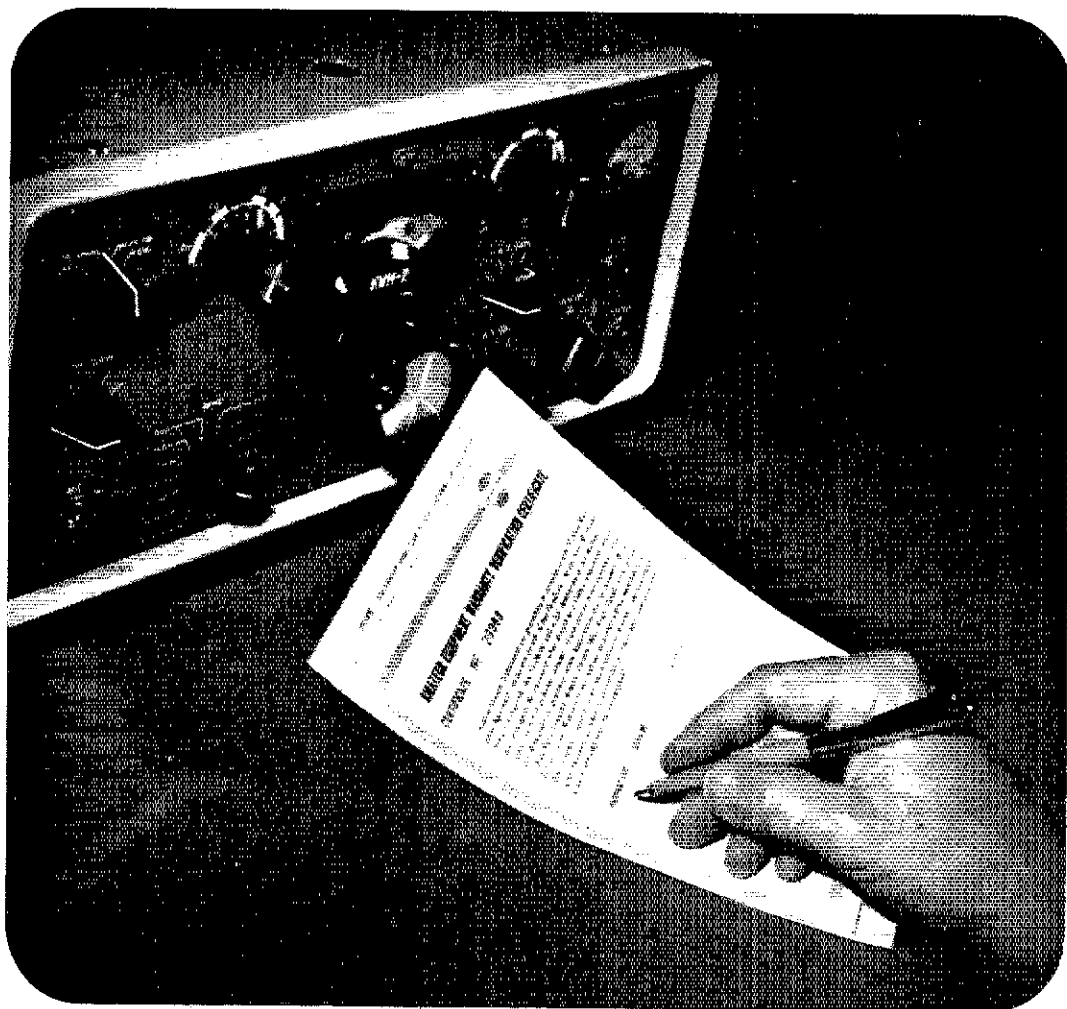
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SEPTEMBER 1970

VOLUME LIV NUMBER 9

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

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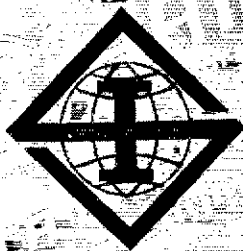
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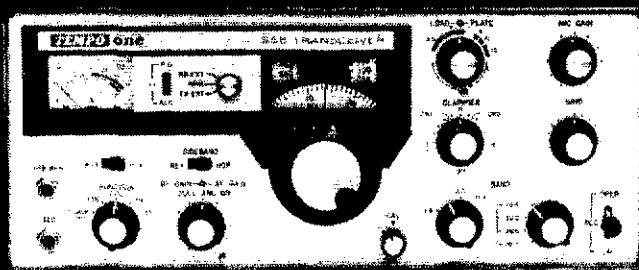


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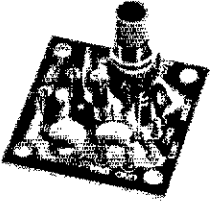
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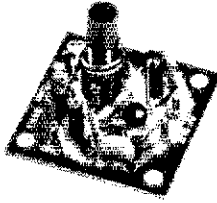
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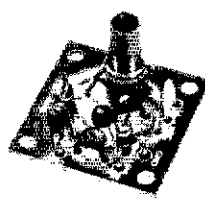
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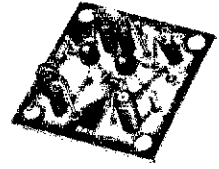
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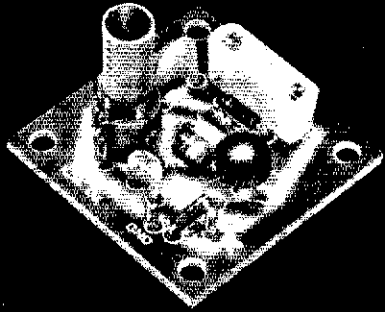
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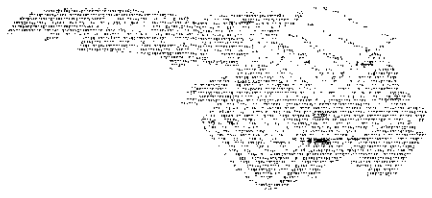
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Vice-Director: Lester L. Harbly W5BNG
4516 Calmont, Fort Worth, Texas 76107

* Member Executive Committee

"It Seems to Us..."



A TOUGH DECISION

LEAGUE LINES" in June *QST*, and the Board minutes in July, covered briefly the subject of expansion of the U. S. phone bands — considered in part in Minute 13, but (after hours of discussion and evaluation) rejected on a vote of six in favor, nine opposed.

The arguments in favor of expansion of the phone bands — particularly 75, which bears the brunt of amateur public service work on voice; and 20, the mainstay of DX QSOs — are starkly obvious, uncomplicated, and easily supported by just turning up the gain on a receiver. It is certainly true that two-thirds of the world's amateurs are in the U. S., possessions, and Puerto Rico. It is true that a majority of FCC-licensed amateurs prefer phone to all other modes, perhaps by 65 to 35% in the hf bands. It is true that the suballocation of voice privileges in each hf band (except 10 meters) is not, in number of kilocycles, in that same ratio.

Question: Why, then, did the League's Board reject expansion?

Answers: (1) Because there are many, not-so-obvious — yet compelling — arguments on the other side of the issue, and (2) because a thorough reading of amateur sentiment showed no widespread desire for affirmative action.

At the Board meeting, directors reported on sentiment within their divisions. Some had taken direct mail polls of membership opinion; some only samplings; some relied on club-council and similar organizational channels. The poll strongest in favor of phone expansion — that in the Southwestern Division — still tallied only 60% in favor. A few hundred miles north, though also in California, the Pacific Division meeting of more than 40 amateur club representatives (set up specifically to advise the director) rejected expansion by a similar ratio. These variations showed up in other areas, as well. E.g., by a small majority the West Gulf Division expressed itself in a poll as in favor of expansion; the Midwest Division said nix. All of this illustrates that amateur opinion has not yet really jelled one way or the other.

The Board had a healthy supply of this and related input in making its decision.

During a year-long study of the matter, the Planning Committee of the League solicited and studied the views of IARU societies, data on band occupancy supplied by volunteers of ARRL's Intruder Watch, and the recommendations of allocations experts.

One of the latter, W4BW, did such a thorough job of summing up the arguments that we've reproduced his treatise in this issue. We commend it to your reading — not to cut off debate, nor attempt to dictate a solution to a tough problem, but to cover the less-obvious points *against* expansion where the arguments *in favor* are so plain.

DIRECTOR ELECTIONS

THE AFFAIRS of this corporation shall be governed by a Board consisting of . . . directors who shall be elected for terms of two years by the members . . ."

Under the above provision in the League's Articles of Association, one-half of ARRL's amateur membership is in the process of choosing directors, their "legislative" representatives in our system of self-government. Routine business, technical and operational matters are handled by a professional staff of some 65 people at Hq., but only in accordance with the wishes and directives of the Board of Directors, who in turn derive their authority from you, the members.

The second call for nominations (the first was last month) appears in "Haps," this issue. If you reside in one of the divisions holding elections this year, read the announcement carefully and then act — to renominate your current director, or name another you think is better qualified. Particularly since each director now represents an average of over five thousand members, your candidate should be the best available, enjoying the confidence of a majority in your division. He should be a mature person of ability and stature, for he helps direct the affairs of an organization whose budget runs \$1.5 million dollars per year.

For the League to continue as a strong democratic organization, and to continue its leadership in amateur affairs, all members must be concerned about our government. Nominate your candidate, then, and when the ballot comes about the middle of October, be sure to vote.

QST

League Lines . . .

There have occasionally been some highly overheated discussions at ARRL convention forums in the recent past, so it is quite a contrast to have this description of a 1970 affair from one who attended: "Things were sure different at this forum; I was reminded of personal testimony, as in a church, when many folks stood to state what the League means and had meant to amateur radio generally and to those present personally."

Many of you wrote with compliments on "Let's Talk Transistors," a series by Robert E. Stoffels which QST ran from November 1969 through July this year -- and most who did so asked for a reprint booklet. We've found it feasible, and the collection is now available from Hq. (only) for \$1, including postage. Our correspondence with the author apparently sparked a latent ham bug, for he has passed his General with flying colors and is now even more closely one of us -- WB9ESH.

Fall is almost here, and with it an upswing in club activity. The Communications Department has a kit for organizing clubs, and a library of training aids, to help your program along. A new rule change permits the films, etc., to be used on a "standby" basis by clubs not yet affiliated with ARRL.

Don't forget new license application fees became effective August 1. See "Haps" this issue. For a while there will be copies of the earlier Form 610 floating around with an incorrect fee schedule shown. If you submit the wrong fee, it is only going to delay your application; do it right. But meanwhile, ARRL is petitioning for reconsideration of the Commission's fee decision.

Several of the Hq. crew, coordinated by WIYYM, are participating in reading contents of QST on tape so that the Library of Congress may circulate reels among blind persons who are hams or interested in amateur radio. Lenore Jensen, W6NAZ, has put ARRL's "Learning the Radiotelegraph Code" on tape, along with some practice cw she tossed in, and this can be obtained through Recording for the Blind, Inc., 121 East 58th St., New York, NY 10022. She's already done the Handbook, available through the same source.

Interested enough in ham radio to make it your career? We have occasional openings on the Hq. staff -- a couple exist at the moment. Basically they require the ability to express yourself well both in person and on paper, and the knack of working with other people -- 100,000 members, that is. Contrary to some impressions, your working day won't be one big hamfest, but your knowledge of amateur radio will be important. These are entrance posts, in the junior administrative chain at Hq. If interested, please send for our standard personnel form.

An additional channel for membership input into League decision-making was opened two years ago in the form of advisory committees on specialized subjects, commencing with VHF Repeaters and Contests. A third, on DX, is now being formed; nominations for committee members are now being sought, per announcement in "Haps."

Last call for the National Convention -- see pages 58-60, this issue.

Quote-of-the-Month. "We may or may not like it, but the ARRL is the recognized representative for Amateur Radio. If we like it, we should support them. If we don't, we will have to vote people in who see things from our points of view." -- Perry T. Gresham, K5BIQ, prexy of Kilocycle Club of Fort Worth.

A Solid-State VOX

BY DOUGLAS A. BLAKESLEE,* W1K1K

A VOICE-OPERATED relay (VOX) provides automatic transmit-receive switching. It is a useful accessory, and one that can add to the pleasure of operating. Owners of commercially-made transmitters that have been designed only for push-to-talk operation, and home constructors who are "rolling their own" rigs, will find that the unit shown in Figs. 1 and 4 provides excellent VOX operation and that it can easily be used with their existing station equipment.

The Circuit

Operation of a VOX circuit is not complicated. A JFET transistor, Q1 in Fig. 2, operates as the first audio amplifier. The high input impedance of this type of transistor is desirable, because the use of high-impedance microphones is nearly universal in the amateur service. Q2 and Q3 provide additional amplification of the audio signal. The gain of these two stages is high. But, if additional gain is needed, bypass capacitor C7 may be added across the emitter resistor of Q2. With all but the low-output dynamic microphones, however, this capacitor should not be necessary. The audio output from Q3 is rectified by CR1 and CR2.

The dc output from the audio-signal rectifier is amplified by Q5 and fed to Q6. With no signal on its base, Q6 draws heavy collector current, holding the voltage on the base of Q7 near zero until the input signal reaches a sufficient level to turn the transistor off. Q7 will then turn on, drawing collector current through the relay coil, closing K1. The transistor that operates the relay is protected by CR5 from transient spikes generated as the current changes in the coil of K1. Provision is made for turning K1 on with a front-panel switch, S1, which holds the relay closed for a period of transmitter tuning or other adjustments.

A delay circuit, borrowed from ON5FE,¹ is included to hold K1 closed for a short time after the audio-signal input ceases. This delay keeps the relay from chattering or opening during the short pauses between words or syllables. The length of the time delay is determined by the value of C15 and the setting of the DELAY control, R22. The advantage of ON5FE's circuit is that a relatively low value of capacitance can be used. Other circuits, which use delay capacitors of 50- to 200- μ F, have slow turn-on action because series resistances used in the circuits prevent the large-value delay capacitor from charging instantaneously. A slow turn-on time is definitely

* Assistant Technical Editor, *QST*.

¹ Gillet, "Transistor Module for SSB Transceivers," *QST*, January, 1970.

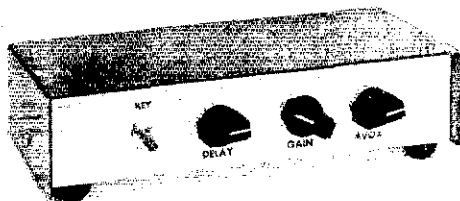


Fig. 1 — Front view of the VOX. The continuous-key switch is used to hold the control relay closed for transmitter tune-up or for manual transmit-receive operation. The knobs are Millen A001.

undesirable, as it results in clipping of the first word spoken.

Audio output from a station receiver can key the VOX; to prevent this problem, an anti-VOX circuit is included. A sample of the receiver audio is amplified by Q4 and rectified by CR3 and CR4. The output of this rectifier is negative in polarity and opposes the positive voltage developed by CR1 and CR2. Thus, when controls R19 and R20 are correctly set, any pickup from the speaker does not activate the VOX, as the positive and negative voltages cancel, and Q5 does not operate. A short time constant is desirable on the output of the anti-VOX rectifier; C11 provides this function. Receivers with 4- to 16-ohm speakers require amplification of the audio signal sampled across the speaker leads. If the receiver audio is taken from a 600-ohm speaker lead, or if the receiver has a high-impedance audio output, the Q4 amplifier stage may not be necessary.

Where Did the Dot Go?

An ideal VOX would have an infinitely-fast attack and a wide-range adjustable delay. As mentioned before, a fast attack time is necessary so that the first word or two of a transmission will not be chopped up, or lost completely. If the VOX circuit is used to control a station for semibreak-in on cw, as is popular in many commercially-made transceivers, the first dot of each transmission may not be transmitted. Proper design will eliminate turn-on delays caused by the time-delay circuit.

Missing the advantages of VOX operation? Here is an easy-to-build circuit that is suitable as an outboard accessory, or it can be built into your next homemade transmitter.

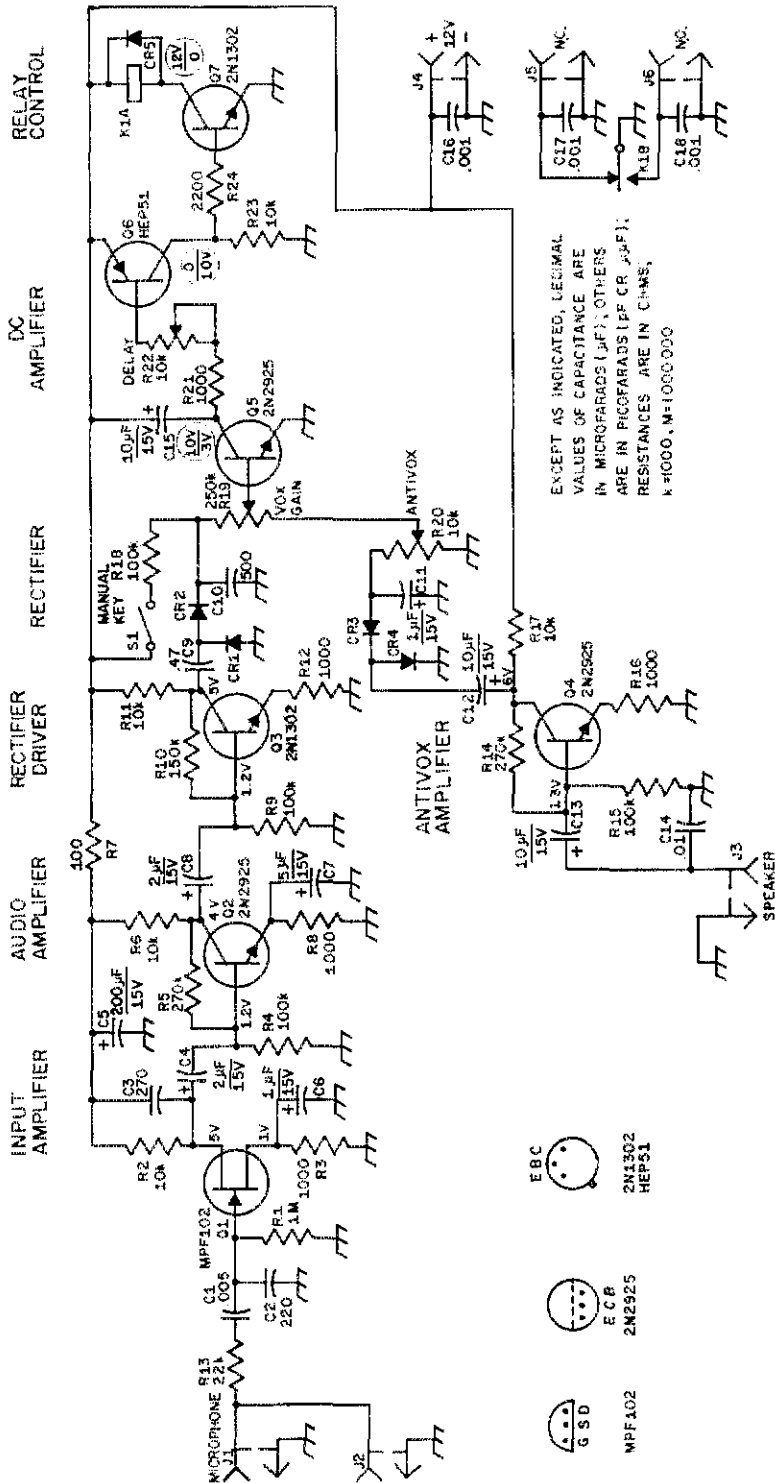
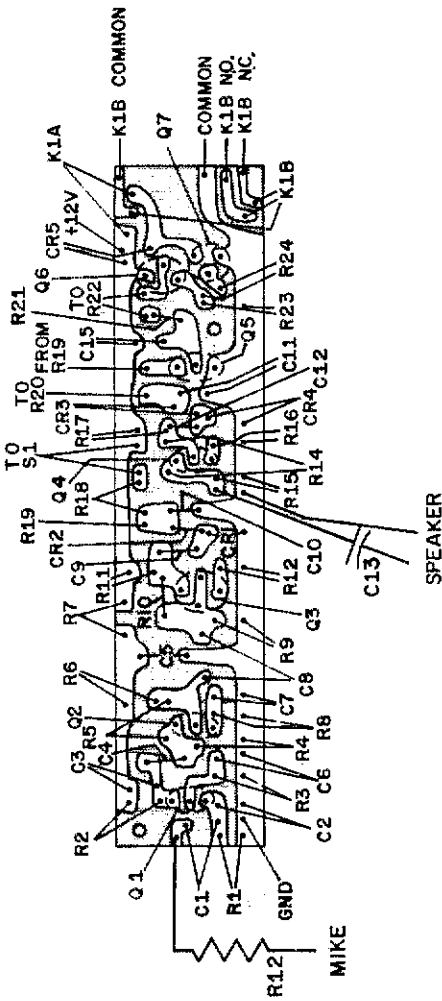


Fig. 2 - Schematic diagram (A) and etched-circuit-board layout (B) of the VOX unit. Unless otherwise noted, resistors are 1/2-watt composition. Capacitors with polarity marked are electrolytic; others are disk ceramic. Numbered components that are not listed below are for circuit-board reference.

- C9 - Mylar or other low-leakage type.
 CR1-CR4, incl. - Germanium diode, 1N67A or similar.
 CR5 - Silicon, 50 PRV or more.
 J1,J2 - Phone jack, panel mount.
 J3-J6, incl. - Phono type.
 K1 - Reed relay, spdt contacts, 12-V coil (Magnecraft W104MX-2).
 S1 - Miniature toggle (Radio Shack 275-1546 or 275-326).
 R19 - Linear-taper carbon control (Mallory MLC254L).
 R20, R22 - Linear-taper carbon control (Mallory MLC14L).



but the relays themselves can be troublesome. Most relays take a certain amount of time (after voltage is applied to the coil) before the contacts actually close. Tests by the author indicate that the operate time is about 10 milliseconds for the small Siemens-type relay used in many transceivers and that it is 15 to 20 milliseconds for the open-frame and antenna-change-over types. These times are average - similar types of relays produced by different manufacturers vary quite widely from the norm.

What happens to that first dot (or word) can be seen in Fig. 3. Here the VOX relay in a transceiver, KA, controls an antenna change-over relay in a linear amplifier, designated KB. Obviously, KB must be closed before any signal can be radiated. The first dot has been lost completely because of the lag in relay operation. Had a dash been sent, it would have come out sounding like a dot. Two cures exist for this problem, neither of which will help much on an existing piece of equipment. Electronic switching can replace the slow relays,^{2,3,4} or a really fast relay can be used. The only inexpensive relays that operate fast enough for this application are the reed types. (Reed relays have closing times of one millisecond or less.) A reed relay⁵ is used in the Solid-State VOX to keep the close time to a minimum, but the delays in the transceiver and antenna relays remain. Multiple-reed relays can be used to replace slower types of relays in transmitters and transceivers; they can even be used as antenna switches if special precautions are taken.⁶ Some operators may prefer to just send a dot at the beginning of each transmission rather than rebuilding their rigs - after all, that dot won't be heard on the air.

Construction

The VOX unit, except for the controls and connection jacks, is built on a small etched-circuit board. This board has a long, narrow shape, giving a modern shape factor to the VOX housing. Parts layout is not critical and it may be adjusted to suit one's individual requirements.

The case for the VOX is homemade. Two pieces of sheet aluminum, cut to size, are bent into U shapes. Small L brackets, fastened to each end of the base, are the points into which the sheet-metal screws that hold the cover are fastened. The overall size of the housing is 1 1/2 X 7 X 3 inches. Phone jacks are used for the microphone connections, and other input connections are made through phono-type jacks. The types of connectors used should mate with the other plugs and jacks used in an individual's ham shack. Unwanted rf pickup is always a potential hazard with transistor equipment. So, standard rf suppression techniques are

² Hildreth, "Experimental All-Electronic VOX System for SSB," *QST*, March, 1968.

³ Hildreth, "VT, Transceiver with Instantaneous Voice Interruption," *QST*, October, 1968.

⁴ See footnote 1.

⁵ A relay with double-throw contacts is used, and the normally-closed function provides the receiver muting. If this feature is not required, a less-expensive relay with single-pole, single-throw contacts (Magnecraft W101MX-2) can be substituted.

⁶ "High Power Version of the Keved Antenna Relay," *QST*, December, 1964.

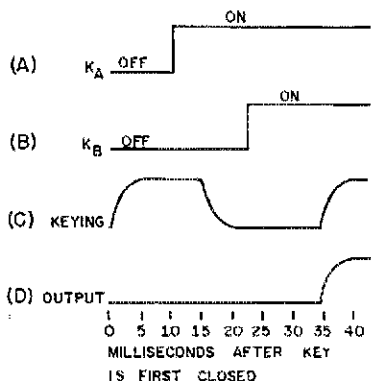


Fig. 3 — Timing diagram of the relays in a typical amateur station. See text for details.

used on the circuit board, and all connection points to the unit are bypassed.

A wide variety of npn transistors can be used; almost any of the small-signal, high-beta types are suitable. The bias resistors for the 2N2925s may have to be changed if a different type of transistor is substituted, however. When soldering connections to the etched board, care should be exercised, as excessive heat can damage transistors and diodes, as well as cause the copper foil to lift off the board. Also, correct polarity should be observed when installing the electrolytic capacitors. The unit's power supply is a 12-volt transistor-radio-battery eliminator, the Midland 18-112. Any of the 9- or 12-volt supplies sold for use with portable radios or tape recorders should do. A "stiff" supply is not necessary. The VOX

(Continued on page 49)

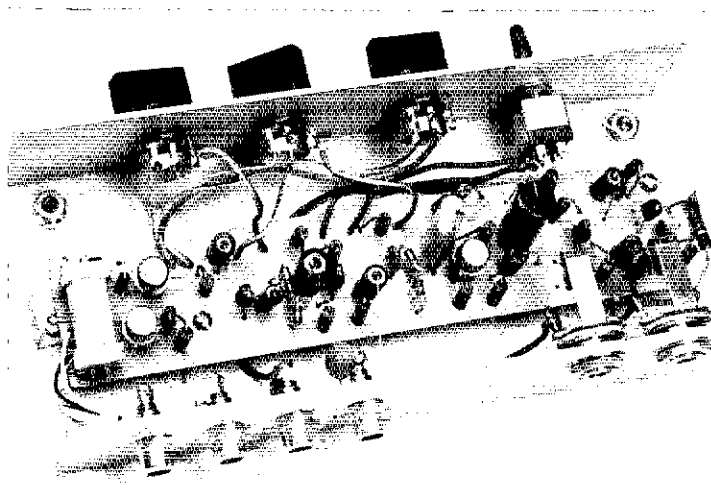


Fig. 4 — Interior view. With the exception of the controls, connection jacks, and rf bypass capacitors, all components are mounted on an etched-circuit board. (The board is available from Stafford Electronics, 427 S. Benbow Road, Greensboro, NC 24701, order no. 9-70).

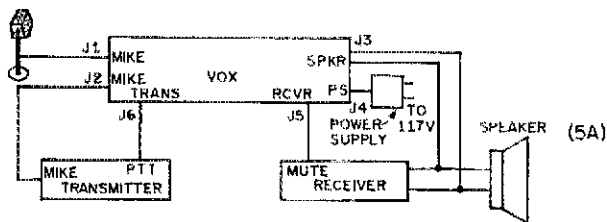
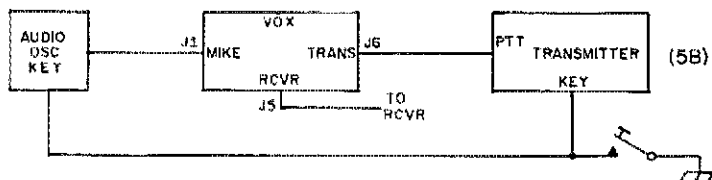


Fig. 5 — Typical connections for the VOX adaptor when used for A phone and B cw operation.



Short Antennas for the Lower Frequencies

In Two Parts

Part II — Trap Construction and Adjustment; Some Applications

BY YARDLEY BEERS, PH.D,* W0JF

THE WRITER has used a wide assortment of components for traps. However, experience has been limited to powers of 150 watts and less, and certainly many of his components would have been unsatisfactory if the legal limit of power had been used. As inductors, coils from war-surplus tuning units, plate tank coils from dismantled homemade transmitters, and Miniductors have been used. More recently some coils wound with plastic-covered bell or hookup wire on plastic pill bottles have been adequate under conditions where large currents are not expected — that is, for monoband loads or traps with low L/C ratios.

Ideally, the capacitor should be the air- or vacuum-dielectric type. However, such capacitors are expensive and are too bulky to be used except with base loading. For the most part, the writer has used prewar mica capacitors with 1000- or 2000-volt ratings and having screw terminals or thick lug terminals. These have worked better than reasonably could have been expected. A modern ceramic capacitor with a 20,000-volt rating and screw terminals has been most satisfactory. However, ceramic capacitors with pigtail leads, even those with a 6000-volt rating, have been unsatisfactory in that as the transmitter key is held down, the resonant frequency of the trap drifts out of tune as the capacitor heats up. The reader should be reminded that in this application the voltage rating is of little direct interest. The important properties are dielectric losses and lead losses when high currents flow. In some cases it may be desirable to use a number of capacitors in series or parallel in order to improve the power-dissipating capability.

Design and Experimental Checking Procedure

As a starting point, it is convenient to employ a rough rule of thumb that the portion of the antenna between the load and the end (H_1 in Fig. 1, Part I) can be expected to have a capacitance of about 2 pF per foot — perhaps 1.9 for wire and about 2.4 for one-inch tubing. For conventional inductive loading of a short monoband antenna, choose a coil having an inductance which will resonate the capacitance of this portion of the antenna at the desired operating frequency.

For the first try in designing a trap, select a capacitor having five to ten times the capacitance of H_1 and choose an inductor which resonates with the total capacitance (capacitor plus H_1). Fortu-

nately, inductances determined this way are likely to be a little too large because additional inductance is contributed by the lower portion, H_2 . You are then ready to start trimming.

In the case of a trap which is not mechanically an integral part of the antenna, the resonant frequency should be checked in the shack with a grid-dip meter, with an allowance for the capacitance of H_1 . Otherwise, it is necessary to work with the complete antenna. Several procedures and different instruments may be used to arrive at the desired results. However, the writer finds that results are obtained most rapidly by first locating the center of the resonance, which is mainly controlled by the trap, and for this operation a grid-dip meter can be used as a signal generator to drive a Wheatstone-bridge type standing-wave detector.⁹ (Standing-wave detectors of this type usually require lower input power than reflectometer types.) Coupling is achieved by wrapping two turns of insulated wire around the middle of the grid-dip meter coil and connecting the ends to the input of the bridge.

It is not necessary to obtain a large deflection on the bridge meter; one or two divisions are adequate. Set the bridge to indicate reflected power and rotate the GDO dial until a sharp dip is observed, indicating approximately the center of the resonance. If the frequency is far from that desired, preliminary adjustments to bring the resonance near to the desired frequency can be

⁹ A bridge of this type is described in the A.R.R.L. *Antenna Book*, Chapter 3, page 128 in the Eleventh Edition.

The term "trap," by long-established usage, means a circuit whose function is to act as an absorber or decoupling device for an unwanted frequency, and has been used in this sense in connection with multiband antennas operating on the principle described in the A.R.R.L. Antenna Book. As used in this article the word has a much broader meaning — a parallel LC circuit tuned so as to provide a specific needed value of reactance for loading an inherently nonresonant antenna.

*740 Willowbrook Rd., Boulder, CO 80302

TABLE I
LOADING NETWORKS FOR 40-FOOT BASE-LOADED VERTICAL ANTENNA

Band (MHz)	Fig. No.	Capacitance (pF)	Inductor					Notes
			L in μ H	No. of Turns	Diameter Inches	Length Inches	Wire Size	
SINGLE-BAND OPERATION								
2.0	3A	0	70	26	3 1/2	1 3/4	16 (dec)	Close-wound. War-surplus tuning coil.
3.5	3A	0	17	22	1 3/8	1 1/2	18	
7.0	3B	-	0	Short Circuit				Coax tap 3 turns from ground end.
14	3E	0	1.4	11	2 5/8	2 3/8	12	
21	3D	35 (APC Type)	1.4	8	1 1/4	7/8	16	
28	3B	-	0	Short Circuit				SWR rather high. Fig. 3D or Fig. 3E should be used if lower SWR is desired.
TWO-BAND OPERATION (LOW-FREQUENCY TRAPS)								
2-7	1 H ₂ =0	1000	4	9	2 1/2	1	16	Miniductor, not fully evaluated. Other L/C ratios have not been tried.
3.5-7	1 H ₂ =0	500	2.5	11	1 3/8	1 1/8	18	War-surplus coil.
3.5-7	1 H ₂ =0	1000	0.7	6	5/8	1 1/2	16	Miniductor. Location of leads very critical.

Note: Inductance values of coils determined from dimensions by use of ARRL lightning Calculator.
Coils are space-wound except for 2-MHz coil, as noted.

carried out with no other kind of measurement. However, when resonance approaches the desired frequency it is necessary to be more careful: Use a frequency source of higher stability, observe both forward and reflected power, and calculate the

SWR first just at one frequency at the nearest band edge and then, finally, at various frequencies throughout the band. For this purpose the writer uses a transmitter and, often, a reflectometer-type detector instead of the bridge type.

Unexpected spurious resonances, in addition to the expected one, sometimes are observed. These usually occur at low frequencies, at which line losses are rather low even with impedance mismatches, and at which the length of the transmission line is close to $1/4$ or $3/4$ wavelength. They result from having the transmission line act as a tuned feeder, and may be distinguished by connecting in an extra length (20 feet or more) of line; if the dip in reflected power then occurs at a significantly different frequency the resonance is a spurious one.

The resonant frequency which has just been discussed is the one which is more critically dependent upon trap adjustment (f_1 for a low-frequency trap or f_2 for a high-frequency trap). The SWR at the other frequency (f_2 for a low-frequency trap or f_1 for a high-frequency trap) next should be checked. In most cases it is likely to be acceptable if the original antenna length is close to the self-resonant length. If it is not acceptable, it is necessary to (1) readjust the length of one or both sections, or (2) use a trap with a different capacitance and therefore a different L/C ratio. The writer has only changed the L/C ratio, in his own experience, but the earlier remarks should be helpful in providing guidance as to whether the second capacitance should be larger or smaller than the previous one. Ultimately, by a succession of readjustments the performance of the antenna can be optimized at both frequencies. If the antenna is close to self-resonance at one of the frequencies, usually a second L/C ratio need not be tried, but if the antenna is somewhat shorter and auxiliary loading must be employed the adjustments are very critical, and the process can become very tedious.

In principle, the whole adjustment procedure can be accomplished with a transmitter having a built-in reflectometer-type standing-wave detector, and in practice this may be done if the antenna is initially resonant close to the desired frequencies. However, in other cases such a procedure may be undesirable. If the bandwidth of the antenna is narrow and if the initial resonant frequency is far from any which may be reached with the transmitter, the SWR is very high and it is difficult to tell whether any readjustment is causing an improvement or not. And one cannot tell how many MHz frequency shift is produced per turn removed from a coil, and the trimming operation may become unnecessarily tedious. Also, it may be difficult to recognize spurious resonances. If a constant frequency is used the SWR should remain constant (with lossless transmission lines) when extra line is added if the resonance is a desired one, but should change if the resonance is spurious. However, losses in the line may cause such a procedure to be undefinitive.¹⁰

The preceding discussion has been concerned only with reactance adjustments and has ignored resistance, although the change of L/C ratio undoubtedly affects the resistance match. In cases where circuits like Figs. 3D and 3E (see Part 1) — or other schemes like gamma matches which

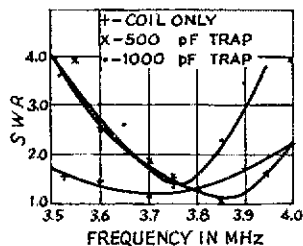


Fig. 6 — Standing-wave ratio of 40-foot vertical antenna as a function of the 4-MHz band frequency with various types of loading. In this graph and in Figs. 7 and 8, no correction has been made for losses in the line, about 50 feet of RG-58/U.

provide for a transformation of resistance — are used it is desirable still to find the resonant frequency and adjust it to be the desired one as described previously. Then proceed to adjust the resistance transformation to obtain an SWR close to 1 to 1. In Figs. 3D and 3E this is mainly determined by the position of the tap to which the line is connected. It is likely, of course, that there will be a small interaction with the resonant frequency, and it may be necessary to make a minor change in the position of the other tap.

Some Practical Applications

Most of the theoretical ideas which have been described have been applied to a versatile vertical antenna which, for the last seven years, has been used with lengths varying between 15 and 40 feet and with both base and body loading. However, in recent years operation has settled upon the use of 40 feet with base loading during the winter, and upon 25 feet during the summer with a high-frequency trap 10 feet above the ground for 7 and 14 MHz, plus auxiliary base loading for 4 MHz.

In the summer, the guys that are required for the 40-foot antenna get in the way of gardening activities, and at that time the lower frequencies are used only for local contacts; also, the 25-foot antenna does not need guying, thus this shorter length seems to be a better overall compromise.

The "Winter" 40-Foot Vertical Antenna

The top 16 feet of the "winter" antenna is a war-surplus tank whip antenna, which probably could be replaced by an 8-foot mobile whip joined to a section of aluminum electrical conduit. The remainder of the antenna is composed of 1 1/4-inch diameter television mast sections. To prevent intermittent contacts when the wind blows, it is necessary to put electrical jumpers, consisting of strips of aluminum, held with hose clamps, at the junctions of the mast sections.

The junction between the whip and the top section of the mast is made as follows: Four longitudinal cuts 8 inches long are made with a hacksaw in the end of the mast, dividing it into eight strips. Four alternate ones are removed. Two concentric pieces of plastic garden hose, about 1 foot long, are slipped over the end of the whip, and a small clamp is fastened to the whip just where it

¹⁰ The apparent SWR also can change with line length if there is rf current on the outside of the coax line.

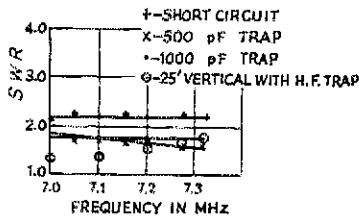


Fig. 7 — Standing-wave ratios of a 40-foot vertical antenna with various types of loading, and of a 25-foot vertical antenna as a function of frequency in the 7-MHz band.

emerges from the plastic tubing to restrain it from sliding in any further. The end of the whip is about 1 inch inside the tubing. The outside diameter of the plastic tubing is slightly smaller than the inside diameter of the TV mast. A hole is drilled an inch or two below the ends of the strips and a machine screw is put through this hole to keep the tubing from sliding farther into the mast. When the upper assembly is slid into the mast as far as it will go, the dimensions are such that the tubing extends an inch or two above the ends of the strips. Then two hose clamps are used to squeeze the ends of the strips down tightly on the tubing. The total capacitance — capacitor and whip — is about 85 pF, and this assembly can act as the capacitor of a high-frequency trap, for use in the "summer" antenna. With the "winter" antenna the capacitor is shorted out by a thin strip of aluminum, which is held under the various clamps already present.

The antenna is supported by a wood 2-by-4 which has been buried in the ground about 4 feet. The antenna is held on the wood by U bolts. No insulation other than the wood is provided for the mounting. Also mounted on the wood are some insulated banana jacks in which base-loading networks and a ground terminal may be plugged.

Before the wood was buried, a piece of metal foil was tacked to the bottom, and a lead to it forms part of the grounding system. In addition there are two 66-foot and four 33-foot radials buried in the ground. The coax lead is also buried, and might be considered as an additional radial. These wires make irregular angles because of numerous obstructions — large rocks, flower beds, and a neighbor's fence.

To learn something about the effect of radials, the writer carried out an experiment with two 33-foot pieces of wire. At both 3.5 and 7 MHz a very small but definite change in SWR was observed when one piece of wire was laid out and connected as a radial in addition to the mast ground and coax already in place. A second approximately-equal change in the SWR was observed when the second piece of wire was connected as an additional radial. However, when the two wires were connected in series to form a single 66-foot radial, there was no change over that caused by a single 33-foot piece. At 3.5 MHz this last observation was rather surprising, since 66 feet at this frequency is a quarter wavelength, and with a voltage antinode at the free end a voltage node

should be expected at the point of connection; this node could be expected to make a significant improvement in the effective ground. Instead, the experiment seemed to strongly suggest that it is more important to have a large number of short nonresonant radials than a smaller number of resonant ones.¹¹

A larger number of loading arrangements have been tried with this antenna, and nearly all were successful. The principal ones used now are shown in Table I.

SWR curves for various kinds of loading are shown in Fig. 6 for the 3.5-MHz band; in Fig. 7 for 7 MHz. Fig. 8 shows 14-MHz SWR curves for the 40-foot vertical antenna with base loading, the 25-foot vertical antenna with a high-frequency trap, and the commercial three-element triband beam used by the writer. It is to be noted that the behavior at 3.5 MHz is in accordance with the earlier discussion: The bandwidth with single-band loading is much broader, and the bandwidth decreases with increasing trap capacitance. With the 40-foot antenna at 7 MHz, the SWR is lower with either trap present than with a short circuit. This result is to be expected, as 40 feet is longer than a quarter wavelength, and a small amount of capacitive reactance, as supplied by a suitable trap, is required to bring it to resonance. Probably an intermediate value of capacitance, about 750 pF, would have given a still lower ratio. An experimental trap using 200 pF gave a very poor SWR at 7 MHz. At 14 MHz it is to be observed that the beam has a much narrower bandwidth than either vertical, undoubtedly due to the reaction of the parasitic elements.

On the air, this antenna has been used to make numerous East Coast contacts on 1.8-MHz cw. On 3.5 MHz, numerous Japanese, Hawaiian, and West Indian contacts have been made, and on 7 MHz, numerous DX contacts have been made all over the world. On 14 MHz, the antenna has sometimes rivaled the 3-element beam. Indeed, at times there is a diversity effect where for a short time one is better, and then a few minutes later the other is better. However, in the long run the beam seems to be the better of the two. This antenna has not been very well evaluated on 21 and 28 MHz, as only a few contacts have been made.

The 25-Foot "Summer" Vertical

In summer, the overall length is reduced to 25 feet by removing some of the TV mast sections, leaving a height of 10 feet to the point where the

¹¹ This is consistent with the findings of Brown, Lewis and Epstein in a classic paper, "Ground Systems as a Factor in Antenna Efficiency," *Proc. IRE*, June 1937, the conclusions of which are summarized briefly in *The A.R.R.L. Antenna Book*, Chapter 2 (page 61 in the Eleventh Edition).

It is to be remembered that a 33-foot piece of wire is approximately one-quarter wavelength at 7 MHz only when the wire is in free space. When the wire is on the surface of the ground or buried in it the wavelength is greatly fore-shortened, and 33 feet may correspond to a much larger number of wavelengths.

When the length of the antenna *H* becomes comparable to a half wavelength the effect of the grounding system is likely to become very unimportant, and the system may even be omitted with little deterioration of performance.

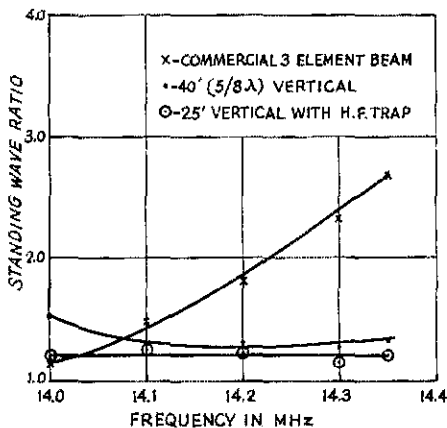


Fig. 8 - Standing-wave ratios of 40-foot vertical, 25-foot vertical, and commercial three-element triband beam as functions of frequency in the 14-MHz band.

whip is mounted. An inductor is connected in parallel with the capacitor incorporated between the two sections of the antenna. Originally this was a Miniductor, 1 1/4 inches in diameter with 16 turns per inch, and was intended to provide monoband body loading. Ten turns were used for 7 MHz, 28 turns for 4-MHz phone, and 35 for 3.5-MHz cw.

However, it was a nuisance to take the antenna down to change the loading, and it became the established practice to leave the tap set for 7 MHz and achieve 3.5-MHz operation by using an auxiliary loading coil at the base. For this purpose a war-surplus coil having 26 turns of No. 18 spaced to a length 1 3/8 inch on a 1 1/4-inch diameter form (about 14 μ H) is used. Furthermore, it was discovered that by pure accident the 10-turn tap also gave an SWR minimum at 14 MHz. In other words, with this coil a two-band high-frequency trap was obtained. More recently, since it has been decided to obtain 3.5-MHz operation by use of auxiliary loading, the Miniductor has been replaced by a coil of 12 turns of No. 18 plastic-covered bell wire close-wound on a 1 1/8-inch diameter pill bottle. This is equivalent to the 10-turn tap, and mechanically it is more rugged.

Operation on 28 and 21 MHz may be achieved by using the networks shown in Table I, but with minor readjustment in some cases. Also, the traps shown in Table I may be used, making the antenna a three-band affair. At 28 MHz, a capacitance of 65 pF (Fig. 3C) should be used.

On 3.5 MHz this antenna has been used only for local contacts. On 7 MHz a number of Japanese and Australian stations have been worked, and on 14 MHz a number of DX contacts all over the world have been made. Evaluation on 21 and 28 MHz is very scant, but on 21 MHz a number of East Coast USA contacts have been made without much trouble.

Any comparison between the 40- and 25-foot antennas must be subjective, and it is the author's opinion that while the 25-foot one is adequate as a

standby and for making local contacts, on DX it is noticeably inferior.

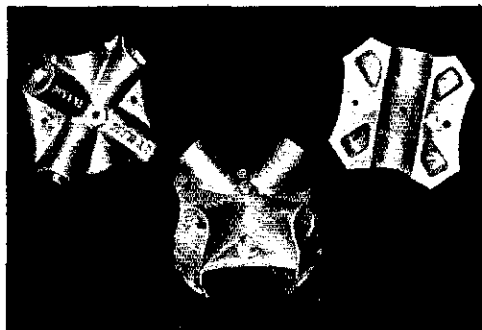
This 25-foot antenna demonstrates the use of a high-frequency trap as a device to produce a capacitive reactance just compensating for the upper 15 feet of the antenna. The whole 25 feet are participating in producing the radiation.

Conclusion

The antennas which have been described have not been completely evaluated on all bands, and the effects of moving the location of a trap have not been investigated. Although not discussed above, experiments with a 40-foot horizontal dipole using a low-frequency trap pair, for two-band operation on 3.5 and 7 MHz, demonstrated again the theory which has been outlined. However, in spite of such omissions the author believes that sufficient information has been given for the reader to understand how trap loading works, and to design and adjust antennas to suit his own needs.

• New Apparatus

The VK3ASC Spider-Quad Hub



THERE ISN'T much argument that a triband quad antenna with optimum - spaced elements is the best way to go when building a cubical quad. However, the clinker in such a design is how to do the job, and do it simply. It appears that VK3ASC has come up with one answer to the problem - a well-designed hub for mounting the spiders so that the quad elements can be proportionally spaced.

The unit shown is made from heavy cast aluminum and can be mounted on a mast whose diameter can be large as 1 3/4 inches. The take-off angle for the spreaders is approximately 22 degrees, referenced against the plane of the mast. This works out to a spacing of 10 feet, 6 inches on 20 meters, 7 feet on 15 meters, and 5 feet, 4 inches on 10 meters. The spreader support holes are 1-inch in diameter, so any bamboo or fiber glass poles with that butt dimension can be used. Net weight of the hub assembly is 4 pounds, 6 ounces, and it measures 6 x 6 x 5 inches. Cost of the complete unit is \$16.00 (Australian funds), postpaid, to any point in the world. The hubs can be ordered directly from Syd Clark, VK3ASC, 26 Bellevue Ave., Victoria, 3084, Australia. - WITC

• *Beginner and Novice*

A Two-Band Vertical for the Novice

BY JERRY ARNOLD* WN6MBP

FOR MANY a city-dweller, antenna space is often at a premium. Even an inverted "V" or a random-length wire is sometimes hard to put up because of cramped space. Knowing of a Novice who had space problems, I set out to design an antenna for him that could be used on 40 and 15 meters. His previous antenna was a horizontal "V" whose performance wasn't worth the time it took to put it up. Because of his narrow property, the angle between the two wires was only around 40 degrees, no doubt causing considerable signal cancellation. Horizontal antennas were ruled out, so I concluded the best antenna for him was a vertical.

Knowing (or caring) little about multiband trap-loaded antennas, I decided the simplest antenna for him would be a quarter-wavelength vertical on 40 meters. After a little paper work, and using formulas given in *The ARRL Antenna Book*, I found the correct length to be 31 feet and 10 inches for 7.175 MHz. This length would also work as a 3/4-wavelength antenna on 15 meters, providing two-band coverage. However, a 32-foot vertical antenna made roof-mounting too difficult! But in mounting the vertical to the side of the house I alleviated many guying and support problems.

Materials

My first concern was what to use for antenna materials. Being almost 32-feet high, the vertical would need strength, so I thought of steel tubing, but that was much too expensive. With conduit there aren't enough sizes offered, and that left only one more material — aluminum tubing. The latter comes in just about any size desired, and I had no trouble in finding just what I wanted. Going to the nearest aluminum dealer I found his stock to be more than ample.¹

*2012 Canada Blvd., Glendale, California 91208.

¹ TV mast material is also well suited for verticals and comes in 10-foot lengths, either steel or, preferably, aluminum. — *Editor*.

This antenna is ideal for the Novice just getting started in radio, because it is inexpensive, is made from readily-available materials, is easy to construct, and gives him some experience in building and adjusting antennas.



Here is the base mount, installed on the side of the house. The two white wires coming out from the base are the radials.

In order to keep the cost minimal, I decided to make the base piece from one-inch diameter thin-wall tubing. Into twelve feet of this was inserted a twelve-foot piece of 7/8-inch diameter thin-wall tubing. This piece was telescoped two feet, then bolted and clamped (after the end has been slit twice by a pair of tin snips). It was necessary to use hose clamps on the tubing because the galvanized bolts didn't provide a good bond between the pieces. The top section was a 13 1/2-foot piece of 3/4-inch diameter thin-wall tubing inserted far enough into the lower piece to make the overall antenna length about 31 feet and 10 inches. Because of its large size, all of the work must be done while the antenna is lying on the ground. Then, the antenna must be disassembled and put up piece by piece. (Do not attempt to put the antenna up in one piece! While the weight isn't excessive, the tubing cannot stand the strain).

Putting It Up

The original base bracket was made from 3/4-inch pine, but during the first rain the wood got wet, and the bracket turned out to be a very poor insulator. So the unit was redesigned to use two pieces of 1/8-inch thick sheet aluminum, a large grommet, and a ceramic standoff insulator (see Fig. 1).

Assembling the two-band vertical was quite simple. First, a four-foot stake was driven into the ground about two and one half feet, and about four or five inches away from the side of the house. Next, the bottom section (with the bracket attached) was slipped over the stake and tightened in place with the U bolts. Then the second section was inserted into the first, clamped, and bolted in place. A support bracket was made from scrap

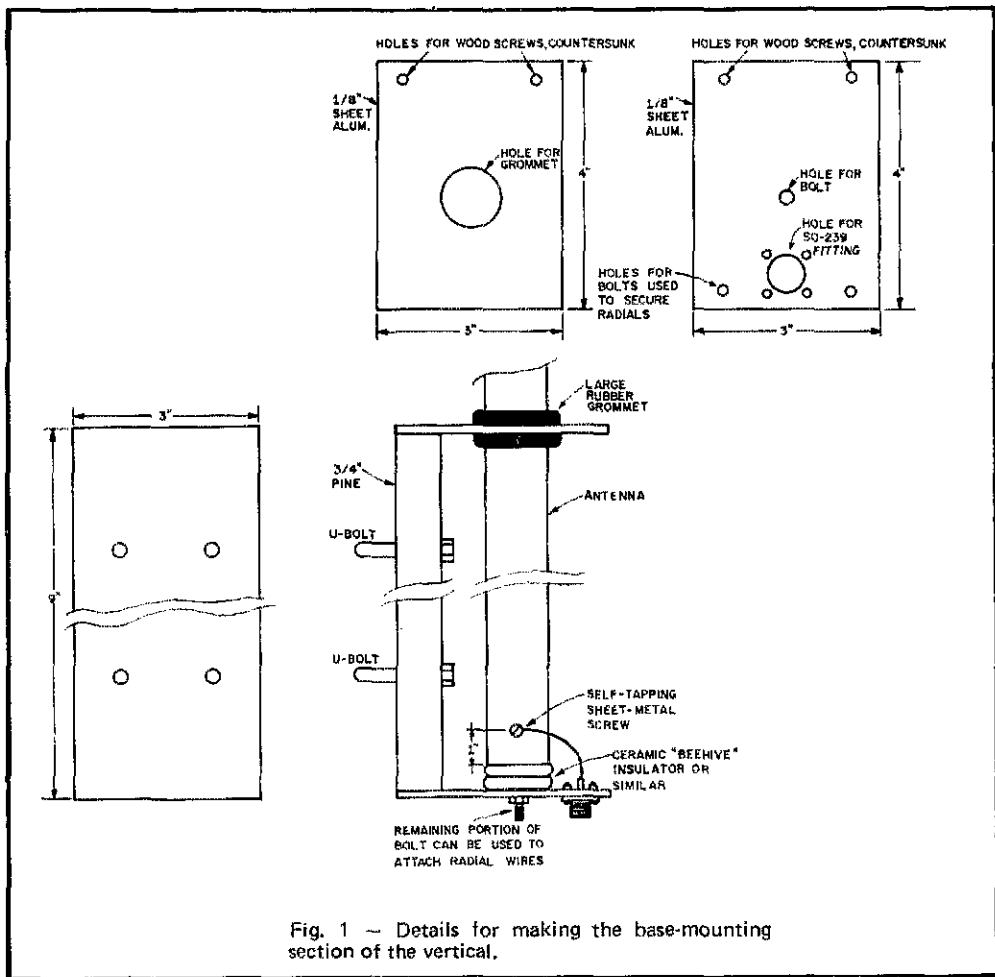


Fig. 1 - Details for making the base-mounting section of the vertical.

aluminum, and a large grommet was installed on it to insulate the antenna from the brace (see Fig. 2). This assembly was then attached to the side of the house (near the gable) with wood screws. Last, the third section was forced through the grommet in the second bracket, and was then inserted into the second piece and clamped. (If adjustment of resonance is desired, it is better not to holt the final section). A suitable cap was mounted on top of the antenna to keep out moisture.

Tune Up

RG-58/U coax was then connected between the transmitter and antenna with an SWR bridge in the line, and power was applied at 7.175 kHz. The SWR was found to be 3:1. This was without any ground system on the antenna. In order to obtain a better match and reduce the SWR, it was apparent that a ground system was required.

According to *The ARRL Antenna Book*, two methods of making a suitable ground system can be used. One way is to connect the coax outer shield directly to ground at the base of the antenna, via a ground rod. However, this doesn't

work too well unless the soil is extremely conductive (his wasn't). The other method is to make up some sort of artificial ground in the form of radials.

I cut a radial from some surplus wire to the same length as the vertical section, attached the radial to the base plate and the SWR dropped to 2:1. Unknown to me at the time, *The Antenna Book* says that the radials should be 2.5 percent longer than the vertical itself, so actually, they should have been made 32-feet, 7 3/4-inches long. A second radial, similar to the first, was attached and the SWR dropped further (to about 1.4:1). When the soil was wet, such as after a rain or after watering, the SWR takes a nose dive to less than 1.2:1. Since the property space was limited, two radials were all that could be used. Ideally, the most perfect system would consist of a metal disk, one quarter wavelength in radius, buried a few inches below the earth's surface, but this approach is rather impractical! But if the antenna was to be erected in an area away from buildings, and guyed, a ground system could be made of chicken wire or other similar material. However, the more radials,

the better the artificial ground. Also, they should be laid out in as nearly a spoke-like pattern as possible. Hy-Gain recommends for their AVQ series antennas that a radial system be used consisting of at least two radials for each band used. However, for this installation the 40-meter radials operate on their third harmonic at 15 meters, requiring but one set of wires.²

The length specified makes the antenna resonant at about 7175 kHz on 40 meters. On 15 meters, at the third harmonic, the antenna is resonant at about 21,425 kHz, but power was applied as low as 21,105 kHz, and the SWR appeared to be only 1.4:1, well within tolerable limits. Band width on both Novice bands was essentially flat.

Additional Information

Total cost will depend greatly on the individual's ability to scrounge parts, but here is a rough idea of the costs in my area:

3-pieces thin-wall aluminum tubing, 1, 7/8, and 3/4-inch diameters, 12, 12 and 13 1/2 feet long respectively.	\$4.60
2-U-bolts.	.40
1-SO-239 connector.	.60
	\$5.60

The other material, including three bolts and nuts, six wood screws, two grommets, two hose clamps, wood and aluminum for brackets, ground stake, and cap will vary from no cost to \$2, dependent on available materials. The price given above is for new tubing; if used or surplus tubing is available one could save more.

In this instance, the top of the antenna extends about sixteen feet above the peak of the roof, but because of the bracing no guy wires were neces-

² Actually, any radials, regardless of length, will help the performance of the system. Also, when used on 15 meters, the antenna would be three quarter wavelengths long with low-impedance feed, approximately 50 ohms. However, the angle of radiation from the antenna will be higher than that of a quarter wavelength vertical. — *Editor*.

This shows the support bracket, as described in Fig. 2.

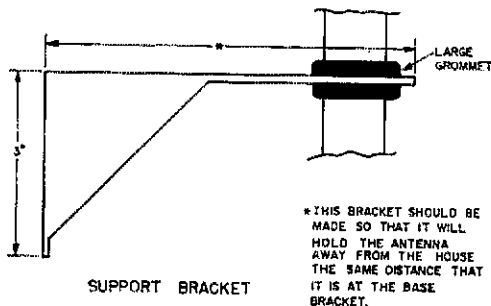
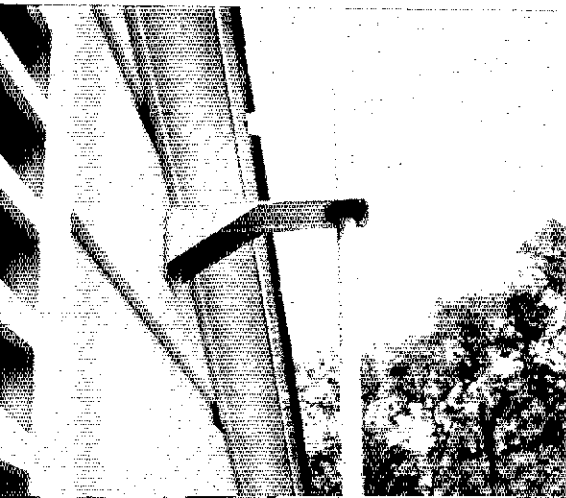


Fig. 2 -- Details for the support bracket.

sary. If the antenna is to be erected in a high-wind area, guys made from nonconducting monofilament fishing line (or other nonconducting line) could be used.

The owner has received nothing but glowing reports so far. Running about 70 watts input, the first CQ on 40 meters raised W9SVJ in Northern Indiana from Glendale, California. His report, RST 589. On 15 meters the owner has worked ZL3JC, AX7SM, and JH1EZZ and received very good reports.

This vertical has no gain, and probably couldn't come near a Yagi or a quad in performance, but for an antenna costing less than \$6 it does one heck of an FB job.

QST

NEW BOOKS

Amateur Radio Advanced Class License Study Guide, second edition, by Jim Kyle, K5JKX; the 73 Magazine staff; and Ken Sessions, K6MVH. Published by Tab Books, Blue Ridge Summit, Pa. 17214. 5 1/2 X 8 1/2, 192 pages including index. \$6.95 cloth cover.

Rather than a "study guide," this is really a textbook, or an attempt at one, built around preparation for the Advanced Class exam. Its style is chatty, the explanations are in fairly simple language, and the illustrations are plentiful and (for the most part) clear and accurate. The various sample questions are grouped generally by subject — there are ten classifications in all — each of which is then explored in some detail in its own chapter. The attentive student is thus better equipped to handle wide variations of a typical question, rather than having to commit certain answers to memory.

Unfortunately, despite the publication date of June 1970, the guide treats only subjects covered by 50 of the initial FCC sample questions released three years ago. It fails to take note of some 14 more added by the Commission in 1968. Exam applicants using this text should, therefore, make certain they are equipped on the additional points as well. — *W1LVQ*.

The Post Office Department promises faster mail service with Zip codes. Use yours when you write ARRL. Use ours, too. It's 06111.

QST for

A QRP Console

BY DOUG DEMAW,* WICER

IT'S HANDY to keep the station equipment neat and orderly, especially during portable or emergency operation. This QRP console is a fitting mate for the August *QST* cw box, and permits matching the transceiver output to almost any load, reactive or resistive in nature. The tuner portion will look into end-fed random or resonant wires, coax-fed antennas, or into antennas that use balanced feeders. Ideally, the antenna would be cut to a resonant length, but even with nonresonant antennas this tuner will disguise whatever SWR is present to give the transceiver the 50-ohm load it is designed to look into.

The Circuit

Referring to Fig. 1, the transceiver connects to J1 at low impedance (50 ohms). An SWR bridge¹ is permanently in the low-impedance part of the line, and permits the operator to adjust the antenna tuner for zero reflected power, which will correspond to a 50-ohm termination at the output port of the bridge (junction of C6 and L1). The forward-power reading can be used when tuning up the transmitter portion of the transceiver.

The tuner consists of a pi-section tuned circuit whose inductor is tapped at 10 places to permit a variety of matching conditions on 80 and 40 meters. By using both C6 and C7 as a part of the matching network the pi-network configuration exists. By adjusting either C6 or C7 to minimum capacitance (approximately 15 pF with the plates completely unmeshed) an L-network tuner can be realized. By switching L2 in parallel with L1 the inductance is reduced. This will permit a vernier effect when working at the low-inductance end of the adjustments. Ideally, a rotary inductor would be used in place of the tapped coil, but sufficient flexibility exists with the circuit of Fig. 1 to match almost any impedance the operator will encounter.

Switch S4 permits the operator to select either a balanced or unbalanced output. In the balanced position S4 places T2, a 1:1 balun transformer, in the circuit to allow the use of balanced feeders (300-ohm folded dipole or similar). When S4 is thrown to the opposite position one can use a single-wire or coax-fed antenna by connecting the wire or feed line to J2.

This accessory box is designed to handle up to 10 watts of rf power. If greater power levels are

*Technical Editor, *QST*.

¹ Information on homemade SWR meters is given in December 1969 *QST*, p. 11.

Here is a mate for the 80- and 40-meter QRP transceiver that appeared in last month's *QST*. It combines a low-power SWR meter with a universal pi-section antenna coupler. The speaker for the transceiver is contained in this accessory box.



The QRP console is shown atop the QRP transceiver described in August *QST*. These electrically compatible units have look-alike decor with green panels, white labels, and eye-bath finished aluminum covers. Kurz-Kasch 700 Series knobs are used on both pieces of gear (Catalog No. 112, Kurz-Kasch, Inc., Dayton, Ohio 45401).

anticipated, the variable capacitors should be replaced by units with more spacing between plates. Also, the primary winding of T1 will require modification, as will the bridge constants. The toroidal inductors will handle up to 25 or 30 watts safely.

Construction Information

The components are housed in a homemade aluminum box which is 7 inches wide, 5 1/2 inches deep, and 5 inches high. The same construction technique used for the August *QST* transceiver cabinet is employed here — two U-shaped channels which are held together by means of L brackets and No. 6 sheet-metal screws. Most of the parts are assembled on a circuit board, whose pattern is given in Fig. 2. The circuit board is spaced away from the bottom surface of the box a distance of 3/8 inch. Rubber grommets serve as spacers.

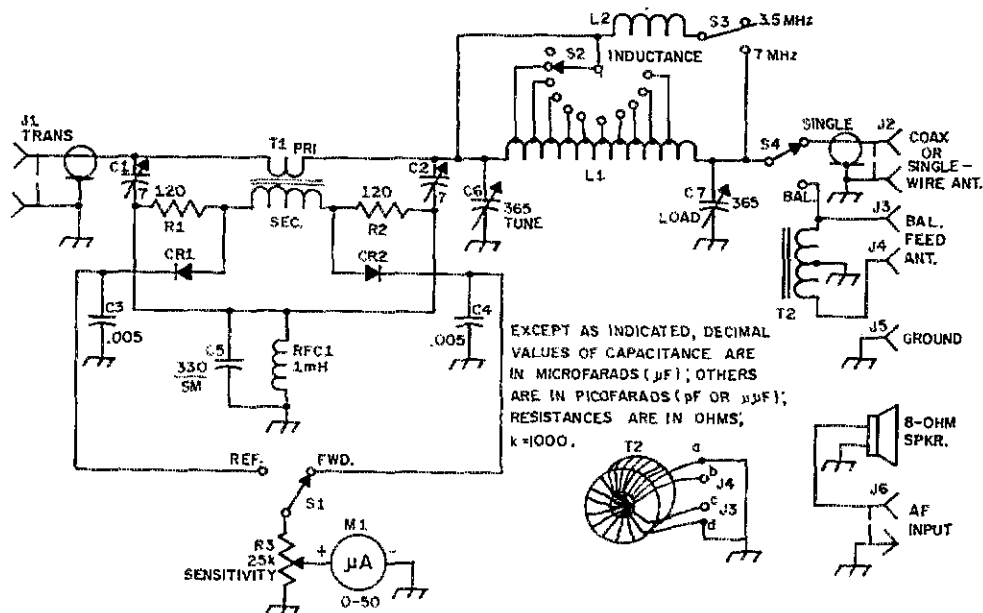


Fig. 1 - Schematic diagram of the QRP Console.

- C1, C2 - 1.5 to 7-pF ceramic trimmer.
- C3, C4 - Disk ceramic, 50-volt type.
- C5 - Silver mica.
- C6, C7 - Single-section variable (J. W. Miller Co. No. 2111 or equivalent. Address is 19070 Reyes Ave., Compton, CA 90221, Catalog available).
- CR1, CR2 - IN34A germanium diode.
- J1, J2 - Coaxial connector, chassis-mount type.
- J3, J4, J5 - Insulated binding post (E. F. Johnson type 111-101).
- J6 - Phono connector, single-hole mount.
- L1 - 38 turns No. 20 enameled wire on Amidon T-130-2 toroidal core. Space turns equally around entire core. Make first tap 4 turns in from C6, then tap at 7, 10, 13, 16, 19, 22, 26, 30 and 34 turns. Unloaded Q is 300. Inductance is 17 μ H. (Amidon Associates, 12033 Otsego St., N. Hollywood, CA 91607.)

- L2 - 44 turns No. 24 enam. wire, close-wound on Amidon T-68-2 toroidal core. Inductance is 15 μ H, unloaded Q is 220.
- M1 - Zero to 50- μ A dc meter (Calectro No. D1-910 used here).
- R1, R2 - 120-ohm, 1/2-watt carbon resistor.
- R3 - 25,000-ohm linear-taper carbon control.
- RFC1 - Miniature 1-mH rf choke (James Millen J300-1000 or similar).
- S1, S3, S4 - Spdt slide switch.
- S2 - Single-section, phenolic-wafer, single-pole 11-pos. rotary.
- T1 - 60 turns No. 30 enam. wire, close-wound on Amidon T-68-2 toroidal core. Primary is two turns No. 24 enam. or insulated hookup wire over center portion of secondary.
- T2 - See drawing and text.

Toroidal transformer T1 uses 60 turns of No. 30 enamel wire for its secondary. The primary winding consists of 2 turns of insulated hookup wire over the center area of the secondary winding, thus assuring symmetry. The 2-turn primary is necessary to assure adequate sensitivity at very low power levels. Full-scale meter deflection can be obtained with somewhat less than 1/2 watt output at zero reflected power.

Inductor L1 uses a toroid core which is considerably larger than those used at L2, T1 and T2. The larger core is not needed as far as power-handling capability or Q is concerned, but the writer found that it was much less difficult to make the tap connections by using the larger core. The stout of heart may use the same core type specified for L2, but from a practical point of view it is not recommended.

Balun transformer T2 consists of 22 bifilar turns of No. 24 enameled wire. Wiring details are given in the pictorial inset of Fig. 1. One winding has its ends labeled "a." The ends of the remaining winding are marked "b."

Using the Console

Attach an antenna to the appropriate terminals on the rear of the tuner - single wire or coax-fed antenna to J2, or balanced-feeder antenna to J3 and J4. An earth ground should be attached to J5. Set C6 and C7 at maximum capacitance, and adjust S2 (S3 open) for maximum inductance (no turns shorted out). Attach the transceiver antenna lead to J1 by means of 50-ohm coaxial line. Set S1 to read REF power. Adjust C6, C7, and S2, alternately, for a peak in received signal. This will get the tuner fairly close to resonance. Next, turn the

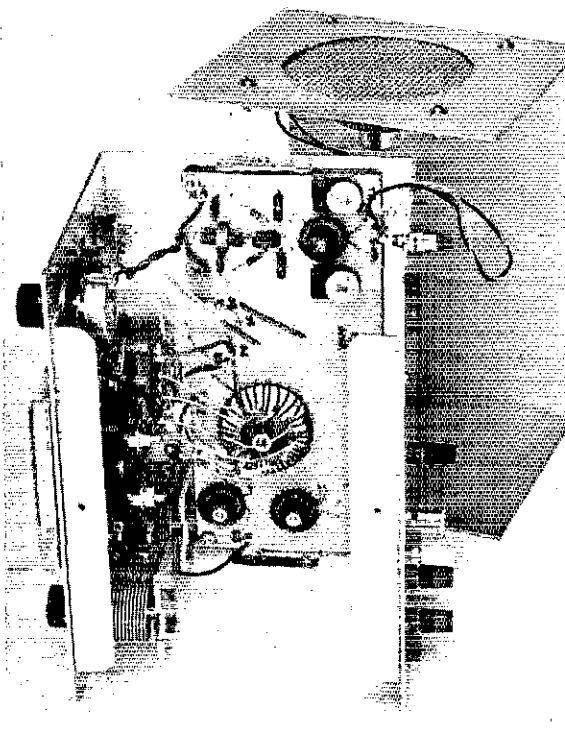
transmitter on and adjust C6, C7, and S2 for a zero reading in reflected power. Now, switch S1 to read forward (FWD) power. Set R3 for a full-scale reading on M1. Then switch back to REF and tweak the tuner controls for minimum meter reading. Retune the transmitter for maximum power output. Be sure to readjust the tuner when changing frequency within the band. If S2 will not provide sufficient range for obtaining an SWR of 1, switch L2 into the circuit and repeat the tuning procedure. The adjustments are the same whether balanced feeders, coaxial line, or single-wire antennas are used.

Final Comments

The SWR bridge should be nulled before the remainder of the console is built. This can be done by placing a 2-watt, 51-ohm resistor between the top connection of C2 (Fig. 1) and chassis ground. Apply transmitter power, set S1 to REF, and adjust R3 to give maximum meter sensitivity. Adjust C1 for minimum meter reading. Next, connect the transmitter to the output side of the bridge, and connect the 51-ohm resistor across J1. Apply transmitter power and tune C2 for a null. Repeat the process once more, then finish assembling the console.

Those wishing to have a measure of safety for the output resistor of the transceiver can use the calibrating resistor as part of the tuner. It can be switched in parallel with C6 during initial adjustments of the tuner. This will provide the transmitter with a constant load until the tuner matches the antenna system to the transmitter output. The resistor can then be switched out of the circuit, and the tuner touched up again for zero reflected power. There is plenty of panel space for adding a switch for this function.

QST



Looking into the console the SWR bridge is at the top end of the circuit board. The large toroid core, which has been wrapped with 3M Co. No. 27 glass tape (masking tape will suffice), is shown at the lower center of the board. The small toroid at the lower right is the balun transformer, and the small core to its left is the inductor which is used in parallel with the large core for 40-meter operation. The circuit board is spaced away from the bottom of the box by means of rubber grommets.

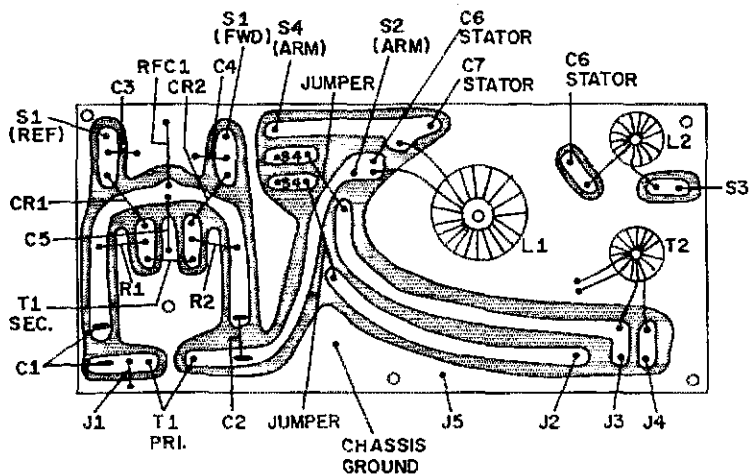


Fig. 2 - Half-scale drawing and parts layout of the circuit board. Ready-made circuit boards for this and other QST projects are available from Stafford Electronics, Inc., 427 S. Benbow Rd., Greensboro, NC 24701.

UHF Directional Couplers

Handy Test Equipment for the UHF Amateur

BY REED E. FISHER,* W2CQH and RICHARD H. TURRIN,** W2IMU

DIRECTIONAL couplers known by such more common names as *Twin-Lamp*¹ and *Monimatch*² have been used by amateurs on the hf and vhf bands for years, to check transmission-line VSWR and relative power output. Generally the performance of these devices begins to deteriorate above about 150 MHz, leaving the uhf-minded amateur somewhat handicapped when it comes to estimating antenna and transmitter performance. Two types of directional couplers for uhf service will be described here.

The first is a strip-line Monimatch, which can be used up to 1300 MHz. The second is a specific form of directional coupler often called a *quadrature hybrid*. It can perform many useful tasks, such as making practical the parallel operation of uhf amplifiers to obtain increased output, and the attainment of circular polarization, a transmission scheme very useful in moonbounce communication.

Theory

As Fig. 1A suggests, a directional coupler is simply two quarter-wave sections of transmission line, coupled both to each other and to a common outer conductor, thereby forming a four-port connector network, which is matched, lossless and symmetrical. This network, when connected to matched loads and driven at Port 1, performs as follows:

- 1) There is transfer of power (coupling) from Port 1 to Port 2.
- 2) There is transfer of power from Port 1 to Port 4.

3) There is no transfer of power from Port 1 to Port 3.

4) There is no reflected power back out of Port 1. (VSWR = 1).

5) The voltages V_2 and V_4 differ in phase by 90 degrees.

It is evident that since the coupler is completely symmetrical, any port can be chosen as "Port 1" and the remainder renumbered in proper order. Conditions 3, 4 and 5, above, are ideally independent of frequency; thus, as Monimatch users know, the coupler can be used on more than one band. The term *coupling*, which is frequency dependent, refers to the ratio of power leaving Port 2 to that entering Port 1.

$$\text{Coupling (dB)} = -10 \log_{10} \frac{\text{Power leaving Port 2}}{\text{Power entering Port 1}}$$

$$\text{or Coupling (dB)} = -20 \log_{10} \frac{V_2}{V_1}$$

where V_1 and V_2 are the rf voltages at Port 1 and Port 2, respectively. For example, if 100 watts enters Port 1, and the coupling is 20 dB, then 1 watt will leave Port 2 and 99 watts will leave Port 4. Coupling between Port 1 and Port 2 is maximum when the coupled lines are one quarter-wavelength long, and it decreases as the frequency is lowered. If the coupler is perfect, no power will leave Port 3. No practical coupler will satisfy this condition, so a small amount of power will always leave Port 3. The term *directivity*, a measure of the coupler's imperfection, is the ratio of the power leaving Port 3 to that leaving Port 2, or

$$\text{Directivity (dB)} = -10 \log_{10} \frac{P_3}{P_2}$$

$$= -20 \log_{10} \frac{V_3}{V_2}$$

A coupler is said to be "good" when the directivity exceeds 20 dB.

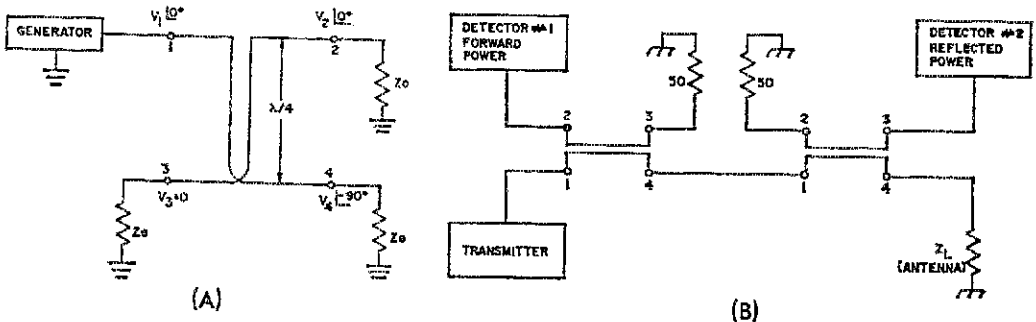


Fig. 1—Directional coupler circuit (A) and example of two couplers (B) used to measure antenna VSWR.

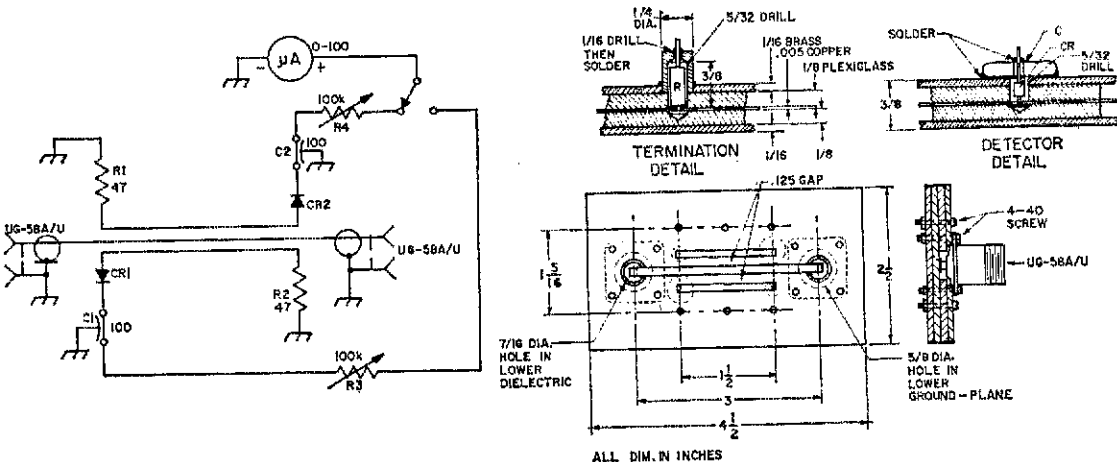


Fig. 2—Circuit diagram and mechanical details of a strip-line Monimatch for uhf service.

C_1, C_2 —100-pF button-mica feed-through.
 CR_1, CR_2 —Schottky diode (Hewlett-Packard 5082-2800).

R_1, R_2 —47 ohms $\frac{1}{2}$ watt, 5 percent
 R_3, R_4 —100 000-ohm control.

Measurement of VSWR

Use of two 50-ohm 20-dB couplers to measure the VSWR of an antenna or other uhf impedance is shown in Fig. 1B. Transmitter power is applied to Port 1 of the first coupler, and the load (antenna) is connected to Port 4 of the second. Resistive terminations and diode detectors are connected to the remaining ports as indicated. It should be emphasized that both terminations must be pure 50-ohm resistances at the operating frequency, or the measurement will be in error.

A portion of the input power, attenuated 20 dB, appears at Port 2 of the first coupler and is measured by Detector No. 1. This is a sample of the incident wave from the transmitter. If the antenna impedance, Z_L , is not 50 ohms, a wave is reflected back from the antenna into Port 4 of the second coupler. For this reflected wave, Port 4 is now, in effect, "Port 1," and a sample, 20-dB attenuated, appears at Port 3 of the second coupler. Hence Port 3 samples the reflected wave, and Port 2 of the first coupler samples the incident wave. The ratio of power between Port 2 and Port 3, called the *return* or *reflection loss*, is defined as

$$\begin{aligned} \text{Return Loss (dB)} &= -10 \log_{10} \frac{P_3}{P_2} \\ &= -20 \log_{10} \frac{V_3}{V_2} \end{aligned}$$

The familiar Monimatch is simply two directional couplers having couplings of 20 to 40 dB. The detectors are diode peak detectors, or rectifiers, and hence the dc output is proportional to the rf voltages appearing on the coupled lines. Some editions of the ARRL *Handbook*³ con-

tain a graph which converts the ratio of detector dc currents to the more familiar VSWR.

A Strip-Line Monimatch

A strip-line dual directional coupler suitable for uhf VSWR measurement is shown in Figs. 2 and 3. Though the coupler is centered for the 1215-MHz band, it will work equally well on all lower bands. Reduction in coupling, which results in lower rectified output from the detector as the frequency is lowered, is shown in Fig. 4.

The sandwich dielectric is $\frac{1}{8}$ -inch Plexiglas, available at most hobby stores. Though somewhat more lossy than some preferred plastics, it was chosen because of its wide availability and low cost. The strip-line conductors, sandwiched between dielectric layers, are cut from .005-inch copper sheet. Other thicknesses near this value will work equally well. The top and bottom ground planes are $\frac{1}{16}$ -inch brass or copper, and the assembly is held together with 4-40 screws. Screw placement shown in Fig. 2 should not be changed. Type N coaxial fittings are recommended for use at 144 MHz and higher frequencies. The terminating resistors are standard 47-ohm $\frac{1}{2}$ -watt carbon units, mounted in special housings to enhance their uhf characteristics. The Schottky barrier diodes are available from Hewlett-Packard distributors for about one dollar each. Do not attempt to use other diodes, as their uhf rectification efficiency may be poor.

The coupler may be tested at 1296 MHz by connecting one end to a well-matched load, such as 100 feet of RG-8/U cable, and the other to a source of at least 10 watts power output. The rheostat on the detector diode nearest the transmitter is adjusted to give full-scale meter de-

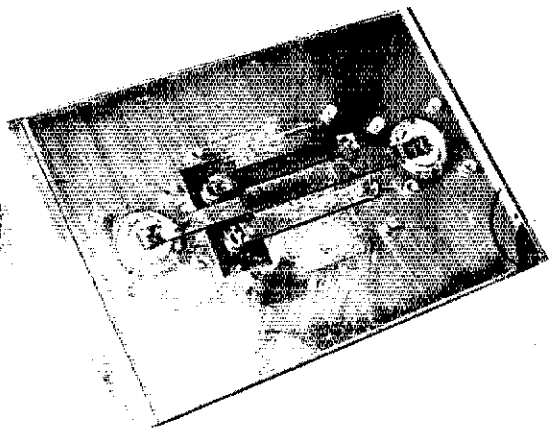
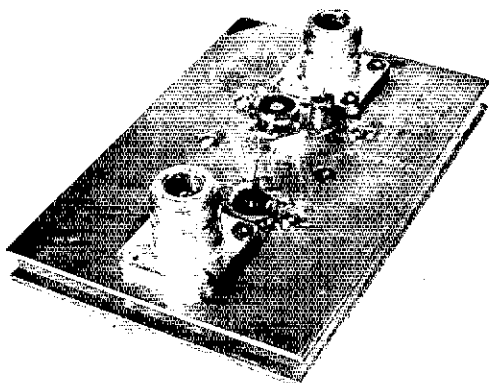


Fig. 3—Exterior and interior views of the strip-line uhf Monimatch.

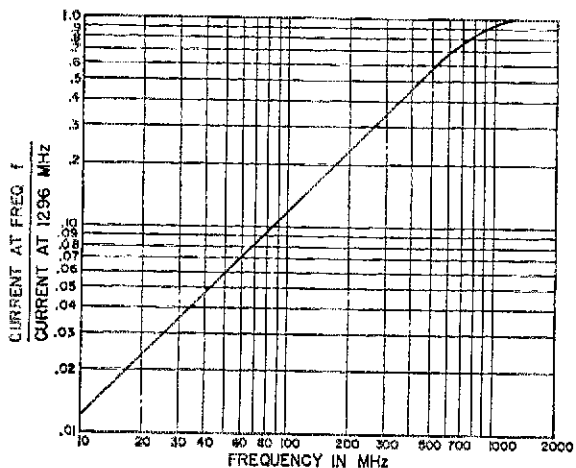


Fig. 4—Increase in Monimatch detector current with increasing frequency.

flection. Next the coupler is reversed and the procedure repeated. The diode currents should now differ by at least a factor of 10, which with a perfectly-matched load indicates 20 dB coupler directivity. Do not expect a complete null from the diode detector nearest the load; many commercial couplers have directivity no better than 20 dB. The coupler is now ready to measure VSWR and relative transmitter power on all bands below 1300 MHz.

Fig. 4 shows the fall-off in dc detector current as the frequency is lowered. The graph is accurate as long as the diodes continue to function as peak rectifiers, a condition that can be satisfied by keeping the rheostat resistance high.

A 3-dB Directional Coupler or Quadrature Hybrid

Referring to Fig. 1A again, if the coupling between lines is increased to the point where equal power emerges from Ports 2 and 4, the device is now called a 3-dB coupler or quadrature hybrid. The latter term is used because the output voltages differ in phase by 90 degrees. The device is very useful for splitting uhf power, while still maintaining a matched system.

Using a quadrature hybrid to obtain circular antenna polarization is illustrated in Fig. 5A. Circular polarization is recommended for moon-bounce communication, as it avoids Faraday rotation, the primary cause of prolonged deep fading on EME circuits where linear polarization is used. A circularly-polarized wave is one in which the electric field is rotating as the wave propagates. The angular velocity is $2\pi f$, which means that the field rotates one complete revolution at the rf rate, in one wavelength of propagating distance.

Two linearly-polarized dipoles are arranged at right angles to one another, with their phase centers coincident. When a ground screen is placed behind the dipoles the assembly makes a convenient feed for a parabolic reflector. If higher gain is desired, the dipoles may be replaced by crossed Yagis; that is two Yagis at right angles, with all elements on a common boom. Being at right angles, the elements do not couple to each other, and each linearly-polarized Yagi can be adjusted separately. The purity of their independence is related to physical construction, especially in the region where the elements cross, but even at 1296 MHz the requirements for good isolation are easily achieved. Circular polarization is accomplished by feeding the two linear systems with equal powers, 90 degrees out of phase; hence the use of the quadrature coupler.

Circularly-polarized waves reflected from a nearly planar surface, such as the moon, arrive back at the receiving antenna with their polarization sense reversed. Reverse-sense polarization is available at the fourth or isolated port of the quadrature hybrid. As indicated in Fig. 5A, the receiver may be connected here, and no mechanical switching is required when receiving your

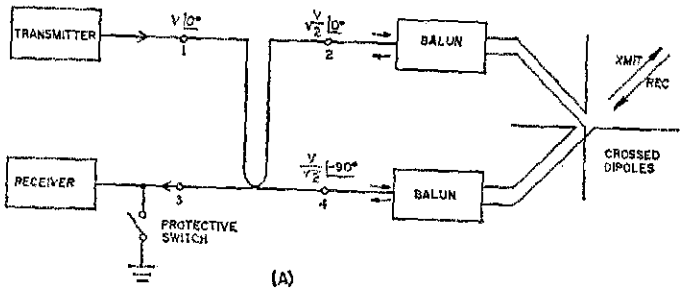
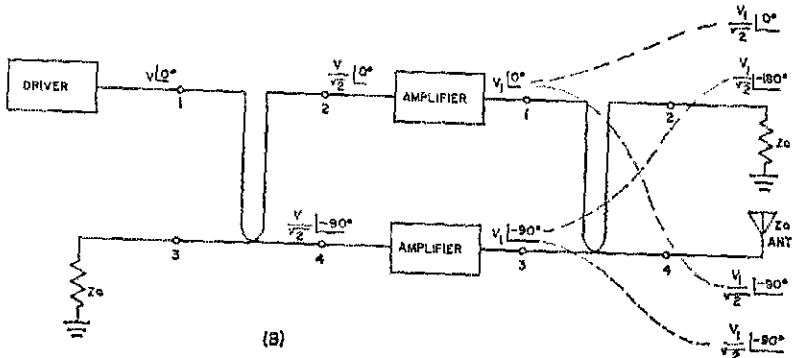


Fig. 5—Uses of the quadrature hybrid. At A one hybrid is used to obtain circular polarization. At B, two are employed to achieve parallel operation of uhf power amplifiers.



own circularly-polarized signal, back from the moon. With infinite coupler directivity and perfectly-matched antennas, no transmitter power would couple back into the receiver. These ideal conditions never exist, so a protective device such as biased diodes should be shunted across the receiver input during transmitting periods.

Parallel operation of two uhf power amplifiers using two quadrature hybrids is illustrated in Fig. 5B. The input hybrid splits the input voltage into two equal components, 90 degrees out of phase. The amplifier outputs are recombined in the second hybrid. Arrows show how each output voltage is split in amplitude and shifted in phase, when passing through the hybrid. The voltages arriving at Port 2 differ in phase by 180 degrees, and therefore cancel. Voltages arriving at Port 4 are in phase, and thus add. All of the power from each amplifier thus appears at Port 4, and both amplifiers "look into" a matched 50-ohm load. Depending on the driver output impedance, they are driven from a low-impedance source. If both have 50-ohm input impedance, none of the driving power will appear in the termination at Port 3 of the input hybrid.

The excellent isolation of one amplifier from the other virtually eliminates interaction between them—a quality that cannot be fully appreciated until an attempt is made to operate two amplifiers in parallel with reactive power

dividers! If one amplifier should fail or become mistuned, the other will still see a matched load, since its output will go to both the matched antenna and the termination at Port 2. The scheme also reduces load variation on the driver, for if one amplifier should fail, half the reflected power from the faulty amplifier input will appear at the Port 3 termination of the input hybrid.

Quadrature Hybrid Construction

Two air-dielectric versions of the quadrature hybrid have been built for 1296 MHz by the authors. They are symmetrical in physical and electrical characteristics, so not all parts are shown in the drawings in some instances. The

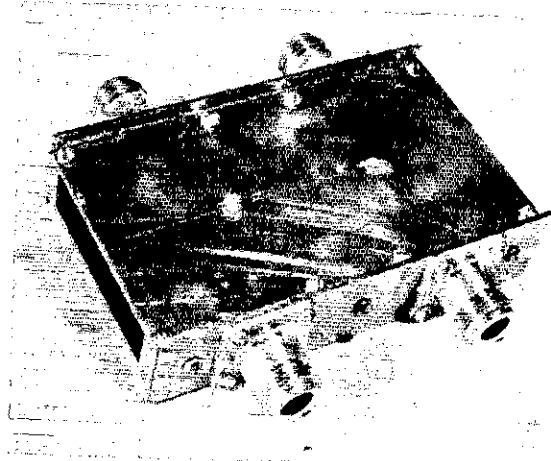


Fig. 6—Rugged form of quadrature hybrid, with edge-mounted connectors.

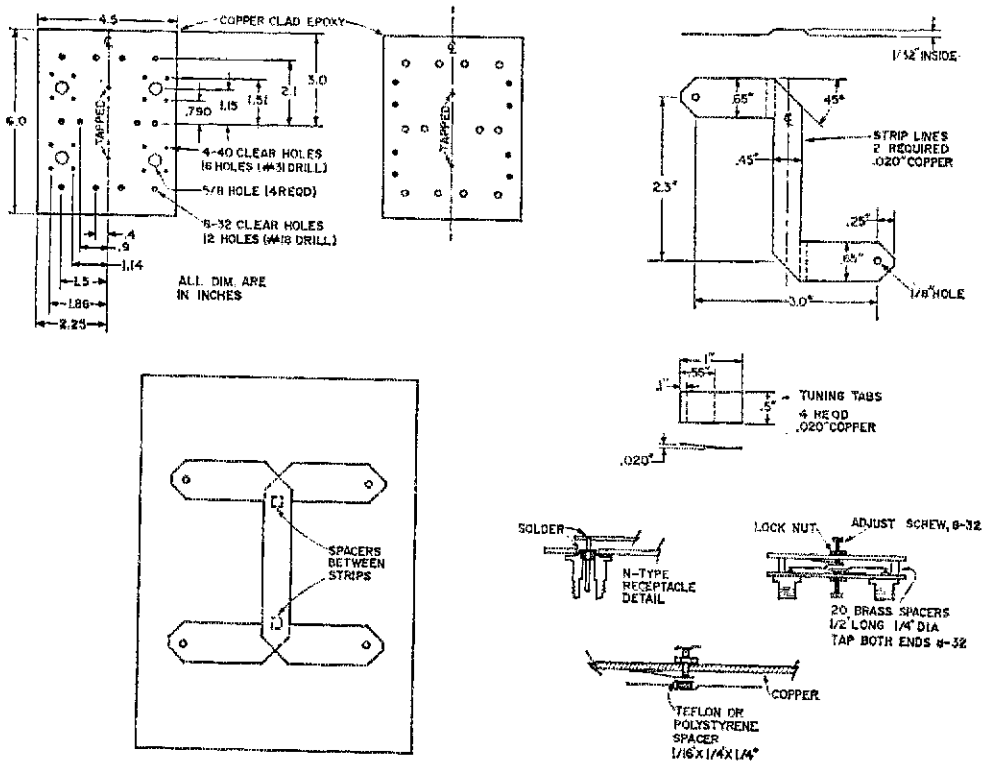


Fig. 7—Principal details of a quadrature hybrid coupler made from copper-clad epoxy board.

strip lines are always centered between the ground planes. No critical machine work is required, the only important dimensions being the spacing between the coupled lines. It should be mentioned that there are several types of coaxial N-type receptacles, use of which may require slightly different mounting dimensions.

The model shown in Fig. 6 is very rugged mechanically, and has edge-mounted connectors, a desirable feature in circuit applications. The identical inner conductors are made from $\frac{1}{16}$ -inch and .02-inch copper sheet, soldered together and supported by four nylon screws. A substitute for these can be made from strips of low-density expanded foam, commonly found in commercial packaging. The four small capacitive tabs can be symmetrically adjusted to obtain best directivity. This coupler does not include side panels, but they can be added to box it up completely.

The other hybrid, Figs. 7 and 8, was built of copper-clad epoxy board, readily available from most radio houses in $4\frac{1}{2}$ by 6-inch sheets, copper clad on one side only. The boards are held apart conveniently by 20 $\frac{1}{2}$ -inch spacers, tapped to accept 8-32 screws. Smaller screws can be run completely through the assembly, with one board tapped. Eight of the spacers are mounted at the N-connector mounting holes, with 4-40 screws clear through.

The strip-line sections can be cut in pairs, with a nibbling tool. Drill the boards in pairs,

clamped together with the copper sides facing each other. Solder the coaxial receptacle around its shoulder to the ground plane, to assure a good electrical connection. The capacitive tabs are soldered directly to the ground planes, and are adjusted by means of small screws extending through the planes. These screws are located where the electric field is not large, so they may be of metal or nylon. If metal, the screw end should be insulated from the tab at the point where the screw end bears on it. The cylindrical spacers, $\frac{1}{4}$ -inch diameter, $\frac{1}{2}$ -inch long, are important in this design, as they prevent the electric field from extending beyond the edges of the ground plane, and radiating. Coaxial connectors are shown all on one side of the assembly, but the unit is symmetrical, so connectors may be paired on either side as use of the hybrid may dictate.

Measuring Quadrature Coupler Performance

It is highly desirable to assure yourself that your hybrid is working properly, and this can be done with modest and uncomplicated equipment. It is assumed that the builder has a low-power source of energy at 1296 MHz, and a suitable detector, such as the type described earlier in the monimatch coupler. In lieu of 50-ohm terminations and calibrated attenuators, it is suggested that sections of ordinary RG-8/U

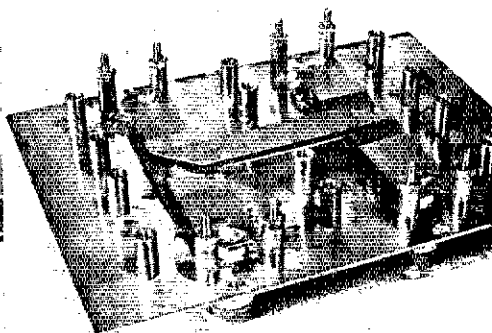
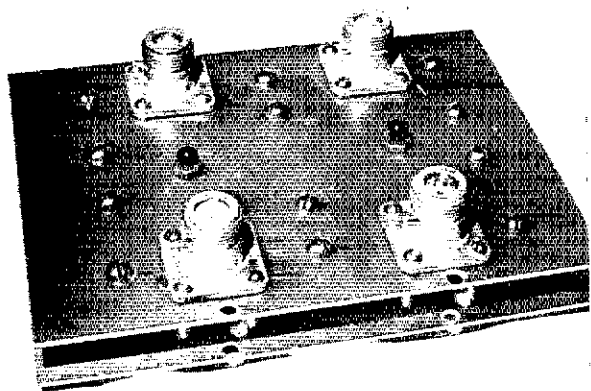


Fig. 8—Exterior and interior of the quadrature hybrid for 1296 MHz, shown in Fig. 7. Note that eight of the metal pillars that separate the ground planes serve the dual purpose of mounting the Type-N coaxial receptacles.

cable with N-type connectors be used. This cable has a loss of about 10 dB per hundred feet at 1296 MHz. Short sections of special attenuating cable (RG-21) equipped with connectors have appeared on the surplus market at times. These may be used in any lengths that will give a measured loss in excess of 10 dB. Sections need not be identical, in this case. The end of such a 10-dB section of cable can be left open, or terminated in a low-wattage 47-ohm resistor.

Connect the rf power source to Port 1, and terminations (cable) to Ports 2 and 4. Connect the detector to the other end of one of the cables, and adjust the power level so that the detector is not overloaded, or operated near its threshold. Note the detector reading, then switch the cables between Ports 2 and 4, and note any small change in detector reading. These two ports are to have equal outputs, so the unbalance will be small. A quantitative measure of the unbalance can be made by using a 10-foot section of RG-8/U as a 1-dB pad, to be inserted ahead of the detector to calibrate the indicator.

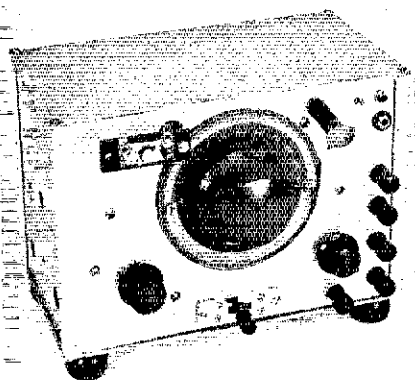
For a small change in level all detectors will be nearly linear, so over a 1-dB range the indicator may be calibrated linearly in 0.1-dB steps. If it turns out that the output ports are not balanced to within a few tenths of a decibel, adjust the spacing between the coupled lines very slightly, and repeat measurement and adjustment until satisfactory balance is achieved.

The directivity can now be checked by connecting the detector alone to the null port (3) and adjusting the capacitive tabs symmetrically until minimum output is obtained. It should be possible to adjust for a good null at Port 3, indicating that directivity is greater than the loss of the cable section used as a matched attenuator in the balancing adjustment. When these operations are completed successfully, the input VSWR at Port 1 may be assumed to be satisfactory (under 1.2:1) without measurement.

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From the Museum of Amateur Radio



5-Meter Transceiver. Built by P. Borsi in the early 30s following articles in *QST* published in 1931, 1933. It was later converted to 2½ meters and used extensively in W.E.R.S. during WWII.—W IANA

Automatic Amplifier Tuning

Electronic System Maintains Tank-Circuit Resonance

BY FRANK WALSMITH, *WSPHR

ONE advantage that a ham who builds his own equipment has over the amateur who buys ready-made gear is that he can build in special features not normally found in manufactured equipment. One such feature is automatic tuning of the final-amplifier stage. With such a system, the final amplifier automatically retunes to resonance as the driving frequency is changed. This is of considerable convenience in the type of operating that requires frequent changes in frequency as, for instance, in contest work. It also assures that the amplifier tube will not be damaged by excessive dissipation as a result of operation in the off-resonance condition for more than brief periods. At least under some circumstances, the amplifier controls need no longer be accessible at the operating position, so the amplifier may be located at a remote point, such as in the trunk of a car, or at any point closer to the antenna when it is desired to reduce losses by shortening the transmission line.

In the automatic tuning systems used by the author, a phase detector coupled to the final-amplifier tank circuit develops an error signal if the tank circuit is not at resonance. This signal drives a servo amplifier controlling the rotation of a motor-driven tank capacitor. When resonance has been restored, the error signal disappears, and rotation ceases.

Phase Detector

In Fig. 1, the phase detector circuit (enclosed in dashed lines) is shown coupled to the tank circuit of a conventional grounded-cathode rf amplifier with pi-network output. The detector is similar in principle to the Foster-Seeley fm discriminator. It compares the phase of the amplifier rf grid-driving voltage in respect to the phase-opposed voltages induced in a center-tapped link circuit coupled to the amplifier plate tank circuit. (The same principle may be applied to a grounded-grid amplifier, using the cathode voltage as the reference.)

In a normally-operating amplifier, phase relationships are such that the phase of the grid-driving voltage, used as the reference, must be

*880 West Hunter Street, Logan, Ohio 43138.

shifted 90 degrees to result in the desired condition of phase-detector balance (zero rectified error signal) when the tank circuit is at resonance. This shift in phase is achieved by the use of series capacitor C_1 . (A full 90-degree shift cannot be accomplished in a single step, but if the reactance of C_1 is high in respect to the resistance of R_3 , the shift will be about 85 degrees, which is adequate for this application.)

When the tank circuit is out of resonance, the phase relationship between the reference grid voltage and the voltage induced in the pickup link L_1 changes, the result being a positive or negative output signal from the detector, indicative of the direction in which the variable tank element must be adjusted to reestablish resonance.

Bandwidth

Since the development of an error signal depends upon tank-current flow in the amplifier, it is obvious that there is a limit to the degree to which the amplifier can be detuned without loss of control by the phase detector. Wide-range control systems usually employ a "scanning" or "searching" device in conjunction with the phase detector, the latter assuming control only after the scanning system has brought tank-circuit tuning within the detector's range of control. However, the bandwidth of the detector system shown in Fig. 1 is adequate for direct control without the use of a scanner, considering the relatively narrow widths of the amateur bands. As a matter of fact, the 200-pf. tuning capacitor in my own amplifier has sufficient range to cover both 40 and 80 meters; with the capacitor set near minimum, the circuit resonates in the 40-meter band; if the excitation is shifted to the 80-meter band, the system will follow and automatically retune the amplifier to this band. The amplifier is not normally tuned in this manner, of course, but it shows that the bandwidth is more than adequate.

The diodes of the detector in Fig. 1 are in a voltage-doubling configuration, and it is believed that this arrangement results in a greater bandwidth than that provided by the more conventional circuit. The voltages on either side

You'll find this system of automatic resonating of an rf amplifier output circuit highly interesting, either as a means of remote control, or simply to reduce the number of adjustments in changing frequency. It's also a good way to protect the amplifier against damage in case of inadvertent misadjustment.

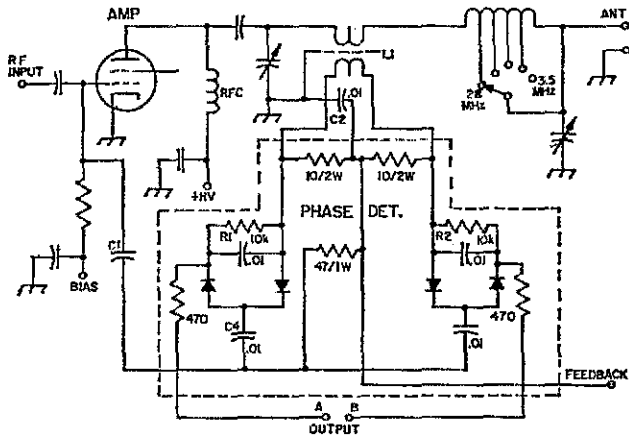


Fig. 1—Circuit of the phase detector (within dashed lines) coupled to a pi-network amplifier. Capacitances are in μF ; resistances are in ohms ($k = 1000$). Capacitors are ceramic or paper; resistors are $\frac{1}{2}$ -watt unless indicated otherwise; Diodes are 1N34 or 1N38.

C_1 —See text and Fig. 2. L_1 —See Fig. 3.

Other component designations are for text-reference purposes.

of the detector oppose each other in such a way that when the tank circuit is a long way from resonance, the side having the greater voltage cuts off the other side. Since the output error signal is the summation of the voltages appearing across R_1 and R_2 , the greater the unbalance in the detector, the greater the output error signal. The resulting characteristics is such that the detector output is low near resonance, but remains above zero over a greater range. When the detector is used with a sensitive amplifier, a very small voltage is sufficient to start the tuning element 'back toward resonance. Other factors affecting bandwidth are the tank-circuit Q , the amount of excitation, and the power output of the amplifier.

Another advantage of this particular detector configuration is that it allows tighter coupling to the tank circuit without danger of burning up the diodes. The author has used 1N34 diodes in the detector with the pickup loop placed about 2 inches from the tank coil of a push-pull pair of 250THs operating at 2500 volts. With full excitation applied, the amplifier was left unloaded by accident. It was expected that four cinders would be found, but the diodes survived.

Detector Assembly and Test

Fig. 2 suggests a method of constructing capacitor C_1 from a short length of RG-59/U cable. Fig. 3 shows the construction of pickup loop L_1 , which must be shielded to eliminate electrostatic coupling. Capacitor C_2 , and the shield of L_1 , should be grounded at the same point as the amplifier tuning capacitor, and the leads of L_1 should be as short as possible.

It is suggested that a reader interested in using this tuning system first wire up the phase detector, and temporarily couple it to his amplifier, us-

ing a zero-center VTVM to measure the output. If plus or minus 0.5 volt can be maintained across R_1 and R_2 over the desired bandwidth, you are in business. Failure to obtain a proper error signal (reversals other than at resonance) may indicate spurious oscillation, or harmonic resonances in the rf amplifier, or ground loops in the phase detector. If the crossover point (reversal of output polarity) does not coincide with resonance, the values of C_1 and R_2 should be reduced. Experience has shown that a 10- to 25-pF. ceramic capacitor across R_3 will usually improve the accuracy of tuning at the higher frequencies. The polarity of the output signal can be reversed by reversing connections to L_1 .

DC Servo

Several different circuits were tried before arriving at the dc servo arrangement of Fig. 4. Dc differential amplifiers that must respond to both positive and negative error signals require an accurate balance, are subject to drift, and have other operating disadvantages. The arrangement of Fig. 4 consists actually of two separate two-stage amplifiers, each requiring a positive driving signal. The diodes CR_1 and CR_2 function as an spdt switch. When Terminal A is positive with respect to B, B is grounded through CR_2 , cutting off Q_2 , and applying full positive error signal to Q_1 . When Q_1 drives Q_3 , relay K_1 grounds one side of the motor input, the other side being connected through the normally-closed contact of K_2 . This causes



Fig. 2—Suggested construction for capacitor C_1 , Fig. 1.

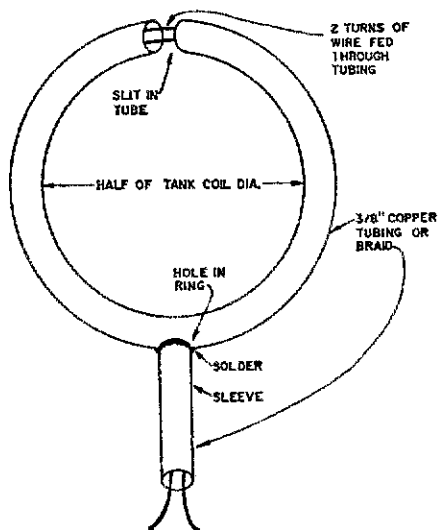


Fig. 3—Constructional details of shielded pickup loop L_1 , Fig. 1.

Q_1, Q_2 —Npn audio driver (Sylvania ECG123, or equiv.).
 Q_3, Q_4 —Pnp audio output (Sylvania ECG104, or equiv.).
 K_1, K_2 —Spdt relay with 12-volt, 100-ohm coil. The motor is a 12-volt reversible dc unit (see text). Other component designations are for text-reference purposes.

CR_1, CR_2 —1N34 or SK3017A.
 CR_3, CR_4 —Silicon controlled rectifier (International Rectifier SCR-01-C).
 R_1, R_2 —Linear control.
 T_1 —12.6-volt 3-ampere filament transformer.
 T_2, T_3 —Audio output transformer, 8000 ohms to ∞ ohms. The motor is a 12-volt dc surplus item (see text). Other component designations are for text-reference purposes.

the motor to turn in one direction. When Terminal B is positive with respect to A , A is grounded through CR_1 , and the positive error signal is applied to Q_2 . Q_4 then actuates K_2 , causing the motor to turn in the opposite direction.

Anti-Hunt

Servo systems of the type described have a tendency to "hunt" about the resonant point because of overshoot caused by the inertia of the system. The back contacts of K_1 and K_2 provide some magnetic braking action by shorting the motor armature when one or the other is released as the error signal disappears at resonance. However, this is usually not sufficient to eliminate hunting except at very slow tuning rates. The feedback circuit, consisting of C_1, C_2, R_1 and CR_3 , further reduces the tendency to hunt when the network is tied back to the link center tap in the phase detector. A property of a capacitor is that the current through it depends upon the rate of change of the voltage across it. On steady error signals, the voltage across C_1 or C_2 is changing slowly, and as a result, the IR drop across R_1 is small. As the error signal starts through the steep crossover portion of its curve in the vicinity of

resonance, larger current flows in R_1 , and the negative-going portion of the voltage across R_1 is applied to the center tap of the phase detector via CR_3 . This, in turn, reverse-biases Q_1 and Q_2 , which reduces hunting.

AC Servo

Alternating-current servos have the advantage of greater sensitivity and less time lag than dc servos. The ac servo circuit of Fig. 5 uses silicon controlled rectifiers in the output, which permit the use of a low-cost dc motor to drive the tuning element. The grids and cathodes of V_2 serve as balanced diode modulators. Opposite-phased ac voltage is applied to the cathodes, and a positive voltage is applied to the grids through R_3 and R_4 . R_1 is a balance control to equalize the conduction in the two sections of V_2 . The plates are connected in parallel. When the stage is balanced, and no error signal is present, a 120-Hz. signal appears in the output. If one of the grids is grounded, the ac phase on the opposite cathode appears at the plates, because that side of the tube is cut off by the IR drop across R_5 . Since each cathode has opposite-phased ac, the output phase will depend upon which grid is grounded. The grids are grounded through the plate-to-cathode resistance of V_{1A} or V_{1B} . The grid of V_1 receiving the positive error signal grounds the grid of V_2 connected to the plate of that same V_1 triode section. The output of V_2 is applied to a conventional two-stage ac amplifier. The output of V_{3B} feeds two audio output transformers, T_2 and T_3 , whose primaries are connected in parallel. The ac error signal is applied to the gates of the SCRs, which are connected to the low-impedance sides of the two transformers. C_2 compensates for the phase shift inherent in small transformers working at low frequencies. The two SCRs are connected in inverse parallel so that the firing of one alone causes the current to flow one way through the motor circuit, while the firing of the other SCR reverses the current flow, causing the motor to reverse direction of rotation. Which of the two rectifiers will fire depends upon which grid of V_2 is grounded as a result of an input error signal from V_1 .

Hunt Suppression in AC Servo

At zero error signal, the output of the ac amplifier is a 120-Hz. signal of reduced amplitude. This results in both SCRs being fired during one ac cycle of the motor voltage. This causes a braking action as the error signal goes through its crossover point at resonance. At slower tuning rates, this alone will reduce hunting.

However, the bridged-T network consisting of C_1, C_2, R_6 and R_7 provides additional insurance against hunting, and will usually be a necessity at faster tuning rates. This network consists of combined phase-lead and phase-lag circuits. At one frequency, the phase lead and lag are equal, and there is no resultant phase shift. At other frequencies, a lead or lag develops. The line frequency in an ac servo may be compared to an rf carrier. At zero error signal, the carrier is suppressed. If the servo hunts, the error signal is

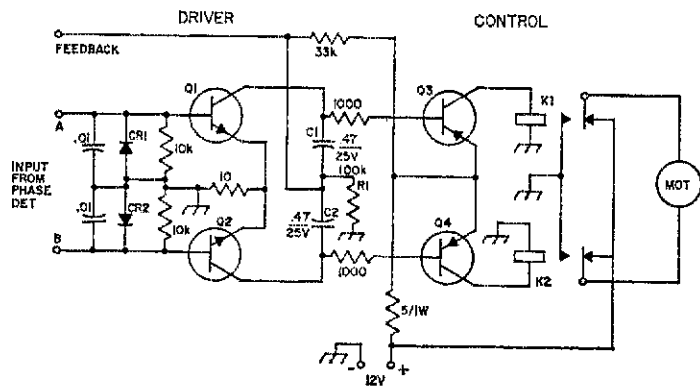


Fig. 4—Circuit of the dc servo. Capacitances are μF ; resistances are in ohms ($k=1000$). Capacitors are ceramic or paper; resistors are $\frac{1}{2}$ -watt unless indicated otherwise. Diodes are 1N34 or 1N38.

equivalent to a double-sideband signal in respect to the carrier or line frequency. On a steady error signal, only the dc component is added or subtracted, and the output is the carrier frequency.

Maximum conduction in a silicon controlled rectifier occurs when the gate voltage is in phase with the anode. By shifting the phase of the gate voltage when hunting occurs, the conducting time is reduced. In this manner the network acts as a damper by causing early or late firing of the SCRs when the servo hunts, and yet does not affect the gate's voltage in-phase condition on a steady error signal.

A problem that arises in using the bridged-T network in this manner is that a sine-wave input error signal is required. The chopper type of balanced modulator commonly used to convert the dc error signal from the phase detector to ac is not at all suitable in this case because of the high harmonic content of the converted signal. To overcome this difficulty, a balanced modulator with forward-biased diodes is used. Forward biasing prevents the ac signal from cutting off the di-

odes, thereby avoiding half-wave output. The ac signal only varies the bias on the diodes. This is similar to the condition in a class A amplifier where the ac signal varies the bias, but never drives the amplifier into cutoff or saturation. Conducting diodes require some power to unbalance them. This is accomplished by using a dc amplifier (V_1) with the diode switching circuit (CR_1 , CR_2), as used in the dc servo described earlier.

Motors

The motors used by the author have been 24-volt dc units of the surplus variety. Many of these motors have permanent-magnet fields. Others will require a source of dc to energize the fields.

A gear train is needed to reduce the shaft speed to a practical rate for rotating the tank capacitor. Some surplus motors are available with built-in gear trains, or gear trains may be purchased separately. High-capacitance tank capacitors will require lower shaft speeds. In general, it is well to choose a relatively high-speed motor, and reduce its speed as necessary with a resistance in series

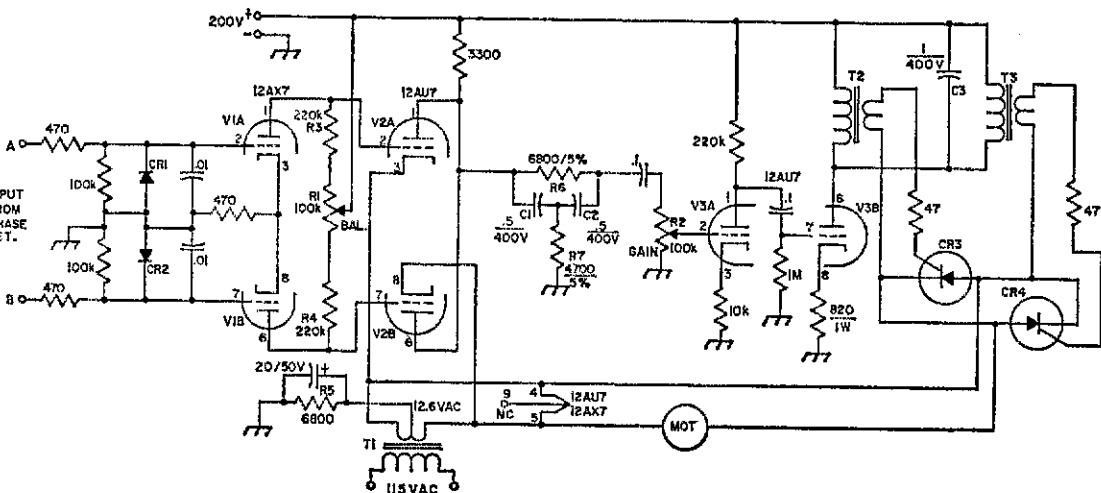


Fig. 5—Circuit of the ac servo. Capacitances are in μF ; resistances are in ohms ($k=1000$). Capacitors are ceramic or paper; resistors are $\frac{1}{2}$ -watt unless indicated otherwise.

with the armature. The author has used a shaft speed of 20 rpm with a 200-pF. tank capacitor.

The motor must have sufficient torque to rotate the variable capacitor through the gear train without difficulty. The gear train should be tight. Any appreciable play between gears will make it impossible to stop hunting.

Adjustment and Troubleshooting

The adjustment of the phase detector has been covered earlier. The ac servo of Fig. 5 requires two initial adjustments. The balance control, R_1 , is adjusted, without amplifier excitation, for no rotation of the tuning motor. The gain control, R_2 , is set for proper sensitivity. Adjustment of the balance control to either side of the balance point should cause the motor to rotate, the direction of rotation changing as R_1 passes through the balance point. If an ohmmeter is connected across CR_1 and CR_2 , the motor should rotate in one direction. Reversal of the ohmmeter leads should cause the motor to turn in the opposite direction.

Checks on the ac amplifier are best made with an oscilloscope, using one side of filament transformer T_1 as the horizontal sweep. This gives a Lissajous pattern, and phase shift can be detected from stage to stage as well as at the output. The pattern should be a closed line in all cases.

The low-impedance secondaries of T_2 and T_3

must be polarized correctly so that only one SCR fires at a time. This can be done by connecting one secondary first, and setting the balance control for motor rotation. Then the balance control should be adjusted to the other side of balance, and the other secondary polarized to give rotation in the opposite direction.

If the rotation of the tank capacitor is limited to 180 degrees, another check of polarization is necessary to make sure that the two directions of tuning are proper in respect to the resonant point, i.e., that the capacitance increases when the tank is above resonance, and decreases when the tank is below resonance. The direction of tuning can be changed by reversing the motor leads, the phase-detector leads, or the cathode connections to V_2 .

Conclusion

The bandwidth over which the transmitter can be shifted without readjustment of loading depends upon the bandwidth of the antenna (the bandwidth over which the antenna presents an essentially constant load impedance).

The output loading capacitor should be preset for the desired amplifier loading at the center of this range. If the change in operating frequency is so great as to require readjustment of loading, the tuning system will automatically compensate for the detuning effect of this adjustment. QST



September 1945



September 1920

... War's end, now imminent, will make available a large number of potential amateurs. How to get them into the ham ranks is a problem discussed editorially by KBW. He thinks that the best and perhaps the only way to get them is through local clubs and other amateurs.

... Phil Rand, W1DBM, talks knowledgeably about "Choosing U.H.F. Sites" and shows how to use contour strips for the purpose. Of course, he is largely talking to people who can perhaps choose a location for a new home with uhf DX in mind. He tells where to get Geodetic Survey maps, etc.

... Captain O.D. Perkins, ex-W7MH and Dave Middleton, W2OEN, describe the effective vhf radio relay system employed in North Africa.

... John G. Marshal W9ARL, goes quite deeply into the matter of "Matching the Antenna for Two-Band Operation." This appears to be new dope. There is a little math, of course. Flat lines for multi-band operation seem to be here to stay.

... A basic and interesting article on "How Microphones Work" is presented by Albert Kahn, W9KYM. He points out a fact often forgotten today. There is a limit in amplitude that a given microphone can handle without distortion.

... A good story by G5NO in "Hams in Combat." He describes his radio experiences during the last stand at Calais.

... We have a complete description of Frank Conrad's station 8XK. This became the famous KDKA a little later. He uses a big flat-top antenna with an equally large counterpoise underneath. A picture of the rig is on the front cover. There are a pair of Navy-type fifty watters. For the amateur, transmitting tubes are hard to come by at present but there is every assurance that they will be soon available. He also has an ICW set, 700-cycle plate supply and a spark rig. One can get transmitting tubes from Edison-Swan, Ltd.

... Leading article describes numerous cw circuits, with design dope, numbers of turns, etc. It is hinted that if the antenna is too big, it will pull so much juice from the oscillators that they won't oscillate. To solve this problem, it is suggested that lower power be used — say a couple of E tubes. A master oscillator-power amplifier circuit is shown. The text says nothing about neutralization, but the diagram shows a neutralizing condenser. Maybe they didn't know what the little beastie was for. It worked, though.

... Kruse of the Bureau of Standards summarizes and discusses the fading tests recently completed between ARRL and the Bureau. Further analysis will appear in an early issue.

... Hiram Percy Maxim, writing as President of ARRL, has a heart-to-heart talk about our less experience brothers. Worth reading even today. — W1ANA



A High-Pass Filter

for Eliminating I-F Pickup
in VHF Receivers

BY CALVIN F. HADLOCK,* W1CTW

IN ATTEMPTING to use a single-conversion receiver for wide-band fm reception on 220 MHz, much interference was experienced from signals in the 10.7-MHz i-f range. A short length of coax ran from the receiver input to the antenna relay. On the far side of the relay was a 75-to-300-ohm balun and about 70 feet of 300-ohm line, feeding a 32-element collinear array for 220 MHz. Removing the antenna from the receiver eliminated

the i-f pickup, indicating that some sort of filter in the coaxial line could be made to do the same, while still passing the desired vhf signals.

A grounded quarter-wave stub, 8 inches of RG-59/U, caused considerable reduction of the i-f interference, but did not eliminate it, so a high-pass filter was tried. Though the example shown is for 220-MHz use, with a 75-ohm line, the principles can be applied for other signal frequencies and line impedances, since adjustment of the filter can be done easily with a grid-dip meter. The basic information is from Terman's *Radio Engineer's Handbook*, but similar filter information is given in all modern editions of the ARRL *Handbook*.

Referring to Fig. 1, the value of capacitance is determined from

$$C_k = \frac{1}{4\pi f_k R}$$

The comparable formula for inductance,

$$L_k = \frac{R}{4\pi f_k}$$

may also be used, but the value of inductance required for vhf applications is not readily measured. In our 220-MHz filter we will use a cut-off frequency, f_k , of 180 MHz.

Substituting in the first formula,

$$C_k = \frac{10^{12}}{4 \times 3.14 \times 1.8 \times 10^8 \times 75} \quad pF = 5.9 \text{ pF}$$

(6 pF used)

Substituting in the second formula,

$$L_k = \frac{75 \times 10^6}{4 \times 3.14 \times 1.8 \times 10^8} \quad \mu H = 0.033 \mu H$$

($2L_k = 0.066 \mu H$)

There is no problem in providing 6 pF of capacitance, but how do you make or measure .066 μH at home? Let's redraw the circuit, as seen in the lower portion of Fig. 1, ignoring the ground, and we have an inductance of 0.132 μH shunted by a 6-pF capacitor. This can be dipped to determine the resonant frequency, which is the same as the cut-off frequency. There will be no change in resonance if the circuit is dipped unloaded, inside the box, with the cover removed, and then connected in a flat line and the cover replaced. If it is necessary to change the inductance each coil should be altered by the same amount. For vhf applications the individual coils will be close enough to the same value if they are wound to be physically identical in dimensions.

(Continued on page 42)

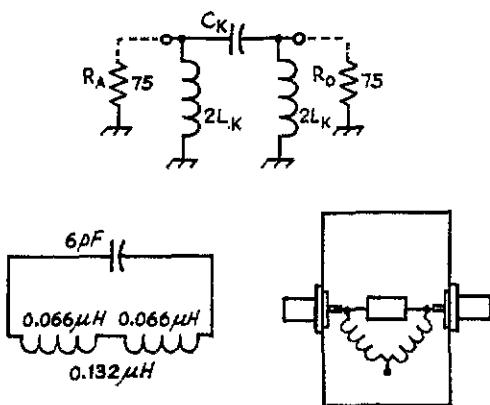


Fig. 1 - Basic circuit of the high-pass filter described by W1CTW is shown at the top. Design values given in the text are for input and output impedances (R_A and R_O) of 75 ohms, and operation in the 220-MHz band. Values for 144-MHz use are also suggested. For adjustment of the cut-off frequency, with a dip meter, the circuit can be thought of as a single inductor of 0.132 μH , tuned with a capacitance of 6 pF, as at the lower left. The physical arrangement of the filter is shown at the right.

A Solid-State Contest Receiver

BY GILBERT ADDIS,* W2NH

THE MODERN-DAY ham-band receiver has evolved in three steps. First, the need for adequate sensitivity was evident. On the high-frequency bands, improvement in sensitivity was achieved early in the game with regenerative circuits, and later with superheterodyne circuits using even better vacuum tubes. The next step, single-signal selectivity, was attacked in the thirties by Jim Lamb,¹ with the introduction of the crystal filter, and has evolved into the present monolithic crystal filter.² The solution to the third problem, protection against overloading and cross modulation, has been much longer in coming. Improved vacuum tubes and circuit designs^{3,4,5} went a long way in the desired direction. However, the emergence of bipolar transistors, and the natural desire to use these new devices, resulted in a step backward. Now, the development of the field-effect transistor, and particularly the MOSFET tetrode, has made possible the design of solid-state receivers equal in all respects to the best that can be had with vacuum tubes. In addition, there are the appreciable advantages of circuit simplicity, small size, and almost no heating. The latter results in negligible temperature drift.

The receiver described here shows a number of ideas for putting these new devices to work. It shows enough detail to permit duplication, but

*1094 Kenyon Ave., Plainfield, NJ 07060.

¹ Lamb, "What's Wrong with Our Receivers?" *QST*, June, 1932.

² Sykes, Smith, and Spence, "Monolithic Crystal Filters," *IEEE Convention Record*, New York (1967), Part 11, 78-93.

³ Goodman, "What's Wrong with Our Present Receivers?" *QST*, January, 1957.

⁴ Andrade, "Recent Trends in Receiver Front End Design," *QST*, June, 1962.

⁵ Squires, "New Approach to Receiver Front-End Design," *QST*, September, 1963.

leaves room for the individual builder's techniques. This receiver is a single-conversion superheterodyne with a 4.5-MHz i-f, as shown in the block diagram of Fig. 1. Three MOSFET tetrodes are used in the rf amplifier, mixer, and product detector. Two bipolar transistors are used as local oscillators, and two integrated circuits function as i-f and audio amplifiers. Five transistors and two integrated circuits, and that's all there is! The results are outstanding.

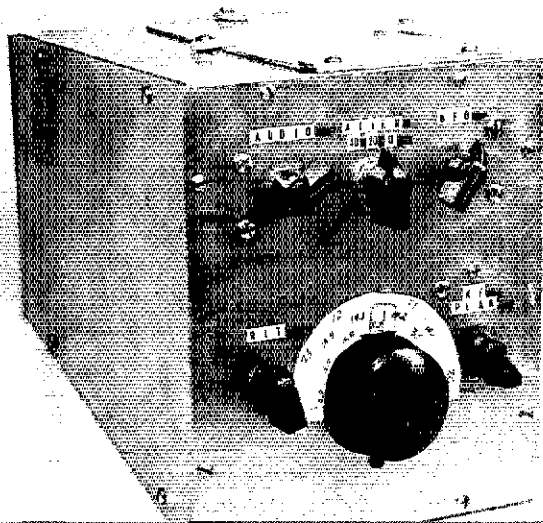
Circuit Design

The single conversion route was chosen for two reasons. First, it is normally desirable to have minimum gain before the crystal filter. Second, this receiver is planned for later transceiver operation. The fewer local oscillators, the smaller the chance of transmitting troublesome spurious products.

As seen in Fig. 2, an RCA 3N140 MOSFET tetrode is used in the rf stage. The first version of this receiver was built with an earlier-model single-gate MOSFET. The single-gate device looked very much like a triode vacuum tube, and for stable amplification required either neutralization, or operation in a cascode circuit. The tetrode's second gate reduces the feedback capacitance by putting a shield between the signal gate and the drain. This makes it similar to a screen-grid tube, and thereby simplifies the circuit.

The mixer stages also use 3N140s. The 3N140 provides a relatively-high-transconductance gate for local-oscillator injection. With this mixer circuit, and with the source bypassed to ground, complete stability is obtained.

A half-lattice crystal filter and an integrated circuit comprise the entire i-f amplifier. The RCA CA3011, a high-gain broad-band amplifier, was first tested. This proved too hot to handle, and produced multiple high-frequency oscillations (it has been learned that later versions are better shielded and less prone to feed back). It was reserved for future testing. The CA3020, an audio amplifier having 60-dB gain to 6 MHz, was then tested. It proved to be an excellent i-f amplifier, being stable and having adequate gain. A second CA3020 is used as the class-B audio amplifier, and it performs well.



The contest receiver in its sloping-front cabinet. The main-tuning dial is flanked by the rf-peaking control and the varactor-tuned receiver shifter for transceiver operation (not shown in the circuit diagram). Above, from left to right, are the audio gain control, rf-attenuator control, and the varactor-tuned BFO control.

Vackar-type oscillators^{6,7} using 2N1177 bipolar transistors are used in both the VFO and BFO. This circuit provides a relatively uniform output across the band, and has proven to be extremely stable. Because of the relatively light loading of the tuned circuit by the active device, susceptibility to pulling is minimized. The BFO is shielded to prevent overloading of the i-f amplifier input. An annoying problem that arose early in the development of the receiver was the radiation of severe TVI from the two local oscillators. However, when the oscillators were changed to the Vackar configuration, with more care taken to minimize feedback, the TVI was eliminated.

Two important power-supply features must be observed in most solid-state circuitry. First, the low-impedance levels make thorough decoupling mandatory in order to help eliminate feedback paths. Second, excellent power-supply regulation is required, particularly for Class-B audio stages which draw heavy peak currents. In this receiver, the varactor used for remote tuning of the BFO requires extra care, and may need its own Zener-diode regulator to prevent inadvertent voltage changes.

Electrical Features

Rf gain is controlled by a pad in the antenna circuit.⁸ Attenuations of 0 dB, 20 dB, and 40 dB can be selected with a double-pole switch. This is the simplest and most foolproof gain-control method to minimize front-end overloading.

The small size and self-shielding properties of toroids make them ideal inductors for the tuned circuits in a compact receiver such as this. Most of the toroids were made by grinding the ends off the cup cores found in the i-f transformers of scrapped

TV sets. A variable toroid consisting of a small slug-tuned coil cemented to a conventional toroid was devised and is shown in Fig. 3. The variable toroid is more compact than a circuit using a trimmer capacitor, and has less radiation than a conventional slug-tuned coil. By winding approximately 1/3 of the total turns around the slug-tuned coil and the toroid, and the remaining turns around the toroid core only, a 10-percent variation in inductance can be obtained, more than enough for all trimming purposes.

Layout problems are severe enough in a compact solid-state receiver, without compounding them by using a band switch. Plug-in units for each band were made by mounting the tunable toroids and necessary padding capacitors for the rf, mixer, and VFO stages all on a single plug-in printed-circuit board. These boards are readily available in the surplus market. To eliminate tracking requirements, the rf amplifier and mixer are peaked with a separate front-panel-controlled two-gang capacitor. The signal gate of the mixer FET is grounded through a 1-megohm resistor, in order to provide a static leakage path when the coil is removed.

Remote tuning of the BFO for cw and ssb is accomplished by use of a voltage-variable capacitor (varactor), in this case, the collector-base junction of a 2N736 silicon transistor. This permits front-panel tuning of the BFO to be done with only dc leads while the shielded BFO can be close to the product detector. The circuits are connected by a short coaxial lead. Since the capacitance change of the diode was more than needed, a 2-pF capacitor was put in series with the diode. A change of approximately 1/2-pF is available between 0 and +12 volts with this particular combination.

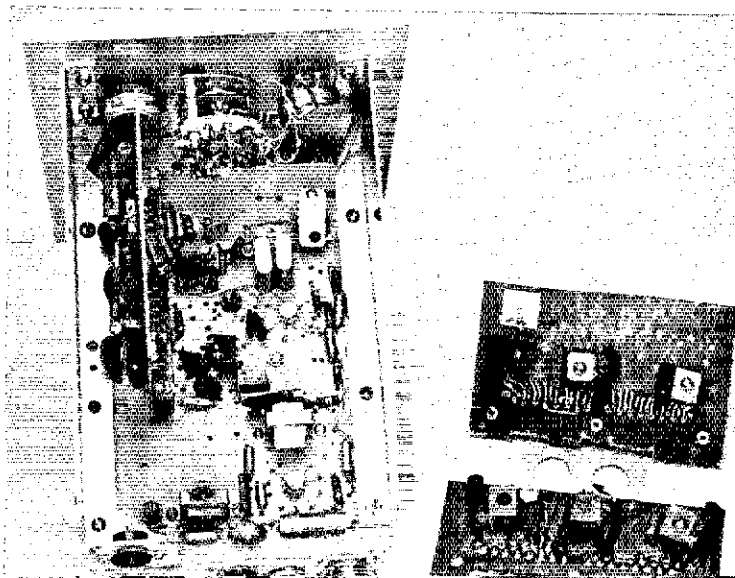
Because the receiver was designed for use with an external storage battery, no provision was made for a built-in battery supply, although plenty of room is available. A silicon diode is wired in the battery circuit to prevent inadvertent reversed polarity, which would be fatal to the transistors.

⁶ Jordan, "The Vackar VFO, a Design to Try," *The Electronic Engineer*, February, 1968.

⁷ Fisk, "Stable Transistor VFOs," *Ham Radio*, June, 1968.

⁸ See footnote 4.

Here is the receiver as seen from the top. Band changing is performed by exchanging plug-in boards containing tuned-circuit components for the rf amplifier, mixer, and VFO stages. An edgewise view of a board plugged into the socket, parallel to the left edge of the receiver, is presented in this photo. Boards for other bands are shown at the right.



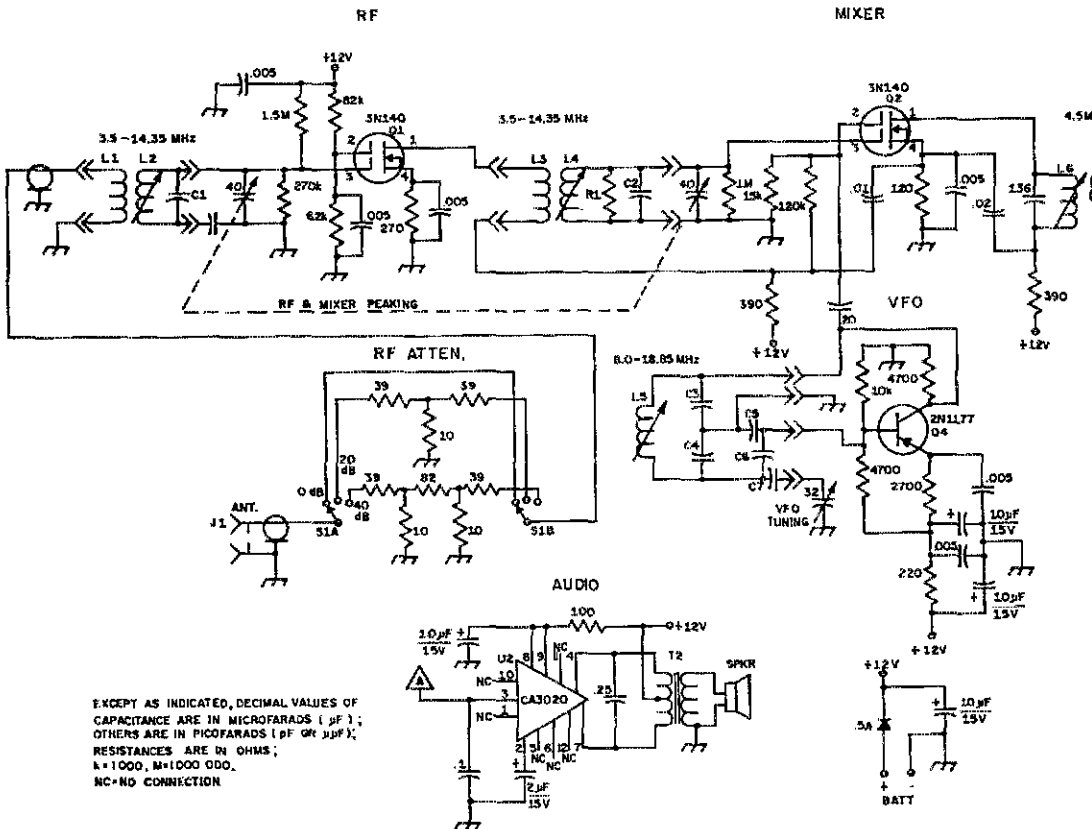


Fig. 2 — Schematic diagram of the contest solid-state receiver. Capacitors with polarity indicated are electrolytic. All capacitors in tuned rf circuits are silver mica. Uncommon values of capacitance are obtained by connecting common-value capacitors in parallel. See text and Fig. 3 regarding construction of variable toroidal inductors. Cases of Y1 and Y2 are to be grounded. C1-C7, incl. — See plug-in-components table. J1 — SO-239-type chassis connector; phono jack also suitable. L1-L5, incl. — See plug-in-components table.

- L6 — Toroidal inductor, 8.4 to 9.3 μH; 37 turns No. 24 enam. wire.
- L7 — 9 turns No. 24 enam. wire, wound over L6.
- L8 — Toroidal inductor, fixed, bifilar wound, 50 μH; each winding 32 turns No. 24 enam. wire.
- L9 — 12 turns No. 24 enam. wire, wound over L10.
- L10 — Toroidal inductor, 8.5 to 9.7 μH; 35 turns No. 24 enam. wire.
- L11 — Toroidal inductor, 9.5 to 10.5 μH; 45 turns No. 24 enam. wire.

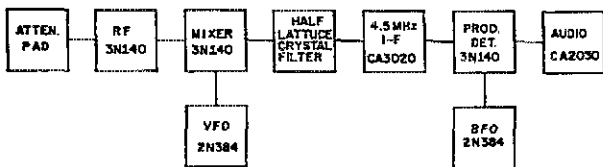


Fig. 1 — Block diagram of the solid-state receiver.

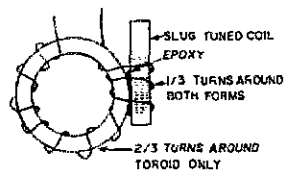
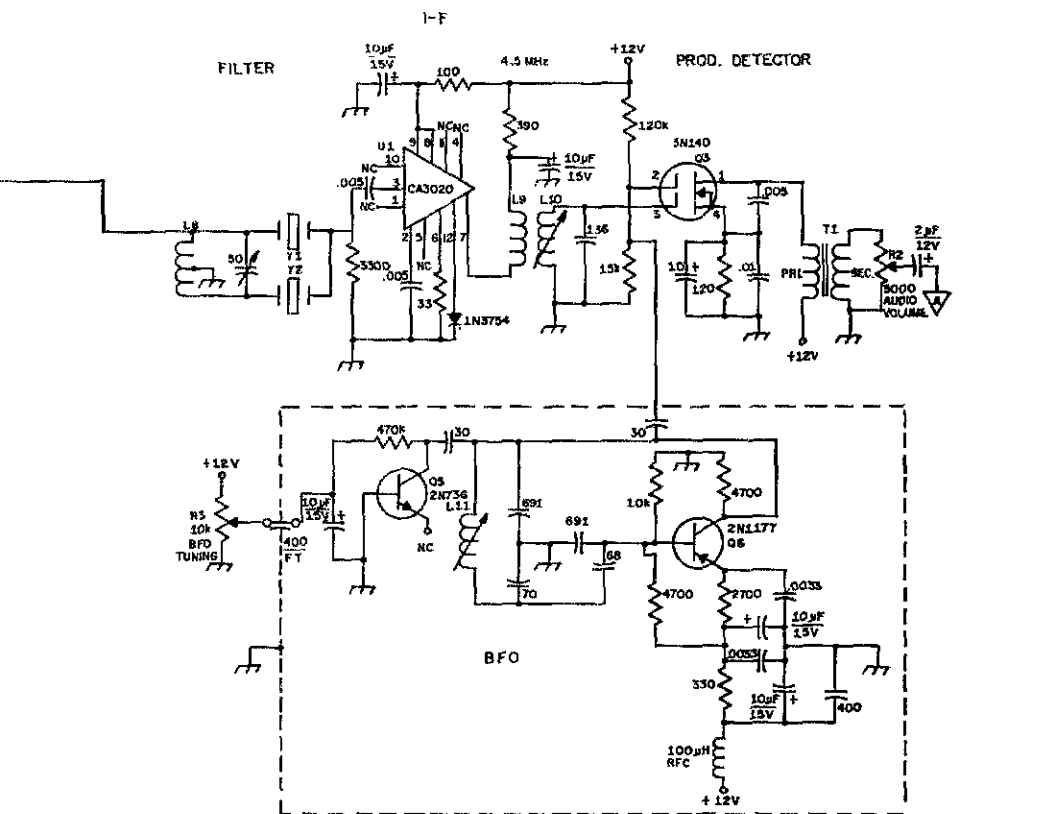


Fig. 3 — Tunable-toroid idea used in the receiver's construction. A ten-percent variation in inductance can be obtained with the turns wound as shown.

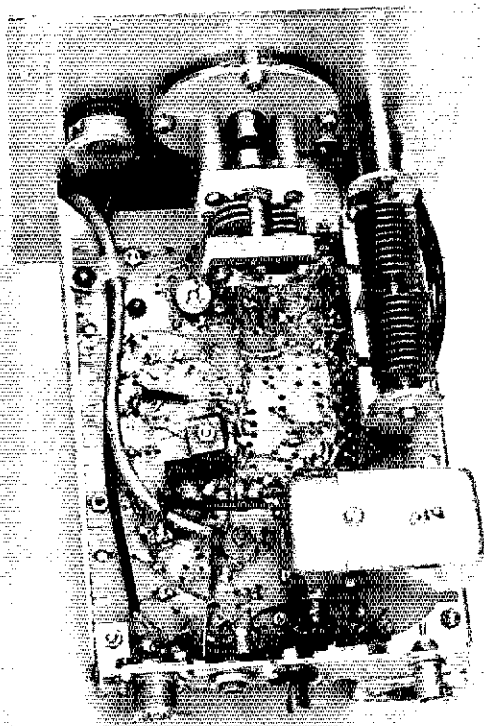


- Q1, Q2, Q3 - N-channel dual-gate MOSFET, 30-MHz rating or greater (RCA 3N140 or equiv. Motorola MFE 3006 also suitable).
- Q4, Q6 - High-frequency amplifier transistor, pnp germanium (RCA 2N1177 or equiv.).
- Q5 - Amplifier transistor, npn silicon (Motorola 2N736 or equiv.).
- R1 - See plug-in-components table.
- R2 - Audio-taper control, 5000 ohms.
- R3 - Linear-taper control, 10,000 ohms.
- S1 - Double-pole three-position switch, ceramic, sitorting (Centralab PA-2002 or equiv.).

- T1 - Audio, transistor interstage; primary 20,000 ohms, secondary 1000 ohms (Lafayette TR 110 or equiv.).
- T2 - Audio output, 0.5 watt; primary 500 ohms ct, secondary 3.2 ohms (Lafayette TR 95 or equiv.).
- U1, U2 - Integrated-circuit differential amplifier, 1 watt, 8-MHz rating or greater (RCA CA3020 or equiv.).
- Y1 - 4.500-MHz crystal.
- Y2 - 4.501-MHz crystal.

TABLE OF PLUG-IN-COMPONENT VALUES

Components	Frequency Band		
	3.5 MHz	7MHz	14 MHz
L1	4 Turns	3 Turns	2 Turns
L2	54 Turns 17 1/2 - 20 1/2 µH	29 Turns 5.6 - 6.3 µH	20 Turns 2.3 - 2.5 µH
L3	13 Turns	7 Turns	5 Turns
L4	54 Turns 17 1/2 - 20 1/2 µH	29 Turns 5.6 - 6.3 µH	20 Turns 2.3 - 2.5 µH
L5	21 Turns 2.8 - 3 µH	18 Turns 1.95 - 2.15 µH	22 Turns 3.4 - 3.8 µH
C1	68 pF	68 pF	34 pF
C2	68 pF	68 pF	34 pF
C3	510 pF	320 pF	390 pF
C4	120 pF	87 pF	100 pF
C5	470 pF	320 pF	320 pF
C6	30 pF	34 pF	39 pF
C7	Short out	47 pF	Short-out
R1	15,000 ohms	Not used	Not used
VFO Freq.	8.0 - 8.5 MHz	11.5 - 11.8 MHz	9.5 - 9.9 MHz



A view of the bottom side of the receiver, removed from its cabinet. The main-tuning capacitor for the VFO is prominent at the center of the front panel, with the rf-amplifier and mixer peaking capacitor at its right. Components on the opposite side of the phenolic board are point-to-point wired, as seen in this view.

Mechanical Layout

As anyone who has built transistorized equipment knows, mechanical layout is a problem equal in importance to electrical circuitry. Ultra-miniaturization makes little sense when it is necessary to find enough panel space to mount all the tuning controls. In any case, one ends up with a full front panel, a circuit board inside, and a large amount of empty space. In many cases the components actually have to be spread apart in order to provide shorter leads to coils, tuning capacitors, and the like. This of course points out the advantage which can be attained when all tuning is done with varactors and when inductors are replaced with gyrators or negative-impedance converters.^{9,10} The final layouts of the front panel and the component circuit board resulted after a number of false starts, and no doubt will evolve into improved layouts in the future. All com-

⁹ DePian, "Active Filters: Part 2 — Using the Gyrator," *Electronics*, June 10, 1968.

¹⁰ DePian and Meltzer, "Active Filters: Part 3 — Negative Impedance Converters," *Electronics*, September 2, 1968.

ponents, with the exception of the tunable toroids and the trimmer capacitor, are mounted on the top of the circuit board, with leads projecting through to the other side for wiring. The adjustable components are mounted on the wiring side for greater accessibility. The plug-in coil board is positioned vertically, perpendicular to the front panel. Coils are changed through a plate in the top cover. Receptacles to interconnect other equipment and power are mounted at the rear of the chassis. This permits easy removal of the receiver from the cabinet after releasing front and rear sheet-metal screws.

This receiver was built basically for contest operation (Field Day and Sweepstakes), so human engineering was important too. A sloping-front cabinet was used to provide good visibility and ease of operation during those long midnight shifts.

Conclusion

The receiver has now been in operation for almost two years, and had its big test during Field Day 1968. At W2LI, it was in close proximity to ten field-day transmitters. It showed excellent overload characteristics and operated as smoothly as the receiver in a vacuum-tube transceiver used in previous contests. Incidentally, it draws 67 mA of current at 12 volts.

QST

Gimmicks & Gadgets

(Continued from page 37)

The filter was built in a small Minibox, with BNC connectors on the sides, as shown in Fig. 1. The information given is by no means new, but this solution may not have occurred to some vhf workers who have had trouble with i-f leak-through. The principal problem in this instance was interference from signals much lower in frequency than the desired signals, so the cut-off frequency is not a critical matter.

A similar filter for 2-meter use, having a cut-off frequency of 120 MHz, and designed for 50-ohm line, would be built with a capacitance of about 8 pF. The similar inductors would be adjusted to give the cut-off frequency of about 120 MHz, using the dipper, as described above.

For any such filter to function properly without excessive insertion loss, it is important that the input and output loads, R_A and R_O , be reasonably close to the design impedance. This means that the antenna line should have a reasonably low SWR, and the receiver input circuit should be tuned and tapped properly.

In receivers having the antenna lead tapped directly on the input circuit, a simpler approach than the filter described here may be worth a try. This involves merely inserting a 100-pF capacitor (mica) in series with the tap on the input coil. Optimum proportioning of the capacitor value and the tap position can give as much as 40 dB attenuation at the intermediate frequency, with an insertion loss in the vhf range of about 1 dB.

QST



Recent Equipment



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

The Heath SB-500 2-Meter Transverter

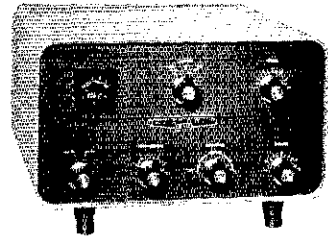
THE SB-500 was designed for use with the latest Heath hf and 50-MHz SB-series transmitters, receivers, transceivers, and the HW-100. Earlier Heath units such as the SB-100, as well as equipment of other manufacture, can probably be modified to work with the SB-500; however, this information is not included in the Heath literature.

Operating in the 144- to 148-MHz range, the SB-500 will deliver up to 50 watts of ssb or cw power to the antenna. The outboard equipment must operate in the 28- to 32-MHz or 50- to 54-MHz range.

Receiving

A 2-meter signal arriving from a 50-ohm antenna is connected through the antenna relay to a neutralized Nuvistor rf amplifier, V1 in Fig. 1. A schematic diagram of the amplifier is shown in Fig. 2. There is a single-tuned input circuit — the coil, L1, is tapped to provide impedance matching — and a double-tuned bandpass circuit in the output. Both input and output can be adjusted from a front panel PRESELECTOR control. Stable operation is attained by a series-tuned neutralizing circuit, L2/C105. Receiver sensitivity is rated 0.2 microvolt for 20 dB signal-plus-noise-to-noise ratio for ssb operation.

Output from the rf amplifier is mixed at V2 with either 116- or 94-MHz energy from the crystal-controlled oscillator, V4 (Fig. 1). The resulting difference signal is now at either 10 or 6 meters and is routed through SB-500 switching to the associated outboard receiver. When 6-meter gear is used, a low-pass filter is required at the mixer output and the necessary components are



included in the SB-500 package. They are mounted on the receiver amplifier/mixer circuit board (see top-view photograph).

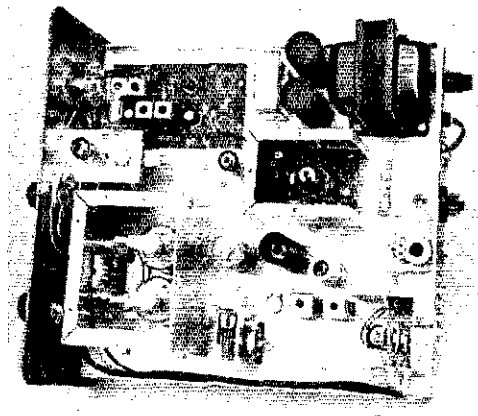
A crystal-controlled 1-MHz calibrator, V3, gives strong readable markers throughout the tuning range of the equipment. A front-panel meter-calibrate switch turns the calibrator on and off.

Transmitting

A driving voltage (only about 0.5 watt of power is required) of either 6- or 10-meter energy from the outboard equipment is heterodyned to 2 meters in the mixer stage, V6 (Fig. 1). The heterodyne oscillator, V4, provides a signal of either 116 or 94 MHz which combines in the mixer with the 29- or 50-MHz signals to give the required 144-MHz signal.

Output from the mixer goes to a voltage amplifier, V7. A pi network couples the output of V7 to the 8156 driver, V8. The mixer, amplifier, and driver output stages are all ganged-tuned by a panel DRIVER control.

Top view of the SB-500. Shielding covers have been removed from the final amplifier compartment, lower left; the antenna relay, lower right; and the heterodyne oscillator, right center. Power supply components are grouped at the top right. A 1-MHz crystal calibrator is attached to the front panel just below the S meter. The circuit board at the top left contains the receiver rf and mixer stages. Since this unit was wired for use with 28- to 32-MHz equipment, several coils and components needed for a low-pass filter with 50-MHz operation are not shown. These low-pass filter components would mount at the right end of the board where the dotted lines are visible in the photo.



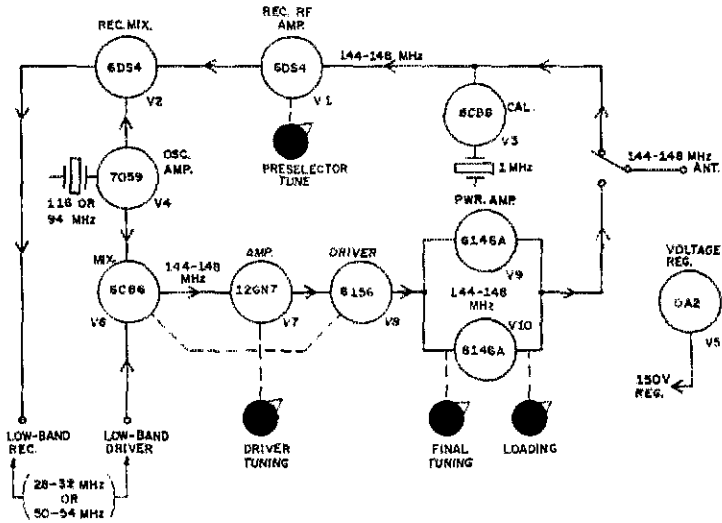


Fig. 1 -- Block diagram of the SB-500 2-meter transceiver.

Two 6146A tubes are connected in push-pull, operating Class AB1, for the final amplifier. The amplifier is rated at 140 watts PEP input and 50 watts (50 percent duty cycle) power output. Plate voltage for the final amplifier is obtained from the companion low-band equipment. Neutralization is accomplished by feeding back a small portion of the output voltage to the tube grids by way of wire stubs sticking up through the chassis in close proximity to the tube grids. The final neutralizing adjustment requires bending these wires until maximum stability is achieved.

Voltage, varying at an audio rate at the grids of the final-amplifier tubes, is coupled to a rectifier-filter network. The resulting output is available as a dc voltage which can be used to control the outboard driver to prevent overdriving and distortion.

Power Supply, Metering, and Switching

The primary of the transformer that supplies power to the SB-500 has two windings which are connected in parallel for 120-volt operation, or in series for 240-volt operation. One secondary winding is connected in a full-wave voltage doubler to produce 300 volts dc for plate operation of all

tubes, except for the final amplifier and the Nuvistor rf amplifier and mixer. Final-amplifier screen voltage is also obtained from this 300-volt line.

A half-wave 150-volt silicon rectifier gives the necessary voltage for muting and operating bias, and a 150-volt regulated supply furnishes stable voltage for the receiving rf amplifier/mixer, the heterodyning oscillator, and 1-MHz calibrator. The 800 volts necessary for the final amplifier is obtained from the outboard exciter.

Two metering circuits are provided in the SB-500. A front-panel meter/calibrate switch has three positions. In the PLATE position, the cathode current of both final amplifier tubes is measured. In REL PWR, part of the rf output is sampled and rectified for relative power-output measurements. A CAL position activates the 1-MHz calibrator, but in this position the meter is switched out of the circuit. The panel meter has two calibrated scales: 0-500 mA and 0-10 for relative output.

Switching the outboard equipment to 2 meters is a casual affair, but what's going on inside the SB-500 is quite complicated. Elaborate switching is necessary since voltages, input and output rf, and

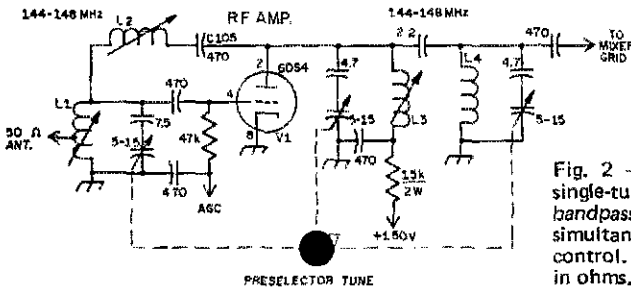
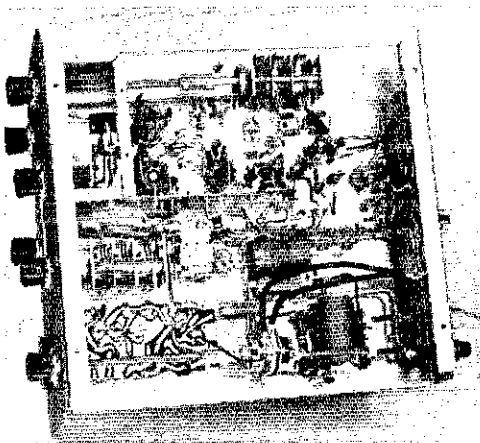


Fig. 2 -- The Nuvistor receiving rf amplifier. A single-tuned input grid circuit and double-tuned bandpass coupler in the plate can be adjusted simultaneously by a panel PRESELECTOR tuning control. Capacitance values are in pF, resistance is in ohms.



This bottom view of the SB-500 shows available room for a neat arrangement of parts and components. The large coil assembly at the top left of the photograph is the final-amplifier grid circuit which requires some pinching and squeezing adjustments during the final alignment process. The screwdriver-adjust potentiometer at the right is part of the relative power-output metering circuit. Rear-apron connectors and controls include rf output, alc, linear-amplifier antenna relay, low-band transceiver relay, rf drive, power plug, low-band antenna, low-band receiver, fuse holder, and a bias-adjust control.

the antenna must be transferred from the outboard gear to the SB-500, and in some cases back again. The necessary switching is done by two relays in the SB-500 and by an ON/OFF switch on the SB-500 panel.

The panel switch turns the power-line voltage on and off and, in addition, when in the OFF position routes the output of the outboard transceiver to its normal antenna or amplifier connection. When ON, the switch directs the output of the SB-500's converter to the antenna connector of the 28- or 50-MHz receiver for reception of 2-meter signals. The panel switch in the OFF position also connects the screens of the external exciter final amplifier tubes to their screen-voltage source. When the switch is ON, the screen voltage is removed and the screens are grounded so that the final tubes in the exciter are inoperative.

The antenna relay in the SB-500 routes the incoming 2-meter signal to the receiver circuits, or connects the final amplifier circuit to the 2-meter antenna.

A power relay in the SB-500 connects screen voltage to the final-amplifier tubes and controls their bias. This relay also connects regulated voltage to the receiver circuits in one position and to the driver screen in the other.

When the SB-500 function switch is OFF and the two internal relays are in the non-energized position, there is still an 800-volt potential on the final amplifier tubes, if the external equipment is turned on, since the high voltage for the SB-500 is obtained from the outboard transmitter and is

connected at all times. *Be sure to unplug the SB-500/exciter cable before working inside the SB-500!*

Assembling and Using the SB-500

Approximately 20 hours were required for construction of the SB-500, not including a couple of hours to catalog, arrange, and make ready for the wiring operation. Several additional hours were necessary to modify existing low-band equipment; Heath has included instructions in the manual for doing this to the SB-110, SB-101, HW-100 and the SB-301/401. Modifying other equipment will require some study and ingenuity.

SB-100 owners who are interested in using their transceivers with the SB-500 will be glad to know that only slight modifications are needed. The writer compared the SB-100 manual with that of the SB-101 (available from Heath), noted the differences, and incorporated them in the SB-100. From then on the instructions outlined in the SB-500 book for the SB-101 modifications were followed and the combination worked fine.

No unusual trouble was encountered in constructing the SB-500. Alignment went smoothly, too. The only unusual thing happened during the neutralizing of the final amplifier. After the final step was completed, and all was stable, the compartment covers were attached and the chassis was installed in the cabinet. Then, testing again, the final amplifier "took off." The neutralizing process was repeated, only this time with the final-amplifier compartment lid on, and all was well.

The only test gear necessary for the alignment is an rf probe and VTVM. However, if neither is available, the SB-500 kit contains components to make an rf detector to be used with the builder's VOM.

Operating in any mode on the 2-meter band requires good frequency stability, but it is especially important when operating ssb. Heath has insured good stability by using regulated voltage on the heterodyne oscillator, converter rf amplifier and mixer, plus the driver screens. It's immediately apparent when using the SB-500 that the stability is good. Using exalted-carrier reception of a-m signals is a breeze, too, (if the received a-m signal is stable!), making cross-mode contacts pleasant. To sum up, the SB-500 is easy and convenient to operate, is stable, and is not difficult to build. -- *WICUT.*

Heath SB-500 2-Meter Transverter

Height: 7 15/16 inches.
 Width: 12 1/4 inches.
 Depth: 14 inches.
 Weight: 14 1/2 pounds.
 Power Requirements: 120/240 volts ac at 82 watts, 700 to 800 volts dc at 200 mA.
 Price Class: \$180.
 Manufacturer: Heath Company, Benton Harbor, MI 49022.

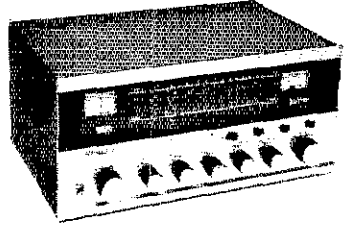
The Realistic DX-150A

THE REALISTIC DX-150 was described in detail in an earlier article.¹ Since that article was written, a new version has been released by Radio Shack — the DX-150A. Although there are few external differences, the circuit has been revised to improve the performance and overcome a few of the problems pointed out originally. The major change in the A model is the use of FETs in the rf, oscillator, and mixer stages. Along with this front-end change, an i-f filter has been added to improve skirt selectivity.

The rf stage consists of two JFETs in a cascode circuit. The low capacitance between input and output of this arrangement allows good gain (up to 25 dB) and stability without the need for neutralization. One novel feature is the use of a bipolar transistor in the source return of Q1 for agc control, providing isolation between the agc line and the rf stage. A simplified schematic diagram of the DX-150A "front end" is shown in Fig. 1. C1 is the MAIN TUNING capacitor and C2 provides the BANDSPREAD function. Output from the rf stage is tapped off the drain coil and is capacitance-coupled to the JFET mixer — a method that is simple mechanically, but that doesn't provide as much protection for the mixer from strong out-of-band signals as does link coupling.

The primary external difference between the DX-150A and its predecessor is the inclusion of a

¹ Recent Equipment, *QST*, March, 1968, page 39.



built-in speaker. The owner is no longer required to buy one as an accessory item. It is mounted on the left side of the chassis and faces outward. The only possible inconvenience is that the receiver should be placed in its operating position so as not to obstruct the left side of the cabinet. — *WIFBY*.

Realistic DX-150A Receiver

Height: 6 1/2 inches.

Width: 14 1/8 inches.

Depth: 9 1/4 inches.

Weight: 14 pounds.

Power Requirements: 6 watts, 105-125 volts ac, 50-60 cycles, or 12 volts dc.

Price Class: \$120 less accessories.

Importer: Radio Shack, 730 Commonwealth Ave., Boston, MA 02215.

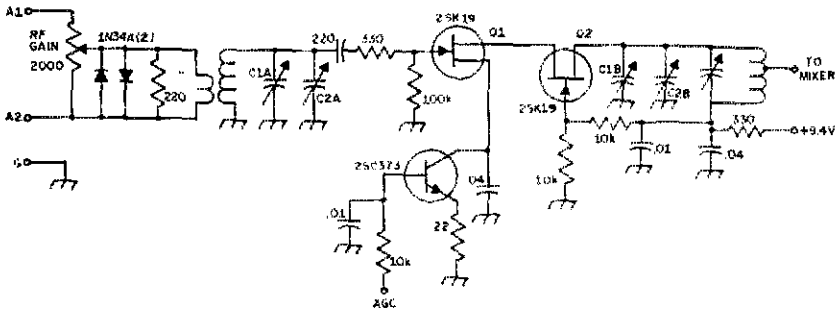


Fig. 1 — Simplified schematic of the DX-150A rf amplifier.

Strays

Stolen Equipment

I would like to report the theft of my Hammarlund HQ-110 receiver from my home sometime between February and May 1970 while I was away at school. I didn't keep a record of the Serial No. but the receiver has an Ameco 6-meter pre-amp mounted on the left rear chassis, no clock, and had a missing FUNCTION switch knob. Jean R. Ward, WA5TIA, 706 Ridgedale, Richardson, TX 75080.

Feedback

The base diagram for the MC1550G ICs (U3 and U4) of the "2-Meter QRP Mountain Topper" (Preiss, *QST*, May 1970), is shown incorrectly on the schematic diagram. The numbering should be rotated (bottom view) so that pin 1 is over the tab. As incorrectly shown, pin 10 is over the tab.

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.

CW Break-In for the Collins S/Line

BY C.W. WADE,* W9INH

AND

D. B. HALLOCK,** K6AZJ

THE advantages of operating a ham station with full break-in (QSK) in the cw mode are widely known. In fact, most cw traffic handlers, and many cw DX operators, utilize some form of full break-in. Being a devout addict of that facet of our hobby, frustration set in after the purchase of a new S/Line because of its inability to operate QSK. Extensive modifications to the equipment were not feasible; a search of the literature revealed several approaches to a solution.^{1,2,3}

One widely-used method of operating break-in utilizes an electronic transmit-receive switch for antenna changeover while allowing you to hear a breaking station between dots, characters, and words. This QSK adapter was designed to be used with such a T-R switch.

With the 32S-3 VOX actuated and key up, a substantial signal leak or feedthrough appears in the receiver, masking any breaking signal. This leakage comes from the output signal of the first mixer, V4, getting through the grid-blocked-keyed second mixer. It can be eliminated by also keying the first mixer. Further, the rf amplifier, driver stage and power amplifier in the 32S-3 are running resting plate current, producing some noise. This noise, when added to the leakage signal,³ covers up all but the very strongest breaking signals.

Several requirements were established for the proposed solution: (1) minimum modification to original equipment, (2) no relays or batteries, (3) ability to switch the equipment back to the original configuration instantly for ssb, (4) no degradation of transmitted signal, (5) retention of all operating features of the original configuration, and (6) a clean, smooth job of QSK even when running 1-kW input.

In order to meet these requirements, some method of disabling the first mixer, V4, and the power amplifier must be utilized when the VOX relay is actuated and the key is in the up position. As pointed out by both Shafer and Hildreth,^{1,2} the removal of screen voltage under key-up, VOX-actuated conditions is enough to cut off the PA. To facilitate PA cutoff, the internal jumper between the PA disable jacks, J5 and J9, on the 32S-3 was cut. If the 32S-3 has been used with

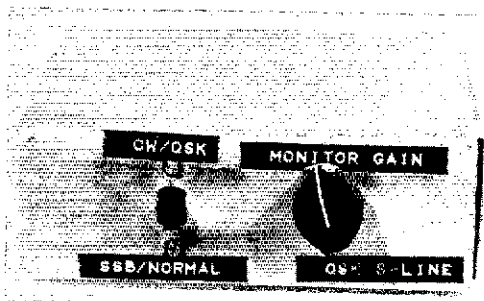
* Box 123, Goodland, Kansas 67735.

** 605 Grand Ave., Marion, Iowa 52302.

¹ Shafer, "Cleaner Break-In with the 32S-3," *QST*, November, 1964.

² Hildreth, "An Experimental All-Electronic VOX System for S.S.B.," *QST*, March, 1968.

³ Hildreth, "TVI," *QST*, October, 1968.



the 62S vhf transverter, this modification will have already been made. The second modification consists of lifting the cathode ground of V4 (R27 arm), and bringing it out to the 32S-3 J21 (spare) and over to the break-in adapter, interconnections being made with RG-174/U coax. No other modifications or changes are required, and the equipment is easily returned to its original configuration.

Fig. 1 is a schematic diagram of the adapter unit. With the adapter switch, S_1 , in the cw position, the VOX relay actuated, and the key up between dots, 20 volts of cutoff bias is put on the first mixer, V4, to eliminate signal leakage, PA screen voltage is removed to eliminate hash, and the receiver is turned on. When the key is closed, the 20-volt bias on the first mixer is removed and V4's cathode grounded, screen voltage is applied to the PA, and the receiver is partially muted. R_1 is a monitor gain control. It adjusts the degree of muting and thus allows the operator to monitor the transmitted signal with the S/Line receiver.

The timing is such that all this switching occurs almost instantaneously with key closure. When the key opens, there is a 7-millisecond delay before everything returns to the receive condition. The 32S-3 keying waveshape is unaffected by having two additional stages keyed.

With the adapter switch in the ssb position, all circuits in both the 32S-3 and the 75S-3 are returned to their normal operation. Since the VOX relay in the 32S-3 must be actuated at all times during the QSK operation, some other method of controlling the changeover relays in the kilowatt linear amplifier had to be devised. This is accomplished with switch arms S_{1A} and S_{1B} permitting the linear's relay to be controlled with a foot switch in the cw mode; during ssb operation, this relay is actuated by the VOX relay in the 32S-3.

Tune-up is accomplished with the adapter switch in the ssb position. The receiver is operated with its agc off. Any key or keyer that is suitable for keying an S/Line directly may be used in conjunction with the adapter. The key or keyer is plugged into the adapter which has a keying line back to the 32S-3.

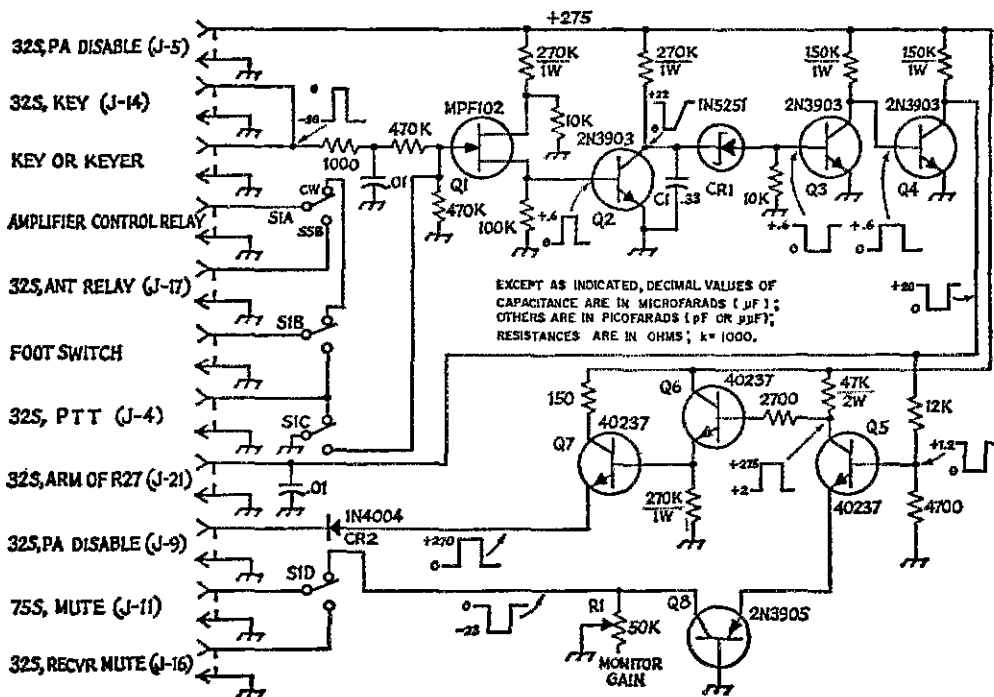


Fig. 1—Schematic diagram of the S/Line adapter. Resistors are 1/2-watt composition types unless otherwise noted. All jacks are the phono type. The waveforms shown are the sequence when one dot is sent.

C₁—Mylar or paper.

CR₁—22-volt, 1/2-watt Zener.

CR₂—400-volt PIV silicon.

R₁—Linear composition control.

Circuit Operation

Referring to Fig. 1, when the key is depressed the negative voltage present on the key line at J14 of the 32S-3 is grounded. This ground, applied through an rf filter to the field-effect transistor follower, Q₁, causes base current to flow into Q₂. (Waveforms for one dot are shown at different points in the schematic.) This, in turn, causes Q₂ to discharge C₁ which, under key-up conditions, has about 22 volts across it. As the collector of Q₂ reaches nearly zero voltage, the base current of Q₃ falls to zero, Q₃ cuts off, and Q₄ turns on. The collector voltage of Q₄ therefore goes nearly to zero and grounds the arm of control R27 in the 32S-3. This puts the 32S-3's first mixer into operation.

As the collector of Q₄ goes to zero, Q₅'s base bias current also drops to zero, letting the emitter current go to zero. The emitter current of Q₃ also goes to zero, which allows the collector of Q₃ to go negative, muting the 75S-3 receiver. Simultaneously, the collector of Q₅ rises up to 275 volts. Q₆ and Q₇ are emitter followers which are capable of supplying the screen and bleeder current of the 32S-3 PA. CR₂ is an "idiot proof." It prevents destruction if the connections to J9 and J5 on the 32S-3 are inadvertently swapped.

All this switching occurs within a millisecond or so of key closure, so that by the time the grid-block keying in the 32S-3 puts a signal out, the first mixer and screens are operating normally

Inside view of the S/Line adaptor. The chassis is home-made. A U-shaped bracket supports the input and output jacks on its rear deck, and the transistor sockets are press-fit mounted on the front. After wiring, this sub-assembly slips into the outer housing.



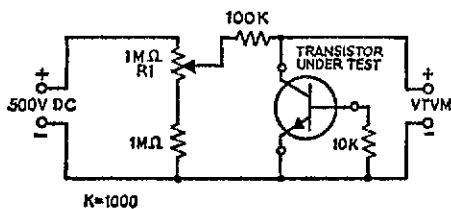


Fig. 2—Test setup to determine the collector voltage breakdown point of high-voltage transistors.

and the gain of the 75S-3 is greatly reduced, the degree of gain reduction being determined by the setting of R_1 . At the end of a dot or dash (key up), the sequence reverses, with one important change. As Q_2 cuts off, the current through Q_2 's collector resistor begins to charge C_2 . For a short while, there is not enough voltage across C_2 to break down CR_1 , and Q_3 remains with zero bias. In about 7 milliseconds, however, C_2 reaches the breakdown voltage of CR_1 and base bias is applied to Q_3 . The first mixer is then biased off, the screen voltage drops to zero, and the receiver is back in normal operation.

The ssb position in Fig. 1 grounds the gate of the FET so that the adapter is in the key-down position all the time.

Transistors

Five of the transistors used are inexpensive plastic types which should be widely obtainable. Substitutions are possible; any npn or pnp silicon transistor with a collector-to-emitter breakdown voltage rating of 40 volts or more may be used in place of the 2N3903 and 2N3905. Just about any n-channel junction FET may be substituted for the MPF102. Substitutions should not be made for the high voltage RCA 40327 transistors unless good knowledge of the substitute is available.

The 40327 transistors are rated at 300 volts V_{ceo} (collector-emitter breakdown, base open circuit). All those purchased ran above 370 volts V_{ceo} . The V_{cer} breakdown (collector-emitter breakdown with a resistor connected from base to emitter) typically runs around 500 volts with

a 10 kΩ base resistor. When the S/Line is first turned on, the voltage goes a bit over 300 volts, so to be safe, the V_{cer} breakdown of the 40327s should be checked. This may be accomplished with the simple setup shown in Fig. 2. It is important that the supply voltage to the transistor have an impedance well above 100 kΩ if the test is to be nondestructive. A high-resistance VTVM (10 megohms or more) must be used to measure the collector voltage. The voltage across the transistor is slowly increased, and the avalanche point, where the voltage across the transistor ceases to increase and may even snap back to a somewhat lower voltage, noted. The peak voltage measured should be about 350 volts to be entirely safe when used in the QSK adapter application.

Construction and Results

The layout or method of construction of the circuit shown in Fig. 1 is not critical. It is recommended that the adapter be built in a cabinet that provides rf shielding. In the prototype unit the parts were mounted on a piece of Vectorbord. The board was mounted in a small utility box with the switch (S_1) and R_1 mounted on the front panel. All leads were brought to phono-type jacks mounted on the rear of the box. Patch cables completed the installation. The transistors all run stone cold; a few of the resistors dissipate some power but the sizes given are conservative. In working with the completed unit, always keep in mind that this is not a normal transistorized circuit — there is a very painful 275 volts present!

Results have exceeded our expectations. The first operation attempt upon completion of the project was to join the cw (D) Party fun for a 15-hour stint to test reliability while running a kW input and using a T-R switch on different bands. The monitor gain control proved to be a most welcome additional feature. To summarize, the QSK adapter further enhances the operating characteristics and flexibility of the S/Line, and it is a joy to use. QST

A Solid-State VOX

(Continued from page 14)

does draw quite a bit of current, however, so small batteries are not suitable. Tests indicate that any voltage between 5 and 15 volts will provide satisfactory operation.

Operation

Connecting the VOX is easy. The microphone is plugged into one of the mic. jacks, J1 or J2, and a patch cord is used to connect the remaining mic. jack to the transmitter, as shown in Fig. 5A. The relay contact leads are connected to the transmitter PTT input, from J6. If a separate receiver is to be used connect a cable from J5 to the receiver mute connections. The receiver audio can be sampled at the speaker terminals and fed to J3. The GAIN control, R19, should be advanced until even softly-spoken words produce VOX operation.

The DELAY time (R22) can be set to suit one's personal preference. The anti-VOX adjustment is set last. Place the microphone near the speaker, and tune in a loud signal. Then, advance the ANTI-VOX control until the signal from the speaker does not operate the relay, even during periods when loud pops and static crashes are present.

A VOX adaptor can also be put to work to provide semibreak-in for cw operation. The connections for this are shown in Fig. 5B. Output from an audio oscillator or the audio signal from the monitor in an automatic keyer is needed to key the VOX. Only a low-level sample of the oscillator output is required; 0.01 volts will assure good operation. If no oscillator is available, one can be built from a commercial kit such as the RCA KC4002. Of course, both the audio oscillator and the transmitter must be keyed simultaneously. QST

Technical Correspondence

DUAL-FREQUENCY OPERATION WITH THE HEATH SB-301/SB-401

Technical Editor, *QST*:

I was pleasantly surprised to see the article by WA8MHO concerning switch selection of two transceive frequencies for the Heath SB-301 and SB-401 in January, 1970, *QST*, as a similar system has been in use here at WA1JMR since February, 1969. I thought readers might be interested in reading of experiences with my modification.

I found that the extra length of cable needed to utilize the spare jacks on the backs of the transmitter and the receiver had no effect on operation of the two units, and made it easy to separate the two units. Only two extra cables would have to be pulled out with the others if it became necessary to move the two pieces of equipment. This also eliminates the necessity of drilling holes in the cabinets. Cabinets can be quite expensive to replace if you ever wish to remove the modification. The way it is set up here, unsoldering a few connections and replacing the rather inexpensive SB-401 panel is all that is needed to restore both units to "stock" condition. I routed small-diameter RG-174/U coax from the switch to the spare jacks via the dial chassis cutout, and used RG-62/U between the two units. Both types of cable are available from Heath, but it is not necessary to use cables with those impedances because WA1FFO made similar modifications to his SB-400/301 using RG-58/U for all necessary cables with no ill effects.

Fig. 1 shows the modification that I have used on my SB-401/SB-300. I added dual receive mostly to see what it was like, and because I had a three-position switch handy. One word of caution: When in dual receive with the LMO mode switch in the LOCKED position, it is possible to transmit on two frequencies at the same time. While I don't

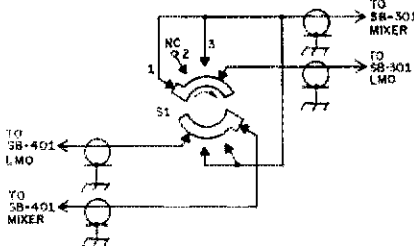


Fig. 1 - Dual-receive modification for the Heath SB-301/SB-401. In position 1, the receiver LMO controls the receive or transceive frequency, depending on the position of the LMO MODE switch. In position 2, the transmitter LMO controls the transceive frequency (LMO MODE switch in LOCKED position). Position 3 provides dual receive.

S1 - Rotary, 2-pole 3-position, ceramic.

know what the FCC thinks of this¹ it could lead to your downfall if one of the LMOs happens to be in a wrong part of the band for the mode you're using, or the license class you have. I do find dual receive useful sometimes though, and therefore have kept it. In position 1 of the new switch, transceive with the SB-300/301 (or split operation) is possible, depending on what position the LMO mode switch is in. In position 2, the transceive frequency is controlled by the SB-401 with the LMO mode switch in LOCKED. There is no output with the LMO mode switch in UNLOCKED. Position 3 is for dual receive.

There is a slight frequency shift in the receiver when switching from LOCKED to UNLOCKED due to the change in load on the LMO, but this is present in the unmodified form of the SB-301/SB-401 and is no worse after the modification has been added.

With a matching Heathkit knob and rub-on lettering, the final result is a very worthwhile modification. J.J. Ashburne, WA1JMR, 24 Northgate Rd., Wellesley, MA 02181.

SIMPLE AUDIO-DERIVED HANG AGC SYSTEM

Technical Editor, *QST*:

A few years ago, the author collaborated with WB6AIG and WA6RDZ in describing a solid-state receiver of modern design.^{2,3} As predicted in the conclusion of the paper, the receiver has continued to be in a state of design evolution. Major alterations have included updating the front end to use the now-common dual-gate MOSFETS, modifications of the product detector, and revision of the agc system as described in this note.

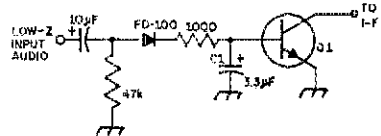


Fig. 2 - Portion of original hang audio-agc circuit. See May 1967 *QST*, p. 24.

In the original agc circuit shown in Fig. 2, audio from an emitter follower is rectified and the resulting dc voltage is applied to the timing capacitor, C1. This voltage is also applied to the base of Q1. The resulting increase in collector current of Q1 then causes a decrease in i-f amplifier gain. While this system worked well in steady-state conditions, it was difficult to obtain a good fast-attack slow-decay action. This results from the following effect: With no signal applied to the system for several seconds, C1 discharges through leakage paths to ground potential. If a signal is now applied, C1 must charge to about 0.5 volt before Q1 turns on and gain reduction occurs. The maximum voltage on Q1's base is about 0.6 volt

¹ The Commission's interpretation is that simultaneous transmissions of the same modulation or keying on two or more frequencies in the same amateur band is considered to be spurious radiation, in violation of Section 97.73 of the Amateur Radio Service rules. A station simultaneously radiating a signal on 14,215 and 14,292 kHz, for example, would be such a violation. - Editor.

² Daughters, Hayward, and Alexander, "Solid-State Receiver Design with the MOS Transistor," *QST*, April and May, 1967.

³ ARRL, *The Radio Amateur's Handbook*, pp. 145-149, 47th edition.

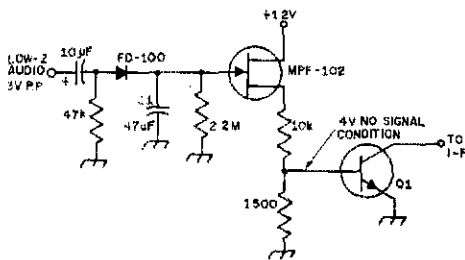


Fig. 3 — Improved agc circuit uses JFET. Resistances are in ohms; $k = 1000$, $M = 1,000,000$. The capacitor with polarity shown is electrolytic.

because of diode clamping. When the signal is removed, C1 discharges quickly through Q1 to 0.5 volt. However, subsequent discharge is slow, since the only path is through various leakage currents. The overall result during cw operations is that gain is adequately controlled during a long string of characters, but the attack time is too slow at the beginning of a dot or dash. The resulting "overshoot" leads to loop instabilities with very strong signals.

The problems of the original agc system were easily overcome with the circuit of Fig. 3. A junction FET is added as a source follower to isolate the timing characteristics from the gain-control stage, Q1. The resistors in the JFET source are chosen to yield a potential of about 0.4 volt at the base of Q1 during no-signal conditions. This voltage rises to about 0.55 volt before gain reduction starts, resulting in the usual agc "delay." A maximum audio voltage of 3 V pk-pk is required from a low-impedance source to operate the system. With the one-second RC time constant shown, full gain recovery occurs in about one-half second. The attack time in the author's receiver is determined totally by the rise time of the 200-Hz crystal lattice filter in the i-f amplifier. Performance is adequate to permit operation of an entire Sweepstakes contest with absolutely no manual gain adjustment needed.

Clearly, the system may be adapted directly to a reverse-age-controlled IC differential amplifier such as the RCA CA3028A. The addition of a pnp level-shifting inverter at the collector of Q1 would allow the system to be used with a forward-automatic-gain-controlled IC cascade amplifier such as the Motorola MC1550G. If a negative supply were available, the system could even be applied to a tube-type receiver. — Wes Hayward, W7ZOI, 7700 S.W. Danielle Ave., Beaverton, OR 97005.

GROUNDING PC-BOARD RIMS

Technical Editor, *QST*:

The case of unexplained hum and nulling difficulties in a Heath SB-400, reported by K6CA in Technical Correspondence (May, 1970, *QST*), may be the result of poor contact between the grounding-rim strip around the large PC board and the aluminum chassis. I have found that a film of oxide or tarnish develops between the mating surfaces after several years. The variations noted by K6CA from "things done to the microphone and cord" are a side effect of the poor ground and are not otherwise significant.

The condition can often be corrected, at least temporarily, by merely retightening the PC-board

mounting screws. In stubborn cases, the PC board could be removed and the mating surfaces thoroughly cleaned. The simplest expedient, however, is to mount small solder lugs on the most accessible screws (on the under side) and then solder the free ends of the lugs to the grounding portions of the PC board. — John B. Ferguson Jr., W3AEV, 336 Brookside Blvd., Pittsburgh, PA 15241.

HIGHER-SPEED RTTY OPERATION

Technical Editor, *QST*:

I recently read that higher-speed teleprinters are becoming available to amateurs, but that the FCC still maintains the 60-wpm rule for amateur service.⁴ I have seen no solution published to take care of this situation.

Regardless of a change in the allowable transmission rate, I believe that an electronic speed-changer would be the best solution to allow communication between RTTY stations of different machine speeds. The logic for such a circuit is not too complicated and should allow use of a standard gate and flip-flop ICs. The main circuit blocks would be:

- 1) A 2-kHz clock.
- 2) Frequency dividers for input and output baud rates.
- 3) A flip-flop commutator, read in at the input rate and reset at the output rate.
- 4) A switch operated by commutator reset signals through an OR gate and reset at the output baud rate.

A few of the details would be:

- 1) An input integrator-trigger circuit to reject noise.
- 2) An input enable circuit operated by a mark-space sequence and reset if a space occurs at STOP time (sync).
- 3) A control for the local transmitter-distributor, if it operates at a higher speed than the output rate.
- 4) A synchronizing system to empty the commutator at the right time.

Except for the integrator, all delays, pulse stretching, and so on, can be done with flip-flop counters and gates. Several approaches are possible with or without shift registers. Modules are available for parallel-to-serial and serial-to-parallel TTY conversion, so that any type of teleprinter should be able to send or receive at any baud rate, as long as the word rate does not exceed the machine's input capacity.

Perhaps some enterprising ham would like to look into the idea further, if such has not already been done. — Hal D. Randolph, W6VR, 1642 Blueberry Way, Tustin, CA 92680.

⁴There presently are two petitions before the FCC to authorize other than 60-wpm RTTY operation. One petition requests 60, 75, and 100-wpm operation, and the other requests 60, 67, and 100-wpm operation. To date, neither petition has been acted upon by the Commission. — Editor.

Changes of Address

Please advise us *direct* of any change of address. As our address labels are prepared in advance, please allow six weeks notice. When notifying, please give old as well as new address and Zip codes. Your promptness will help you, the postal service and us. Thanks.



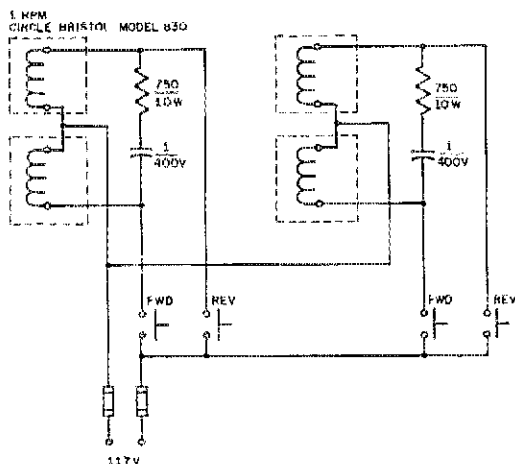
Hints and Kinks

For the Experimenter



REMOTE TUNING THE OMEGA OR GAMMA MATCH

Here is a way to tune the Omega or Gamma match without leaving the operating chair. Each variable is driven from a small one-rpm high-torque reversible synchronous motor. These motors are made by Circle Bristol Co. and can be purchased from Minarik Electric Co. in Los Angeles, California. The motors are 2 inches in diameter and 2 inches long. They operate on 117 volts ac and have friction clutches that slip at approximately 20 inch-ounces.



For reversing, each motor requires a 750-ohm, 10-watt resistor and a 1-uF, 400-volt capacitor. The two motors are mounted on the outside of the box as shown, with the shaft connected to the capacitor by means of a flexible coupling.

Five 16-gauge wires run from the motors to four push-button switches at the operating desk. The control leads at the antenna are run in a loop with the feed line to permit the beam to turn its full rotation.

For weatherproofing, two pieces of auto radiator hose were slipped over the motor and cemented to the side of the box. Covers for the end of the hose were cut from gasket material and cemented on with epoxy. A 1/8-inch hole was drilled in the bottom of each cover to prevent water accumulation.

Selsyn motors have been used for tuning the capacitors, but they require motors at each end -- one transmitter and one receiver. My method requires only switches at the operator end. -- Roy M. Landrum, W6IVT.

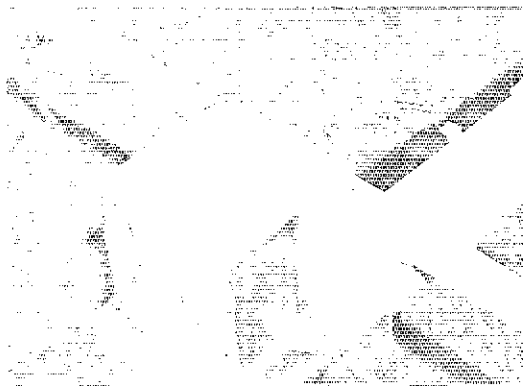
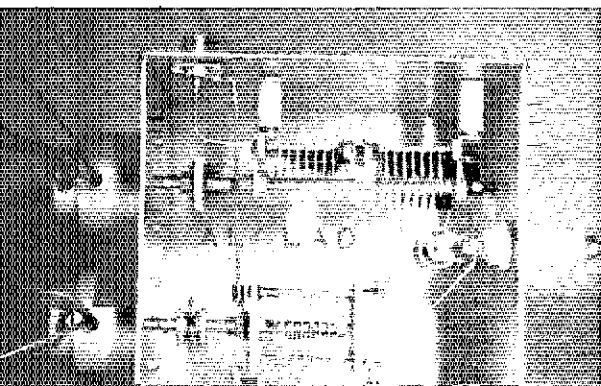
DRILLING SPEAKER GRILLES

Drilling a rack panel for a speaker grille, or preparing a chassis for ventilation in rf shielding can be difficult with a small hand-held power drill. This tedious task is simplified by using inexpensive Masonite peg board as a template. Simply drill two holes and attach the peg board to the work. A small piece of Masonite can be used repeatedly and can be kept on hand for just this purpose. It is an easy job to turn out professional-looking panels and rf shields when using this method. For intricate patterns, lines can be drawn on the Masonite connecting the holes to be drilled. -- Frank S. Lamb, K4ADI.

TELEPHONE INTERFERENCE

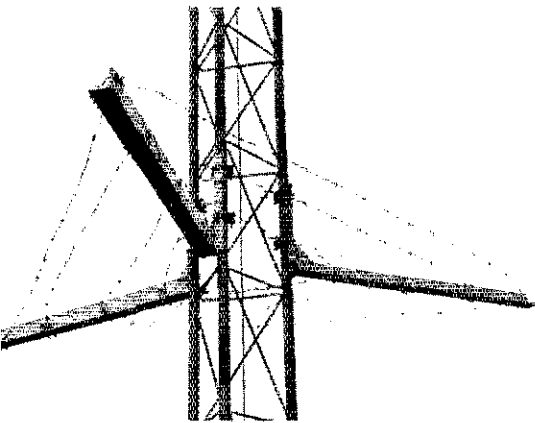
Since I got my linear amplifier I have had telephone-interference problems in my own house. I ran tests with Southern Bell Telephone Co., adding the usual capacitors and chokes, and even replacing the telephone wires in the house with shielded cable. No improvement!

Then I ran across an article in June 1966 *QST*, by James R. Balmer, W8KRS, describing the 425-RF network. I called Southern Bell and asked for one of these and found there is a newer edition for the 500-series telephones, a model 500J. Southern Bell installed the 500J filter and it completely eliminated my trouble. -- Bill Asbury, WB4GYZ.



PROTECTION AGAINST UNWANTED TOWER CLIMBERS

My 70-foot tower is located 250 feet away from the house, and in the summer is hidden completely by several trees and bushes. This is great for the aesthetic beauty of the property but caused great concern when I discovered that small children were climbing up and down the entire structure as a dare — hanging a red handkerchief at the uppermost point as proof! Chastising did no good at all as there were always new children arriving at the climbing age! The device shown has worked quite well for several years. Basically it consists of two pieces of angle stock approximately 3 feet in length — with a triangular reinforcing piece welded at the joint. Four angle cuts are made as notches in the upper part of the long pieces to anchor barbed wire which is strung around the arms. The whole affair is above reach to prevent anyone from unwinding the wire. The only disadvantage is the nuisance of having to take a small ladder to the tower when I want to climb it myself. Peace of mind, however, is excellent, knowing that no one will be killed by falling from my tower while playing "dare," or any other game! Entire cost was about \$15. — *Gene Hastings, W1VRK.*

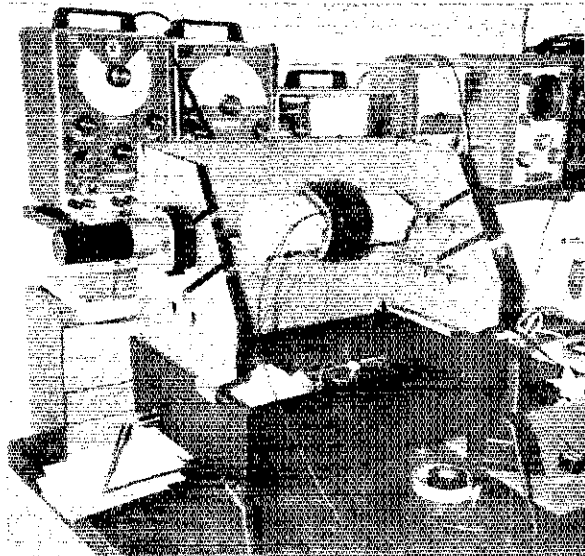


DUAL-FUNCTION COAX

To permit use of my mobile antenna when running the mobile rig on the workbench, I installed a length of RG-8/U from the cellar to the garage with a wall-mounted SO-239 on each end. Also, I use a short RG-8/U patch cable from the car antenna to the SO-239 fitting in the garage. As an extra benefit, I find this coax handy for piping 12 volts dc from the bench power supply to the car battery for an occasional overnight charge. — *Raymond DeMers, W2KVP.*

FOOT-SWITCH OPERATION FOR THE SB-401

A foot switch for both ssb and cw can be added to the SB-401 Heath Transmitter by inserting a 68-ohm resistor between pin 6 of V12 and the spare phono jack on the rear of the chassis. In order to activate the VOX relay on either cw or ssb, just ground the center pin of the phono jack with a suitable foot switch. This trick is especially useful for cw contests. — *Eddie Goss, WA3GVP.*



COIL WINDING MACHINE

After reading the article on how to rewind transformers,¹ I decided to tackle a bigger job than the one discussed. A battery-powered rotisserie which has a reversible motor designed for slow speeds made the job much easier. Winding my own power transformer not only saved me a lot of money, it made me feel like a real ham again. — *Celino F. Hernandez, WB4ILG.*

WEIGHTS FOR YOUR BUG

If your bug weights are too light to make the dots readable, take some lead sinkers (which can be purchased at most hardware stores) and flatten them to about 1/4 inch or so. The weights that I used in my case were of 1-ounce size. After the weights are flattened, saw a slit in the sinker and add it to the existing weight on the bug. — *Jeff J. Walters, W8SGNY.*

TILT-OVER TOWER IMPROVEMENT

To carry W1KUK's idea of an easy tilt-over tower a little further (Hints and Kinks, May, 1970) and to gild the lily, I mounted a boat winch on the base of the telephone pole, and ran the steel cable from the winch up to a pulley at the top of the pole, then out through another pulley on the tower and fastened the cable back on the pole. Thus, I have my raising and lowering mechanism always available. The boat winch has a 5-to-1 mechanical advantage, and the doubled cable between the tower and pole has a 2-to-1 mechanical advantage. It is easy for even the XYL to raise and lower my 50-foot tower with the quad and rotator mounted on top. — *Dick Morris, WA5WIT.*

WIRE SOURCE

A handy source for No. 14 through No. 6 solid copper wire is the wire sold for house wiring. Most hardware and Sears stores stock two-conductor plastic covered wire and it can be purchased in any length required. — *W1ICP.*

¹ McCoy, "How To Wind Your Own Power Transformer," *QST*, February, 1970.

The Operational Amplifier

In Two Parts

Part II — Some Practical Circuits

BY JULIAN M. PIKE,* WA9TCU

FOR the 20-dB gain shown, the response is flat to over 100 kHz. However, at 40-dB gain the response would be flat to just past 10 kHz, but stability should not be hard to achieve with proper circuit layout for any gain down to unity. There is much more to the frequency compensation picture, but this should suffice for beginning applications.

Circuit Information

Let's consider some actual working circuits and practical hints for experimenting. One of the first uses around the shack might be a dc amplifier to convert millivolts at microamperes into usable power to drive a voltmeter or panel meter. A circuit for such a device using the Fairchild μ A702 op amp is shown in Fig. 8. Note that this is a noninverting amplifier with gain control, and high input impedance. Note also that some guards are included to protect the unit from accidental destruction.

Two schemes protect from misapplication of power supply. The two diodes in the power-supply leads protect against wrong polarity, although they will cause some voltage drop. Supplies over +12 and -6 should best be avoided. The 20-volt Zener diode and 100-ohm resistors should protect against any accidental overvoltage, but would be unnecessary with proper batteries. Their use would be prudent with an adjustable power supply.

The 702 should not have over +1.5 or -6 volts applied to the input. For many applications, the input voltage will be on the order of millivolts. Input overvoltage protection can be obtained easily by the two silicon diodes if no inputs over about $\frac{1}{2}$ volt are anticipated. Larger inputs would be allowed by more than one diode in series, or a Zener.

A condition known as "latch-up" can occur when the gain is held to low values with heavy feedback. Saturation of the inverting-input transistor by a transient, so that no inversion takes

place and the feedback goes positive, can result in high current and eventual destruction. The silicon diode from pin 2 to ground prevents latch-up by limiting the voltage at the inverting input to about 0.7 volt. Note that other silicon diodes than the 1N914 can be used, but the very high resistance of a silicon diode below a half volt dictates avoidance of germanium diodes in these applications. They would suffice for power-supply polarity-reversal applications, however.

The 200-ohm resistor connected to pin 7 guards against accidental short circuit which could result in destruction in a matter of seconds. It will decrease the available output voltage slightly, however. It would also be wise to use an output load of several hundred ohms minimum.

With such a high-gain device, positive feedback with oscillation at megahertz frequencies is sometimes troublesome. Oscillation can usually be detected by a shift in output as a hand or screwdriver gets close to the circuit, and can be positively identified by looking at the output on a scope. Ceramic disc capacitors of .01 μ F or more across the power supply connections at the socket are sometimes necessary to prevent oscillation. The capacitor of .01 to 0.1 μ F connected from the output to pin 2 will greatly reduce the high-frequency response of the circuit (behaving as an integrator), and in so doing will help prevent oscillation. However, high-frequency response is of little use in driving a meter, for instance. The capacitor connected to pin 6 is used to give the aforementioned conservative frequency compensation. Other compensation arrangements can yield almost 30-dB gain at 50 MHz providing the circuit can be tamed!

The 25-k Ω gain control will adjust the dc gain from about 2 to 25. The 1000-ohm resistor in series with it limits the negative feedback, as well as limiting any current through the latch-up protection diode. Higher power-supply voltage can be used, and will mainly increase the linear output voltage available, although requiring

* National Center for Atmospheric Research, Boulder, Colorado 80302

Have a look at a device that, like other types of integrated circuits, will find an increasing number of applications in amateur gear. The article also shows some practical circuits that will give experimenters a start in the right directions.

more power. All in all, the circuit shown will drive the 0-1 mA 100-ohm meter to full scale on as little as 40 millivolts and have an input impedance of over 100 kilohms.

We will not attempt to discuss in detail nor give circuit values for many other chores that op amps can perform. They are fascinating to experiment with, but most certainly the protective measures outlined above should be taken until one gets good feeling for what he is working with. They may well be eliminated in final construction of a proven design.

Now, after all this fuss, shall we reveal the latest in developments? The Fairchild $\mu A741$ has been recently announced, and many of the precautions above are no longer necessary. It has built-in frequency compensation and will take 30 volts on the input. It won't latch up, and you can't destroy it by shorting the output. It takes less power than the 709, is a pin-for-pin replacement, and the price is about the same. If you cut your eye teeth on the 741, just think what you wouldn't have to know!

Active Filter

Not too obvious from our discussion thus far, but of such importance that it is sometimes included in a definition of an operational amplifier, is the ability to make a "passive" network "active". For example, a band-pass filter for audio frequencies needs bulky inductors, but a simple resistance-capacitance network used as the feedback element in an op-amp circuit may yield an active filter of superior ability. Such a filter might have a 3-dB bandwidth of 10 Hz at a 1 kHz center frequency. Both the Q (which determines the bandwidth) and the center frequency can be adjusted over wide ranges by variable resistances. No inductors are involved. The design of sophisticated filters is no easy matter. We may illustrate the idea, however, with a simple Twin-T feedback circuit, Fig. 9, to make an op amp into an active filter tuned to about 1200 Hz (a good cw note!). The formula for frequency at peak response is $1/(2\pi R_f C_f)$ which gives $R_f = 2.7$ k Ω and $C_f = 0.05$ μF , $1/2R_f = 1.35$ k Ω (use two 2.7 k Ω in parallel) and $2C_f = 0.1$ μF . The components in the Twin T should be fairly close tolerance for good performance, although in this simple filter the skirts will not be steep. It has a voltage gain of about 40 at resonance, and unity gain will occur at about one-half and 2.5 kHz.

Log Amplifier

Let's consider one last circuit which will illustrate how an op amp can easily perform a conversion one could find much harder ways of accomplishing. It will also illustrate the hookup of the 709 generation of amplifiers. The circuit is a dc logarithmic amplifier. It is particularly useful since decibels are logarithmic, and the output of a field-strength meter could be registered on a decibel scale if desired. The circuit is shown in Fig. 10.

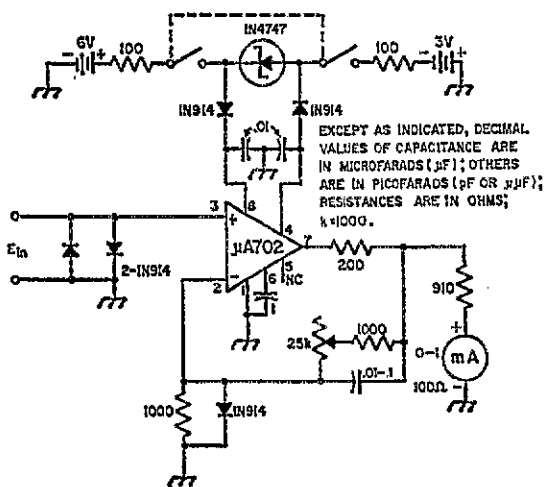
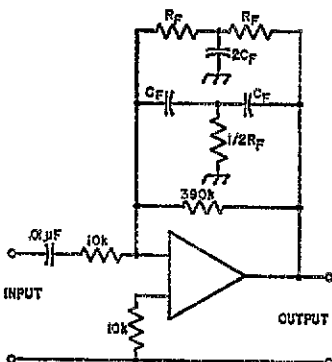


Fig. 8—A dc amplifier circuit using a 0-1 milliammeter for the measurement of small currents. Protective diodes are included. The 1N4747 is a 20-volt Zener diode for transient suppression.

Before discussing its log properties, let's dispense with a few standard details. Note the provisions to prevent instability, the 0.1-pF "integrator" capacitor across the 2N3904 which limits high-frequency response, and the two 0.1- μF power-supply bypass capacitors right at the socket, pins 4 and 7. Note also the components between pins 1 and 8 and the 200-pF capacitor between pins 5 and 6 for frequency compensation. This compensation is that specified for unity-gain operation. The 1N914 sets an upper limit on feedback voltage. The control marked "offset" adjusts the output to zero with zero input, thus caring for small imbalance in the 709. The control labeled "bias" supplies



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

Fig. 9—An active audio filter using a twin-T bridge as a feedback element with an operational amplifier. The constants for a given pass frequency can be determined as described in the text.

bias current which would otherwise be drawn from the signal and cause large error at low inputs. We will discuss the adjustment of these later.

A semiconductor junction can be shown from theory to possess a logarithmic current-resistance relationship. This is why you do not read the same values of diode forward resistance using different ohmmeter ranges, since the ohmmeter current changes with range. An accurate logarithmic relationship exists only at small values of current, but this current is quite adequate as a signal if the device is used as a nonlinear feedback element for a high-gain op amp. This is a good example of the op amp activating a passive network. The log signal from the 2N3904 alone would be useless; from the 709 it will drive a panel meter. Note that not all transistors will give a good log characteristic. Of several 2N3904's tried, there was some variation in output for given input, but good log characteristics.

Fig. 11 shows the dc characteristics of the amplifier. Note that as the input voltage varies from 0.1 millivolt to 10 volts, five decades in magnitude, the output voltage varies from 0.288 to 0.586 volt, or a change of about 0.3 volt. Note how accurately the points lie on the ideal straight line. Since this is semilogarithmic graph paper a true logarithmic relation plots as a straight line.

Let's see how the circuit is adjusted. The offset comes first and is adjusted for zero output when a jumper shorts pin 2 of the 709 to ground. Next apply 10 volts to the input. Start construction of a graph like Fig. 11, plotting the output against the 10-volt input. The 5-cycle semilog graph paper is available at engineering supply centers. Next, reduce the input to one volt and plot that point. You should be able to

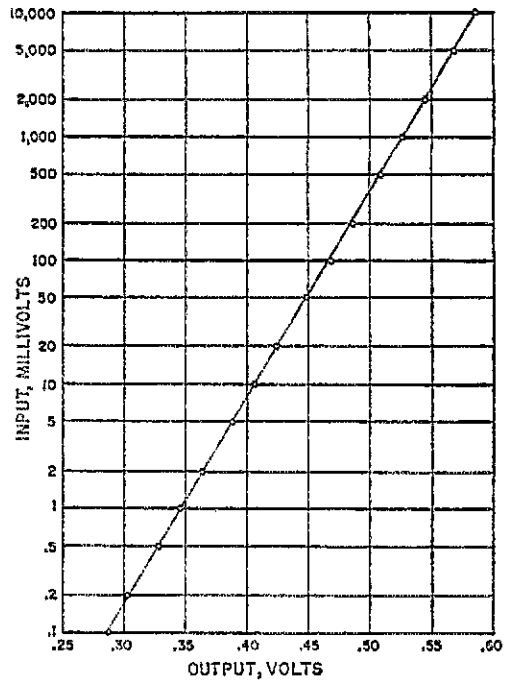


Fig. 11—The dc response of the amplifier circuit shown¹¹ in Fig. 10. The amplifier output voltage is almost exactly proportional to the logarithm of the input voltage over a 5-decade range.

spot the output at 0.1 volt input before you measure it by using a ruler through the first two points. Try it! From here it will require some ingenuity unless you happen to have access to some good lab equipment. You need an input of .01 volt, which you likely cannot measure with the shack voltmeter. Probably the best way is to use a voltage divider made of precision resistors. If you keep the resistances below 1000 ohms, the loading of the 100-k Ω input resistance of the log amplifier will not cause observable error. When you do obtain 0.01 volt, you will likely find it does not fit your growing straight line on your graph. You now *make it fit* as perfectly as possible by adjustment of the bias control. If the point lies to the left of the line, the bias current is too low. If to the right, it is too high. For complete adjustment, one should next connect 1 millivolt to the input, further adjust the bias for a point on the straight line, and finally the same procedure for 0.1 mV, although that point will be slow to come to equilibrium, and may be unstable. Note that things rather float around with *zero* input, since the logarithm of zero is mathematically undefined, and the amplifier is confused to say the least!

To put the amplifier to practical use an output offset is needed so that some zero dB reference at some particular input voltage can be adjusted to read zero on the meter. One could return

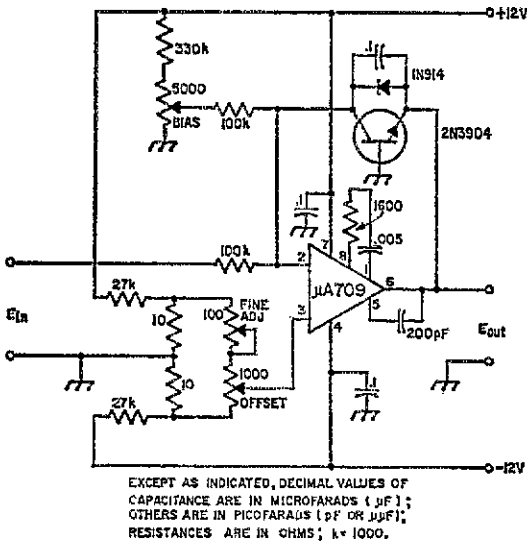


Fig. 10—Logarithmic-response amplifier using the μ A709.

the meter to an adjustable "bucking voltage" instead of ground, which would cancel out the $\frac{1}{2}$ volt or so if 1 mV were the reference. A much more elegant way would be to use a second op amp with the bucking voltage applied to one input, the log signal to the other, and a gain control included so that the meter can be set to full scale. Why don't you try your hand at design?

How would you set the meter full-scale reading? Note that each time the voltage input increases by a factor of $\sqrt{2}$, the power doubles, or goes up 3 dB. Likewise, 10 dB would be a power gain of 10 and a voltage increase (assuming constant impedance in the circuit) of $\sqrt{10} \approx 3.2$. Therefore if 1-millivolt input was called 0 dB, 1.41 mV would be 3 dB, 3.2 mV would be 10 dB, 10 mV would be 20 dB, 100 mV would be 40 dB and 1 volt 60 dB. This is an application of the formula $\text{dB} = 20 \log (V_2/V_1)$. Note that decibels will be linear across the meter dial. If one used an rf voltmeter on his 50-ohm matched line with a voltage divider for

say 10 mV into the log amplifier at a power level of 1 watt, 1 kW would be 30 dB or an input to the log amplifier of 0.32 volt. The meter scale should be divided among 30 equal decibel divisions and adjusted for full scale with 0.32 volt input. Be sure the voltage divider doesn't load the rf voltmeter, causing error.

Conclusion

These discussions and several examples should give one enough information to do some intelligent experimenting, and make good acquaintance with a capable and useful device. The consensus in solid-state electronics today is that although many of the devices brought out in the last decade have reached somewhat of a plateau in their development, this is still not so with operational amplifiers. One may look for improved performance, smaller errors, easier handling in circuits, and best of all, lower prices as time goes on.

Get your feet wet now! Op amps will be turning up more and more frequently in the ham rigs of the future! Q57

Strays

The IEEE Electronics and Aerospace Systems Conference (EASCON), to be held in Washington, D.C. (Sheraton Park Hotel) October 26-28 will feature a session of special interest to amateurs. Presented by W3GEY and K3JTE, the paper entitled "The Use of Satellites in the Amateur Radio Service as an Educational and Research Tool for the Developing Nations" will review pertinent work done with previous amateur satellites, and with plans for future amateur space experiments.

Wisconsin Week

If you qualify during the period of Sept. 20-26, 1970, you'll receive an award signed by the governor. Wisconsin hams submit their card with name, address and call of 10 or more out-of-state or DX contacts; U.S. hams same rules with info. on 5 Wisc. stations worked; DX stations (including VE/VO, KH6/KL7) with information on 2 or more Wisconsin hams. Submit log information and 25 cents for handling to the chairman, R.J. Draeger, WA9KNH, Box 2501, W. Allis, WI 53214.



The former president of Bolivia, Dr. Luis Adolfo Siles, on a recent tour of the United States, visited the shack of WA9VLI. Here, Dr. Siles is shown speaking to his wife (who was at the shack of CE3PR) while WA9VLI tunes the rig. (*Kankakee Daily Journal photo*)



Members of the Barbour School (Hartford, CT) Ham Radio Club display their finished transistor radio kits. Standing from left are Wayne Smith, Ronald Beckmen, Warren Gordan, Alexander Rolland, and seated are Trentton Mack, Gregory Anderson, James Gordan, and Diane Foxworth. W1CNI and K1VIK work closely with Bob Riddel, the school's science teacher. They say that the key of the success of the amateur radio club is

QST The 1970 ARRL National Convention amateur radio



modate the many hams visiting the convention from distant locations. Also on Friday the ARRL booth at the convention will be open with a full supply of publications and ham aids. The official registration booth will also open and tickets will be available for many functions (although the Saturday banquet, show & dance will probably be sold out by that time). *A word of caution:* at the 1966 National at Boston, over 225 banquet ticket requests had to be turned down because of late orders! A new aspect this year for FEMARA-sponsored affairs will be that registration will be required of all OMs 12 years old and older in order to gain entrance to the exhibits and meetings. YL/XYL registration is encouraged but not required.

A special 3-day AMSAT (amateur satellite) program will commence on Friday as an integral part of the convention. Friday night there will be a fun-night at the "bunny club," Playboy of Boston, which will include refreshments, a show and a steak dinner. There is only a limited number of tickets available however and those unable to obtain tickets may enjoy dinner at the hotel's famous Trader Vic's Polynesian restaurant where the food is superb and the service excellent.

Massachusetts Governor Francis Sargent has proclaimed the week of September 20th Amateur Radio Week in honor of the National Convention and in recognition of the public service performed by amateurs everywhere. In addition, a special talk-in station operated by the members of the Honeywell Radio Club from the 8th floor salon of the John Hancock building will be issuing commemorative QSL cards for contacts with W1DC/1 during the convention at approximately 3.935, 7.24, 14.3 and 50.25 MHz. The station will give detailed directions to the convention to those requesting same. Hours: Friday, 3-8 P.M.; Saturday, 7:30 A.M.; - 6 P.M.; Sunday, 7:30 A.M. to noon.

Program Highlights

Saturday and Sunday will feature full programming from 10 A.M. through 5 P.M. with as many as 8 concurrent sessions so as to please as many conventioners as possible. ARRL staff members will be in attendance commenting on the latest developments in ham radio - whether it be public service or transistor circuitry. The New England DXCC will hold their annual fall get-together as a part of this year's convention and will have a luncheon Saturday with a special guest DXer. There will be programs on repeaters, computers, the legal aspects of radio, commercial station operation, etc, plus a special program for SWLs on how to become a ham. The ARRL film *Ham's Wide World* narrated by Arthur Godfrey will be

NEW ENGLAND will play host to the 1970 ARRL National Convention September 25-26-27, and thousands of fun-packed minutes will be enjoyed by hams from all over the world as they visit historic Boston and the famous Statler Hilton Hotel just off Exit 22 of the Massachusetts Turnpike.

Most major manufacturers of ham gear will exhibit and answer questions about the latest in equipment. Leading engineers and technicians from the country's top industries will give talks on various subjects concerning the ham and his fascinating avocation - its variations and its problems!

There will be something for everyone - ham and SWL, YL and XYL featuring subjects ranging from DX to gas cooking! (Got to keep the YL happy!) A glance at some of the program highlights (see box) will indicate the variety of scope of the special programs arranged for this spectacular National Convention.

The convention begins Friday morning at 10 A.M. sharp with an air-conditioned bus tour to ARRL headquarters in Newington, Connecticut. The tour will include a nice luncheon and of course the return trip will be in plenty of time for the evening activities planned at Boston!

Also at 10 o'clock at the FCC offices at the famed Boston Custom House Tower you can begin examinations for General, Advanced or Extra Class. By special arrangement the FCC has agreed to extend exam hours through 3 P.M. to accom-

PROGRAM HIGHLIGHTS

Friday, September 25

Convention Opens

Registration

10 AM-3 PM F.C.C. Exams at the Custom House

10 AM Bus leaves for ARRL tour to Newington, Conn.

2 PM Ham's Wide World (Film)

3 PM Cooking Class & Film

4 PM AMSAT Satellite Program

5 PM Golden Years of Radio by Bruce Kelly W2ICE

6:30 PM Big Party at Boston's PLAYBOY CLUB across the street from the convention

Saturday, September 26

10 AM Registration; Exhibits Open

Lewis Collins — Moonbounce

Jim Fisk, W1DTY

YL Entertainment — Fun With Makeup

How Do Computers Work? (part one)

11 AM Repeater Operation Demonstration

Vic Clark W4KFC ARRL Advisory Comm.

F. O. C. Les Radnay, W1PL

12 N Repeater Operations on West Coast

Jim Green W1GT — Antennas & Height

Ken Cantrell K1OTA — DXpeditions

DXCC Luncheon

1 PM Lew McCoy W1ICP ARRL Technical

DX Propagation Forecasting

Collins Radio — Digital Voice "Mode of the Future"

YL/OM Historic Tour of Boston (2 hours)

2 PM Ed Tilton, W1HDQ ARRL VHF

Doug DeMaw, ARRL Technical Editor

3 PM Australis/Oscar 5 Results

Rule Making in Amateur Service

How To Become A Ham (For all SWL's)

4 PM A New DX Band Called Oscar

Combining a Commercial & Ham Station

Setting Up a Commercial Station

Sunday September 27

9 AM Special Folk Mass (Roman Catholic)

10 AM Registration; Exhibits Open

SEC & SCM Meeting

YL Program: "What to do when the rig blows up"

How Do Computers Work? (part two)

11 AM ARRL Forum, President Denniston, W0DX, N.E. Director

Chapman and visiting Directors

12 N Robert Booth, W3PS ARRL Counsel

Cal Hadlock, W1CTW Repeaters/FM

Slow Scan TV Demonstration

South Seas Luncheon for YL's

1 PM FCC, Washington, D.C.

AMSAT Forum (Satellites — 2 hours)

ECARS

2 PM Fr. Daniel Linehan, W1HWK

Army Mars (2 hours)

Ham's Wide World (Film)

3 PM Dr. Harold Edgerton, scientist

N.E. DXCC Special Program (2 hours)

YLRL Forum

4 PM Women's Program with Lew McCoy

Navy Mars

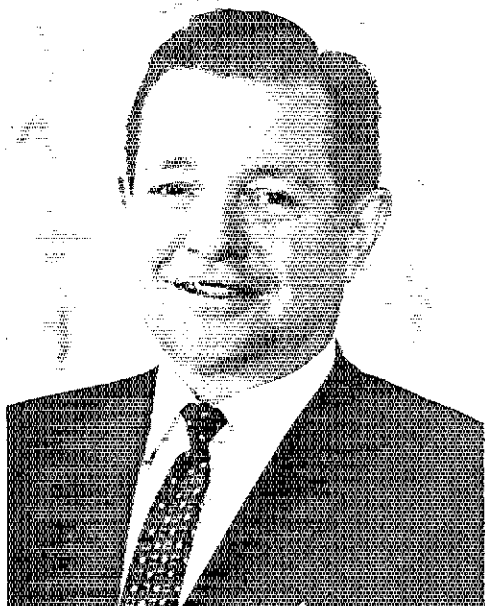
5 PM Special Presentations

Programs and Times Subject To Change.

Convention Program Book will have Complete Details.

Co-chairmen W1VRK and W1HKG; Program assistant WA1HPS gives some late revisions to program chairman W1MXC; Program committeeman W1ZOM and his XYL, K1BUF (who is YL chairman) during a lighter moment at a committee meeting; Special events co-chairmen W1ADD and K1ZLA; Ticket chairmen K1LDC and W1KCO; Committeemen K1CKS, K1LJN and W1EED; Prize assistant K1LTP and chairman W1BAB; Ticket committeemen W1THT and W1ZQQ.





Guest speaker at the banquet will be Dr. John F. Clark, the Director of NASA's Goddard Space Flight Center. He will present a fascinating commentary on our space programs and activities. The Center has a diverse mission that involves practically every aspect of the U.S. space program. Dr. Clark is a licensed radio amateur with the call W3GYH.

shown once each day. The W1/K1 QSL bureau will be on hand with thousands of unclaimed DX cards. There will be a CW contest with a nice prize for the winner - in addition to a QSL contest which also will offer a prize. A flea market - that is, a ham's market for ham gear - will be in full operation. Everyone is invited to bring some gear to display and hopefully return home with cash instead!

Saturday night is the "big time" when everyone is invited to the no-host cocktail reception at 5:30 followed by the fabulous steak banquet, dance and show. There will be a full course steak dinner (starting with lobster bisque) followed by some special award presentations including the Ham of the Year plaque presented to a ham nominated from within the ham fraternity for his contributions to ham radio. There will be dancing to a 10-piece orchestra followed at 10 P.M. by three sensational night-club style acts by top performers in their fields!

Sunday morning there will be an unusual religious service at 9 o'clock - a Catholic folk mass featuring a well-known Boston folk group. This should be of interest to persons of various faiths. A QCWA breakfast is planned as of this writing and it should be noted that several programs will be added as convention time approaches - far too late for inclusion in this article!

There are several programs for YLs during the convention - a cooking class by Boston Edison, a program on what to do when the rig blows up (and the OM isn't home), an historical tour of Boston for YLs and OMs too if they like, plus several YL entertainment sessions. The big YL feature will be the South Seas Luncheon Sunday Noon at Trader Vic's Restaurant right in the hotel. This will be an exotic array of delicious meat, fish and fruit delights served in such a manner as to entice the palate and enabling the diner to select her favorites! This deluxe treat is by ticket admission only and, since advance arrangements must be guaranteed, *tickets are available by mail only*. There will be a YL hospitality lounge where hot coffee and soft chairs will be available at all times both Saturday and Sunday. The central location of the Statler means that the many famous shops are at close walking distance too - OMs beware!

ARRL President Bob Denniston, WØDX will be co-chairman of the ARRL Forum Sunday morning at 11 with New England Director Robert York Chapman, W1QV. In attendance will be visiting directors and League officials from across the nation and from Canada: this is your chance to hear and be heard. The forum is an open discussion of ham radio and the League's participation in the growth of our service and hobby; inquiry and commentary is urged from all League members attending. At 5 o'clock on Sunday awards will be made, concluding the program.

Registration Procedures

Special reduced rates at the Statler Hilton have been obtained for this convention but they will not be honored unless you mention upon registering with the hotel that you are with the amateur radio convention and request the specially reduced rates. To make it easier, with all early bird tickets the committee is including a postage-paid hotel registration request card to be sent to the hotel on which you indicate the price range room desired and the dates you wish to stay overnight. Early bird registration is available by mail only and is \$3. per person (*vs* \$4.00 at the door). Registration is required for admission of all OMs 12 and older. Tickets to the Playboy reception are \$10 each. Tickets to the Saturday night steak banquet, dance and show are \$12 each including tax and tip and to the YL luncheon are \$3 each including tax and tip. Tickets for the ARRL bus tour and luncheon are \$13 each including everything on the trip and at headquarters. Checks should be made payable to FEMARA and sent along with a self-addressed stamped envelope to John McCormick, 372 Berkley Street, Taunton, Massachusetts 02780. It should be mentioned that ample parking is available at the Motor Mart Garage opposite the hotel, the Elliot Street Garage a block from the hotel and the Boston Common (municipal) underground garage at the common - about a 5 minute walk from the hotel (and least expensive by far!)

This will be the 11th consecutive ARRL convention sponsored by the Federation of Eastern Massachusetts Amateur Radio Associations.

☐

Hamfest Calendar

Florida - The Tampa Hamfest will be held this year on Sunday, October 11 at Lowry Park, Sligh Ave. and North Blvd., in Tampa. Fun for the whole family, lots of free parking. Plenty of sheltered space for swap section.

Illinois - The Peoria Area ARC will hold its 13th annual Hamfest Sunday, September 20 at the Exposition Gardens (the same place as last year) located on the Northwest edge of Peoria. Lunch will be available. There will be plenty of activities for the entire family, beginning with the campsite opening the preceding evening. Free coffee and donuts from 9:00 to 9:30 A.M. CDT. Free swap section, parking, contests, cartoons for the kiddies and, of course, the many eyeball QSOs. Advance registration \$1.50, at the gate \$2. For further details and advance registration write our registration chairman, Ferrel Lytle, W9DHE, 419 Stonegate Road, Peoria, IL 61614.

Indiana - The Hoosier Hills Ham Club will hold their Hamfest October 11 at the Spring Mill State Park near Mitchell, Indiana.

Massachusetts - The New England DX Assn. (NEDXA) will hold its annual banquet in conjunction with the ARRL National Convention on Saturday, September 26 at the Statler Hilton Hotel in Boston. A luncheon will be served and the principal speaker will be Bob Denniston, W0DX; slides of the recent Malpego Island DXpedition will be presented. On Sunday, September 27 from 3 to 5 P.M. in the Ballroom West, an open DX Forum will be held with Dale Strieter, W4DQS, presenting slides of the 1969 Navassa Island DXpedition. Also on Sunday, Ellen White, W1YYM, will conduct a DX Quiz. All DXers are welcome.

Michigan - The Tawas Ham-Fest featuring a gigantic swap and shop, equipment displays, banquet, Ham-of-the-Year Award and auction will be presented by the Iosco ARC on September 26 and 27 at Tawas City on US 23, 60 miles North of Bay City. Plenty of activities for the ladies - boat trips, air-base tour, ladies luncheon, and more. Bring the family for a weekend of fun. Additional information from Ham-Fest, P.O. Box 3321, Jeff. Sta., Detroit, MI 48214.

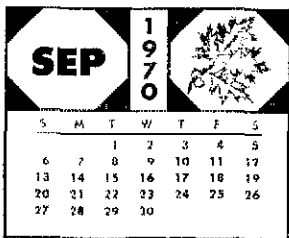
Michigan - The Monroe County Swap-and-Shop will be held October 11, indoors at the Monroe County Fairgrounds located on Highway M-50 four miles west of Monroe, Michigan.

New Mexico - The Albuquerque ARC and The Caravan RC of New Mexico will sponsor the New Mexico Hamvention at Albuquerque on September 18-20. Headquarters will be at the Holiday Inn East, East Highway 66. There will be a banquet on Saturday night in the main ballroom. Technical sessions, gabfest, flea market, and lots of fun for all. MARS and VHF FM Society meetings. Talk-in on 3,990, 7,293, 14,345, 29.6 MHz (a-m and f-m); 146.34-146.94 MHz repeater; and 146.94 MHz direct nbfm. For further information and registration contact Ray Hill, W5SDM, 9016 Los Arboles Ave., Albuquerque, NM 87112. Telephone: 505-299-1719.

New York - Canandaigua. A.W.A. National Historical Radio Conference, October 9 and 10 at Sheraton Inn on Canandaigua Lake. Talks by well-known pioneers, wireless demonstrations, auction of early equipment and magazines plus old-time entertainment. Special O.O.F.C. Meeting and Pioneer Banquet. Registration deadline October 1. Write for program and information from Lincoln Candall, W2QY, 69 Boulevard Parkway, Rochester, NY 14612.

New York - The Northeastern States 160-meter ARA will hold their annual election and banquet at the "K" and "D," Chatham, N.Y. on Saturday, October 10. Dinner at 6:00 P.M., \$3.00 per person. A flea market from 1 to 4 P.M. For further information write W1EUB.

New York - The Central New York Chapter of QCWA will hold its fifth Annual Banquet and Meeting on September 26 at the Treadway Inn Owego, Owego, N.Y., on Route 17C.



twenty miles west of Binghamton, N.Y. Cocktail hour and get together from 5 P.M. to 6 P.M., dinner at 6 P.M. sharp, followed by the business meeting and election of officers for 1971. Interesting guest speaker and live entertainment. Tickets \$5.50 per person. Deadline date is September 22. QCWA members from everywhere are invited. For further information and reservations contact Chairman Clark Galbreath, W2AXX, 111 Keeler St., Endicott, NY 13760, or Secretary Wendall Dunning, W2TS, 707 Wilson Avenue, Endwell, NY 13760.

Ohio - The Findlay Hamfest will be at Riverside Park on September 13. Tickets and info from Clark Foltz, W8UN, 122 West Hobart, Findlay, OH 45840. Tickets \$1. in advance, \$1.50 at the park.

Pennsylvania - The Anthracite Chapter, QCWA will hold its annual Banquet at the Hometown Fire Company, 2 miles North of Tamaqua on Pennsylvania Route 54. A Pennsylvania Dutch style ham and turkey dinner will be served. Reservations \$4.00 per person. All radio amateurs are invited to attend this affair. Time is 6:30 P.M., the date is October 3. Reservation from the Anthracite Chapter, QCWA, 211 Schuylkill Ave., Tamaqua, PA 18252. Reservation deadline is September 26.

Washington - The Walla Walla Valley RAC will hold its 24th annual all family picnic and hamfest September 26 and 27 at the Jefferson Park field house in Walla Walla. Swap and shop, contests, ARRL and homebrew and antique radio display. Annual meeting of M.I.N.O.W. and N.W. SSB groups. Lunch served at 12:30 Sunday with potluck, coffee and punch furnished. Free registration all day. Talk-in on 3,960, 29.6 and 146.760 MHz. For more information write Pat Stewart, W7GVC, 1404 Ruth Ave., Walla Walla, WA 99362

Strays

W6GCM was ready to raise a 62-foot wooden tower, with the help of family and friends on the guys. A tractor hooked to the cable slowly started raising the tower from its cradle. Hearing a scream above the noise of the tractor, OM Bush was utterly amazed to see XYL Doris slowly rising with the tower, her head nearly to the top of an adjacent prune tree. Safely back down, she said, "I wrapped the guy wire around my hand to get a better hold - and then couldn't let go!"

"One of my Novices in our school radio club called a WN4. Apparently the 4 didn't catch his call, because he came back 'WN1? My Novice, disappointed, said, 'Darn - he's calling WN1M!' Honest, I thought I was a better teacher than that when we took up code punctuation!" - WA1DJC.

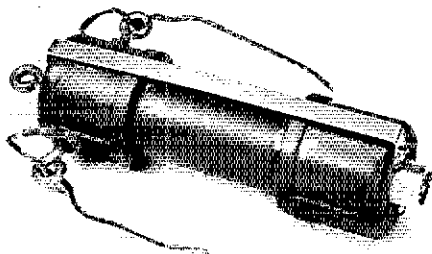
W4EVN sends a clipping which may explain the origin of a common ham abbreviation. Seems there is a traffic sign in China which reads, "When a passenger of the foot heaves into sight, tootle the horn trumpet to him melodiously at first. If he still obstacles your passage, tootle him with vigor and express by word of mouth this warning - Hi! Hi!"

• New Apparatus

New High-Power Balun

THE USE of stainless-steel hardware to reduce corrosion effects, and a nonconductive epoxy-based core to minimize high-voltage breakdown tendencies are features of two new models of Unadilla Radiation's "W2AU" balun. This popular product is now rated for use with transmitters running as much as 2 kW PEP. The manufacturer reports that the new models have been used successfully by government services at 2 kW dc input; Intended to match balanced antennas to coaxial feed lines, the balun is available in either 4:1 or 1:1 transformation ratios for use with 50- or 72-ohm coax.

The use of stainless-steel hardware will be appreciated by anyone who has tried to disassemble an antenna after it has been up in the air for a few years. Electrical connection to the antenna is made by means of two stranded copper leads which protrude from the balun. These leads should be wrapped (and soldered if possible) to the antenna terminals. An eye hook on the top of the unit is provided for center support of long dipoles. The feeder connection is through an SO-239 type connector. The balun



has a built-in lightning arrester, but the outer braid of the coaxial feed must be connected to a good outside ground before it enters the house to make this feature fully effective. The price for either model is \$12.95; additional information may be obtained from Unadilla Radiation Products, Route 7, Unadilla, NY 13849. — WIKLK

Simpson Century-Series Meters

IN THEIR new "Century Series" of general-purpose panel meters, Simpson Electric has developed a line that vividly demonstrates the advantages of scale readability to be found in square-faced designs. The clean-cut appearance of these instruments can be seen in the accompanying photograph. The outer case is made of phenolic and the window is glass. All of the "Century" meters have self-shielded movements, which are not affected by surrounding metal objects.

Amateurs who have purchased surplus meters and found that they read correctly only when mounted in 1/4-inch steel panels, will appreciate

the self-shielding feature. To check the shielding properties, a large horseshoe magnet was rotated around a 50-0-50- μ A Century-series meter. This test caused only the slightest flicker of the meter needle; a nearby transformer should not affect the performance of these meters.

A complete line of instruments is available, including voltmeters, dc ammeters, milliammeters, and rf ammeters. Ac models have magnetically-damped iron-vane movements, or a dc movement with a rectifier. The frequency range of the iron-vane types is 20 Kz to 1 kHz for reading current, and 20 Hz to 100 Hz for voltage measurements. The models using the rectifier/dc-movement combination cover 24 Hz to 10 kHz. The rf ammeters are accurate within one percent of the 60-Hz calibration frequency up to 1 MHz. Thus, these rf ammeters would have to be recalibrated on a higher frequency for accurate use in the amateur hf bands. The dc-current meters and ac iron-vane types have voltage and current accuracies of plus or minus 2 percent, while the rectifier types are rated at 3 percent.

Four case sizes, 1 1/2, 2 1/2, 3 1/2, and 4 1/2 inches, are available. All mount through a round hole in the equipment panel and are secured by four mounting studs. A template for cutting the required holes is included with each meter. Prices range from \$18 to \$25 for the models of interest to amateurs. Information on the entire line may be obtained by requesting bulletin 2081 from Simpson Electric Company, 5200 West Kinzie Street, Chicago, IL 60644. — WIKLK



10th World-Wide RTTY DX "Manitoba Centennial" Sweepstakes. October 16-18 1970

1) The contest commences at 0200 GMT Sat. Oct. 17 and ends at 0200 GMT Mon. Oct. 19, 1970. The total contest period is 48 hours but no more than 36 hours of operation is permitted. Time spent in listening counts as operating time. The 12 hour non-operating period can be taken at any time during the test but times on and off must be summarized on the log and score sheets.

2) The contest will be contact on the 3.5, 7, 14, 21 and 28 MHz. amateur bands.

3) Use the ARRL Country List, except that KL7 KH6 and VO are to be considered as separate countries.

4) The message is to consist of a message number, time in GMT, the band and country.

5) All two-way contacts with stations in one's own zone will receive 2 points. All two-way contacts with stations outside one's own zone will receive points as shown in the Zone Chart. (See page 54, Sept. 1970 QST.) Stations may not be contacted more than once on any one band. Additional contacts may be made with the same station if different bands used for each contact.

6) In honor of the Manitoba Centennial, a bonus of 100 exchange points will be added for every VE and VO station contacted. The bonus points are to be added to the total score.

7) A multiplier of one is given for each country worked including one's own on each band. (If one country is worked on 3 bands, then 3 multipliers are given.)

8) Log Sheets are available from CARTG on receipt of s.a.s.e. or IRCs. Use a separate page for each band. Logs must contain band, number exchanges, times in GMT, station calls, zones, countries, scores, exchange points, power input and rest periods. Logs must be received no later than Dec. 1, 1970. Send logs to: Canadian Amateur Radio Teletype Group, 85 Bifeshire Road, Willowdale, Ontario, Canada.

9) To score, the total number of exchange points is multiplied by the number of countries worked, times the number of continents (maximum 6). Finally, the "Manitoba Centennial" Bonus points are added to the total score.

Scoring Example

Exchange points 2020, countries 40, continents 5.

3.5 MHz.	-	5
7MHz.	-	4
14 MHz.	-	18
21 MHz.	-	10
28 MHz.	-	3
TOTAL	-	40

Score: $2020 \times 40 \times 5 = 404,000$ points, plus bonus points of 300 for final score of 404,300 points.

Awards

Plaques (10) will be sponsored by Manitoba CARTG members, *RTTY Journals*, (11) High Score U.S.A. Gold Medallion and ribbon by *RTTY Journals*, (12) Canadian High Score, Gold Medallion and Ribbon, Canadian Director's Award, (13) Green RTTY High Score (never participated in any RTTY contest), bronze medallion and ribbon by *RTTY Journal*, (14) 10 Meter High Score, silver medallion and ribbon by *RTTY Journal*, (15) High score for low-power station (under 100 watts input), a bronze medallion and ribbon by Manitoba CARTG members, certificates for two top scorers in each U.S.A. and Canadian District, and in each country. QST

Strays

QST congratulates . . .

Rickey Chapman, WN3LHN, and Chuck Swift, WN3LLZ for taking first and second place respectively in the Communications Sciences (Junior) Division of the Area Science Fair held at Maryland University.

J. A. Doc Gmelin, W6ZRJ, appointed AV/TV Media Coordinator for his school district, Sunnyvale, California.

David Ausley, WB4NCT, on winning first prize at the Martin College Science Fair with his entry of a homebrew 40-meter transmitter.

H. L. Schwartzberg, W3VOQ, appointed manager of the Improved TIROS Operational System (ITOS) satellite program at RCA Astro-Electronics Division, Princeton, N.J.

Edmond Metzger, W9PRN, elected School Board President in Springfield, Ill.

Adam Handy, WA8FSM, mayor of the city of Ewart, Michigan.

Johathan Eldridge, WA2CRE, on receiving the Marconi Memorial Gold Medal for his distinguished service in world and space communications.

Jim Bandy, WA3HKR, for taking second place with an Australis-Oscar Tracking Network in the Senior Division of the Area Science Fair at Maryland University.

Howard O. Lorenzen, W3BLC, selected as a Fellow in the IEEE for leadership and contributions to countermeasures technology.

Amateur Radio Club of Southwest Louisiana, cited by the Calcasieu Area Council of the Boy Scouts of America for 15 years of service to Scouts of Southwest Louisiana.

Herman Lukoff, W3HTF, on becoming a Fellow in the IEEE for pioneering in the development of digital computer and digital input and output devices.

— . . . —
The Windblowers VHF Society will sponsor their 16th Annual Big Blow Contest on September 26, 1970. The time will be from 1300 to 2000 EDST. A certificate will be awarded to those who contact W2ZDR/2 in N.J., W2RRP/2 in N.Y., WA2AU/1 in Conn., and W2ERZ/3 in Pa., all on 2 meters.

Results

June VHF QSO Party

REPORTED BY AL NOONE,* WAIKQM/WB6SAZ

DESPITE seemingly normal band conditions for this time of the year, the June VHF QSO Party certainly had its moments.

Sporadic-E activity on 50 MHz. was widespread throughout most of the country and while section totals were rising to hitherto unparalleled heights, multi-hop and scatter communication was providing many a station with that "rare new state." Conditions on 144 MHz. were good, but we could sure use more activity on this band. Particularly gratifying was the increased level of activity on 220 and 432 MHz. Section totals of 10 and more were not uncommon on these bands.

Logs were received from 412 stations in 70 sections representing 11 Canadian provinces and 1 foreign country. Certificates are scheduled for mailing on September 15th.

Leading off with the single-op multiband category, our congratulations go to WA5RMS in Miss, with a score of 16,740 (AB). Finishing a strong second was W2CRS in ENY, with 16,569 (ABCD). K3WJB in EPA, turned in the only other score above 16K with 16,116 (ABCD).

The rest of the Top 10 are as follows: K2OJD 13,992 (ABD); WB2YZV 12,750 (ABD); K9HMB 11,977 (ABD); K6YNB/6 11,592 (ABCD); K1AGB 11,130 (ABCD); WA2BBS 11,074 (AB); and WB5AEH 10,896 (AB).

Single band leaders were (50 MHz.) WA5VCF 14,651; WB4BND 11,400; WB6HIL/4 9282; WB5AJM 8405; and W7VDZ 7130. On (144 MHz.) WA2DPF 2520; WA2UDT 2400; W3LUL 2288; WB2VQK 2175 and W2UK 1936.

Canadian high scorer was VE5US (VE5UF, opr.) with 6072 on 50 MHz, while VE2JB/2 again takes 144 MHz. with 500 points.

The year 1970 must be a record breaker in the multi-op category with three entries exceeding 70K. Taking first place is WIDC/1, the 1200 Radio Club with a total of 75,030 (ABCDE). A close second was registered by W3CCX/3, the Mt. Airy VHF Radio Club, with 74,272 (ABCDE) and WA2WEB/2, the East Coast VHF Society, came in third with 71,200 (ABCDE). Other excellent scores were contributed by WAIMUG 67,554 (ABCD); W2UFT 61,855 (ABCDE) and W2JKI 61,030 (ABCD).

High Canadian entry this year is VE3CWT/3 with 14,632 (ABCD).

A word of thanks to Bill, KØCER and crew of the KL7ABR expedition to Ketchikan, Alaska and to Bob, W4GDS and the gang at ZFIRS on Grand Cayman Island. You can be assured that

your efforts are greatly appreciated by the many who QSOed you for a "rare new one."

In passing, I would just like to mention two items of interest. A note detached from the log of K2OJD states, "Look for me (FPØCA) during the September brawl. Also, amateurs using the 50 MHz. band are asked to look for OX5AP, Thule, Greenland, who is making five minute transmissions on the hour, from 2200 to 0200 GMT daily. These transmissions are on 50.15 and will continue through this year, except for the period of August 5 through 14. He will listen for 6 meter signals in the 5 minutes after each test. OX5AP is available for 144 MHz. schedules between 2100 and 2200 GMT. Please report any reception or two way communication on 50 MHz. to ARRL, CU in September.

SOAPBOX

Enjoyed the contest very much including the competition from several locals. The band (50 MHz.) opened up in the afternoon of the 13th and the morning of the 14th. — W2OW, WNY. New antenna really works. — W3KWH, WPA. Apparently no one in Connecticut with crystal-controlled 1296 MHz. gear. — WA2VTR, ENY. Thanks for a great contest and hope to work in all of them. — WA5YRS, Ohio. Could you schedule more activity during the September affair? — WA8YYW, Mich. Our 4000 foot elevation was great but we were invaded by the dreaded "fog moth" which slithered out of the valley to obscure our vision and increase our SWR! — WB4HEL/4, Tenn. The two largest band openings I have ever heard occurred during the contest. — WA5RMS, Miss. This was my first contest and I picked up a lot of good experience. — WB5AJM, La. Heard VP7, KP4, ZF1 and XE2. I managed to work the VP7. I would like to see each foreign country count as a multiplier. — K9KFR, Ind. First contest I have ever worked, all contacts were A3 mode. Lots of fun. — WA9AKS, Ill. Band opened to FF1a on Saturday with a few sporadic openings on Sunday. — WA3IEM, EPA. Worked three new states for WAS and was particularly happy with a VE4 and VE3 and ZFIRS on Grand Cayman Island. — WA3KLF, MDC. Band conditions in general were rather good during my periods of operation. — W2REB, SNJ. Worked four states on 1296, best DX was WIGAN. — K2JNG, NNJ. Managed 38 QSOs, not had for 1 watt! — WA2KJJ, NLI. This is my 30th consecutive VHF contest on 2 meters, still going strong! — W2KXG, NLI. Highlights on 50 MHz. were QSOs with Arizona, Idaho and the West

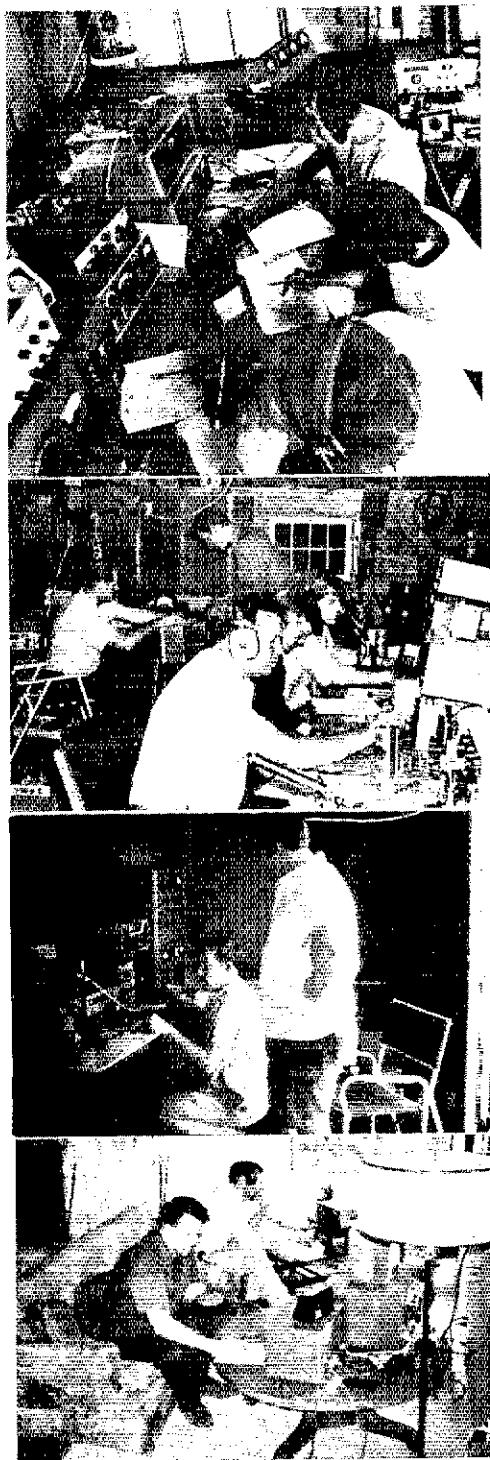
* Communications Assistant, ARRL.

Indies. — W2UFT, ENY. It seems our funny call letters didn't hurt us much; in fact, they sometimes came in handy. We hope to be on again in September with an even better station. — WA1MUG, WMass. Heard Oregon and Montana but no contacts. — K1GYT, Vt. Operation from Rhode Island sure is different from NNJ! — WB2GKE/1, R.I. Limited use of 146 and 449 MHz. FM helped. All contacts were direct. — W1DC/1, NH. Highlight was our contact with K4GL via random meteor scatter! — W1AZK, NH. Contacting W6ANN was my biggest thrill of the contest! — W1GJZ, Maine. Not quite like June 1969, but fun as always. — K1AGB, EMass. Conditions poor except for a 2 hour opening to Texas on Sunday morning. — W0NXF, Nebr. Six meters open all day Sunday but never farther east than Missouri and Iowa. Very disappointed with the lack of Double-Hop to the East Coast. — K5EFW, NMex. Our successful effort on 432 MHz. was the high point of our entire operation. — K4RKA/8, WVA. Two meter cw is where the action is! — K2UOP/4, VA. Very pleased to work into New York and Massachusetts, but feel the potential of the opening was not realized by many. — W6KQG, SCV. If I win this one, it will be all 3 VHF contests in a row. — WA6CPP, SJV. Wish we had more activity on 220 MHz., there was only 5 of us on in Northern California to my understanding. — WB6TJO, SF. Only signal heard out of the East was WB2LZD/3. — K7ICW, Nev. Operated from San Juan Island in Puget Sound. This was my first contest and the scatter contact with Alaska was very exciting. — WA7BAY/7, Wash. June 14th gave us some good openings into the East Coast and for the first time I have worked into the New England states. — K7WXW/7, Ore. The 28 hour restriction penalizes those of us who depend almost 100% on band openings to work anyone. Otherwise, I enjoyed it and hope to do better next time. — W7JRG, Mont. Made 68 QSOs in the first hour but that rate sure didn't last long! — VE5US, Sask. All things considered, the northern latitudes had very poor conditions. Nothing heard from KL7 and VE8 land. — VE6AHE, Alta. 50 MHz. Es to W6 and mid-west sure came in handy. — VE7ANP, BC. Six meter activity was good with contacts from the Bahamas through to Seattle, Wash. — VE3VHF/3, Ont. Conditions for both Es and Aurora on six meters were down from previous years here, but good conditions for making people work for contacts. — VE2AIO, Que. One of the big thrills of the contest for me was when VE6AHE answered my CQ! — WA51YX/5, STex. Finally got my 220 gear working. — WA5ZVI/5, Okla. This was our first mountain top experience, sure is nice to be wanted! — WB6WKC/6, SBar.

SCORES

In the following tabulation, scores are listed by ARRL divisions and sections. The top single-operator scorer in each section receives a certificate award. Multiple-operator scores are shown at the end of each section tabulation; in sections where at least three such entries were received, the top multiplier scorer receives a certificate award. Asterisk following call indicates Headquarters staff member, ineligible for award.

Columns show final score, total number of contacts, section multiplier, and bands used. A represents 50 MHz.; B, 144 MHz.; C, 220 MHz.; D, 432 MHz.; E, 1215 MHz. and above.



Above are but a few of the many multi-op stations which abound in the June party. They are (top to bottom), WA2WEB/2, W1ZGO, VE3CWT/3 and WA6JUD/6.

ATLANTIC DIVISION

Delaware

W UCGV 7260-118-48-ABCDEF
 W 3RRU 677 48-14-AB

Eastern Pennsylvania

K 3WJE 16,106-29-51-1-ABCD
 K 3WKY 6280-184-40-ABC
 W 00Y1 1493- 61-23-AB
 W A 3LAI 131-9-101-1-3-A
 K 30BU 2886- 82-19-6
 W 160A 720- 48-15-A
 E 3ATI 297- 27-11-A
 W A 3KXK 271- 34- 8-K
 W A 3MIE 248- 31- 6-A
 W A 3KIT 188- 41- 6-A
 W A 3LZB 150- 30- 5-A
 W A 3EYD 116- 27- 5-AB
 W A 3LUV 64- 21- 4-A
 W A 3RKY 76- 19- 4-AB
 W 3CCX/1 (26 ops.) 78,272-714-88-ABCDE

W 3AD/1 (16 ops.) 25,474-327-69-ABCDE
 K 0MTK/3 (9 ops.) 20,010-344-58-ABCD
 W 3ARW (K 3SQD,W 3JG1) 12,544-191-56-ABCD
 K 1S1E/3 (+K 1LUG) 910-177-45-ABD
 W 3LZD/3 (+W A 2OPT,W 3LZLU) 9540-722-43-AB
 W 3HZU (5 ops.) 4422-127-33-ABC
 W A 3JEM (+W A 3JGV) 2088-116-18-AB
 E 3JRO/3 (+E 3R1N) 4178- 62-19-AB
 W A 3AD/1 (8 ops.) 580- 58-10-AB
 W 3DGB/3 (K 3VOI,W A 3J1E) 450- 50- 9-AB

Maryland-D.C.

W A 3KLE/1 7344-184-41-AB
 W 3KMW 4000-145-28-A
 W 31UC 7280-104-22-B
 W A 3HEN 800- 74- 9-B
 W 31MZ 392- 28-14-B
 W 3GN 316- 42- 8-A
 E 3MD 218- 27- 6-A
 W 3MAB 186- 27- 6-A
 W A 3JML 146- 47- 4-AB
 W 3MSN 98- 11- 6-AB
 W 3SOA 18- 6- 3-B
 W 3JEL 8- 3- 2-B
 W A 3NUL (5 ops.) 17,394-262-46-ABD
 W A 3MDR (+W A 3H1) 11,332-242-46-AB
 W 3PGA/3 (5 ops.) 10,530-218-45-A1H
 W A 3NPD (3 ops.) 450- 50- 9-B

Southern New Jersey

W 2REB 4940-130-38-AB
 W 3NYK 1071- 56-17-ABCD
 E 2QPN 680- 58-16-A
 W 32VI D 516- 43-12-AB
 W 3BLV 374- 17-17-D
 E 2BWR (+E 2ZKJ)
 W 3B1QJ (+W 3BHM)

Western New York

W 2UCZ/1 4806-178-27-A
 W 2CNS 4257- 90-43-ABCD
 W 2WGL 688- 47-14-B
 E 2ACO 580- 25-11-0
 E 32KNI 277- 27-11-AB
 W 2HMC 278- 36- 7-AB
 K 2JZF 40- 8- 5-B
 W 2MYN 30- 15- 2-B
 W A 2MDL 1- 1- 1-B
 W 23W (11 ops.) 18,100-281-60-ABCD
 W A 2VMB (4 ops.) 7184- 91-24-AB
 K 21ER (+W A 2LAI) 1349- 71-19-AB
 W A 2KQJ7 (+W A 2YH,W 3BMS) 1296- 72-18-AB

Western Pennsylvania

W 3BWD 2244-102-22-AB
 W 3DJM 810- 54-15-AB
 W 3KWH (5 ops.) 12,420-266-45-A1H
 K 3HK/2 (6 ops.) 3786-177-46-ABCD
 W A 30BU (+W A 31AL) 1260- 60-21-AB

CENTRAL DIVISION

Illinois

E 3HMR 11,977-300-59-ABD
 W 3A1 4410-176-45-AB
 W 31ET 1628- 74-22-AB
 W A 31TH 1386- 60-21-AB

W A 3VOX 384- 64- 6-B
 W 31VZ 245- 69- 4-AB
 W A 3AKS 360- 65- 4-B
 W 33QPM 244- 61- 4-AB
 K 3VTF 191- 36- 5-AB
 W A 3FKI 132- 31- 4-B
 W 3000P 44- 22- 7-A
 W 33YV 181- 18- 1-B
 W 33YZD 18- 15- 1-B
 E 3YH (5 ops.) 8349-244-13-ABD

K 3DPT (+W A 2ZT) 301-131-23-AB
 K 3EQL (+W 3E SMC) 281- 71-11-AB
 W A 3QZ (+W A 3QAD) 310- 61- 5-B
 W A 3ML/9 (6 ops.) 159- 5- 3-B

Indiana

K 3KFK 7631-191-41-AB
 W 30HD 3360-120-28-AB
 K 3OCR 2200-110-20-AB
 W 3RRZ 1677- 88-19-A
 W A 3YXA 600- 60-10-A
 K 3GMI 458- 39-12-A
 W 301F 378- 61- 6-B
 E 3LSE 138- 23- 6-A

Wisconsin

K 3R1E 2160- 80-27-AB
 W A 3ZLU 264- 72-12-A
 W A 3SDC (+K 30YK) 16,112-304-53-AB
 K 3UUT (+W A 3U VAS) 258- 51- 8-B

DAKOTA DIVISION

Minnesota

K 3PWR 3780- 76-30-4
 W A 3SBZ 2250- 90-25-A
 W 3PHD 705- 47-15-A
 W A 3RUF 476- 13-14-ABD
 W 3PABM 46- 16- 4-A

North Dakota

W 3GNS 3570-119-30-A

South Dakota

W 3RHZ/9 (+W A 3QLE) 1764- 84-21-A

DELTA DIVISION

Arkansas

W A 3NOB/5 (5 ops.) 13,462-254-53-AB
 W A 3VLE 14,651-299-09-A
 W 3A1H 10,886-277-48-AB
 W 3AMJ 6405-203-41-A
 W A 30BX 3800- 95-40-A
 W 31EB 510- 34-13-AB

Louisiana

W 3ASRMS 16,740-310-64-AB
 Tennessee 8240-206-40-AB
 E 34LUV 1178- 59-19-ABCD
 W 3GLS 1070- 66-15-AB
 K 40WH 51- 17- 3-B
 W 34HEL/4 (4 ops.) 8174262-31-AB
 W A 4ZXB/4 (+K 4FRO) 7480-220-34-AB
 W 3SG (5 ops.) 6596-194-34-AB
 W 3AAS/4 (+W 3A1G) 3302-127-76-AB
 W A 4BZ (4 ops.) 1300- 65-20-AB

GREAT LAKES DIVISION

Kentucky

W A 3TFF/4 2,892- 92-27-ABD
 Michigan 4794-141-34-AB
 W 3R1U 980- 56-18-A
 W A 3YV 900-101- 9-B
 W A 3LKD 382- 49- 8-B
 W A 3V 390- 36-10-ABD
 W 3DBL 306- 44- 9-A
 K 3NND 264- 44- 6-B
 W 3ABLY 245- 81- 5-B
 K 3ZND 3- 1- 1-B
 W A 3ZFE (4 ops.) 377- 79-13-AB
 Ohio 1549- 81-10-A
 W 3RFXI 1480- 74-20-AB
 W 3WEM 473- 43-11-B
 W 3A1RS 278- 25-11-A
 W 3RCKI 252- 36- 7-AB
 W 3RCCQ 245- 35- 7-A
 E 3DIZ 132- 22- 6-AB
 W 3E1D (+W A 3BGE) 94- 16- 4-A
 W 3RAC 45- 15- 3-A
 W 3SCT (9 ops.) 30,624-455-66-ABD

K 3BMM (+K 30HK,W A 3LRE) 22,361-370-50-AB
 W A 3PL/1 (1 ops.) 70,888-364-56-ABD
 W A 3ZVY (+W A 3ZUO) 1504- 94-16-AB

HUDSON DIVISION

Eastern New York

W 2CRS 16,569-232-63-ABD
 W 3VQL 7175-145-15-B
 W A 1G1/2 912- 76-12-B
 W A 3VTR 392- 20- 8-0L
 W 3MH 35- 7- 5-BC
 W 2DET (6 ops.) 61,885-600-89-ABCDE
 W 2KJ (10 ops.) 61,030-638-85-ABCD
 W 2F KJ/2 (16 ops.) 32,388-889-85-ABCDL
 W 2FKJ/2 (7 ops.) 17,613-287-87-ABCD
 V 3JZAR/W2 (12 ops.) 5346-162-43-AB

New York City - Long Island

W 32YV 12,750-230-51-ABD
 W 32BV 11,074-226-49-AB
 W A 3W 2530-180-14-B
 W A 2PMT 1820-140-13-B
 W A 2EUS 1748- 61-23-ABD
 W 3GWTU 1712-107-16-AB
 E 2R1W 936- 30-12-B
 W 3TUT 300-101- 9-0
 W 2KJK 587- 71- 8-B
 W 3HOT 296- 37- 8-B
 W A 2KJ 250- 18- 4-B
 W A 2NR 140- 35- 4-B
 W A 2KD 100- 25- 4-B
 W A 2YJ/2 (2 ops.) 10,320-241-40-ABD
 W 2RAK/2 (5 ops.) 6733-198-44-AB
 W 2IGT (4 ops.) 3800-163-30-AB
 W 2OQI (4 ops.) 3699-137-77-AB

Northern New Jersey

K 2OJD 13,982-281-53-ABD
 K 20WR 7366-254-29-AB
 W 3P2P 2582-108-34-A
 W A 2UD 2400-160-15-B
 W 2UK 1936- 89-22-B
 W 2CVW 1804- 76-23-ABD
 W 2AQI 1547- 91-17-B
 W 3HVF 572- 52-11-B
 W 3OMS 520- 20-11-0
 K 2JNF 460- 19-10-BDF
 W A 2ICX 144- 42- 8-AB
 W A 2I1H 297- 32- 8-B
 W 3LW 178- 35- 5-B
 W 3ZSW 156- 13- 6-B
 W 3HMT 180- 30- 5-R
 W 3ZLI 42- 14- 3-B
 W A 2WER/2 (17 ops.) 21,200-692-89-ABCDL
 W 2PE/2 (9 ops.) 29,568-437-64-ABCD
 W 2ECL/2 (4 ops.) 16,564-404-41-AB
 E 2DEL/2 (11 ops.) 15,457-377-41-AB
 W A 2YXQ (4 ops.) 1196- 92-13-AB
 W 2EWC (+K 1PTY) 111- 49-19-AB
 W 3EJN (+W A 3AHH Y3N) 176- 22- 8-AB
 W A 2UD (2 (+W 3J1N)) 30- 15- 2-B

MIDWEST DIVISION

Iowa

W 3PFP 1240- 90-16-A
 W 3JIG 660- 44-15-A
 W A 3QIH 154- 14-11-A
 W A 3UPS 147- 21- 7-AH

Kansas

W A 3PR (+W A 3PKG) 5007-143-49-AB
 Missouri 5184-106-48-ABD
 W A 3YWS 96- 34- 4-AB
 W 3KC 48- 12- 4-AB
 W A 3NQ (5 ops.) 3510- 89-30-A
 Nebraska 1034- 47-12-A
 W A 3RKO 308- 22-14-A
 W 3NXT 178- 16- 8-B

NEW ENGLAND DIVISION

Connecticut

W A 101 4026-115-33-ABC
 W A 1EJ 8610-127-30-AB
 E 1HTV 3528-104-28-BD
 W A 3N1 3400-154-20-AB
 W A 3H1 1743- 83-21-A
 W 3WHL 1206- 67-18-AB

W 10T (W 1ZUO) 787- 80-12-B
 W 10T 740- 14-20-ABC
 W 1NZ 671- 61-11-B
 E 1MP 520- 26-10-D
 W A 1LO 490- 49-10-A
 W 1JL 432- 48- 9-B
 W 1NH 98- 14- 7-B
 W A 1CS 78- 13- 9-A
 W A 1PP 570- 14- 6-AB
 K 10UX 7- 2- 1-A
 W A 3EHR/1* 1- 1- 1-A
 K 1PXL/1 (6 ops.) 43,055-477-79-ABCD
 W A 10X (14 ops.) 53,300-410-74-ABCD
 W 1LUA/1 (3 ops.) 9790-244-40-AB

Eastern Massachusetts

K 1AGB 11,130-177-33-ABCD
 W 1EJL 10,780-204-47-ABCD
 W 10XX (K 4GL) 3975- 91-31-BCD
 K 1CHY 2706-116-18-ABC
 K 3AOP/1 1512- 36-21-BCD
 E 1HBY/1 850- 85-10-AB
 K 1VEV 840- 84-10-AB
 W A 1WB 567- 81- 7-A
 E 1J 543- 82-10-B
 K 1COS 481- 69- 7-A
 W 10OP 420- 12-12-BCD
 W A 1GAK 516- 27- 8-AH
 E 1DRI 48- 10- 4-BE
 W 1CTR/1 18- 6- 3-B
 W A 1RYK (+W A 1RY) 316-138-22-A
 W A 1HUD (+W A 1MHU) 1321-111-11-AB
 Maine 3978-106-34-ABC
 W 1GJZ 2407- 83-29-AB

New Hampshire

W A 1KX/1 4672-144-32-ABCD
 W A 1CTR 2200- 88-23-AB
 W 1EJM 1136- 71-16-B
 W A 1ZK 465- 10-13-BD
 W A 1CD 366- 36-11-AB
 W 1DC/1 (19 ops.) 25,030-853-82-ABCDE
 K 1HDD/1 (2 ops.) 3330-159-21-AB

Rhode Island

W 1POP 708- 59-12-B
 W 1BGEK/1 (12 ops.) 38,850-492-74-ABCD
 W 1ZGO (8 ops.) 30,624-432-66-ABCD

Vermont

K 1GYT 6440-161-00-AB
 K 11JG 263- 23-11-B
 W A 1B 64- 8- 8-A
 W A 1DLA/1 (8 ops.) 9250-250-37-AB
 W 1MX/1 (2 ops.) 4368-177-78-BC
 K 1R1D/1 (2 ops.) 1292- 68-19-AB

Western Massachusetts

W A 11HN 8692-212-41-AB
 K 1LHX 692- 23-17-BCDE
 W 1UCR 78- 13- 6-AB
 W 1FME 64- 16- 4-B
 W A 1MIG (20 ops.) 67,544-759-81-ABCD
 K 1YLU/1 (7 ops.) 22,550-410-50-ABCD
 K 10X/1 (7 ops.) 1010-101-10-AB
 W A 1LLI (+W A 1S JUY) 638- 58-11-B
 K 1TEA/1 (+K 1IPT) 403- 31-13-AB

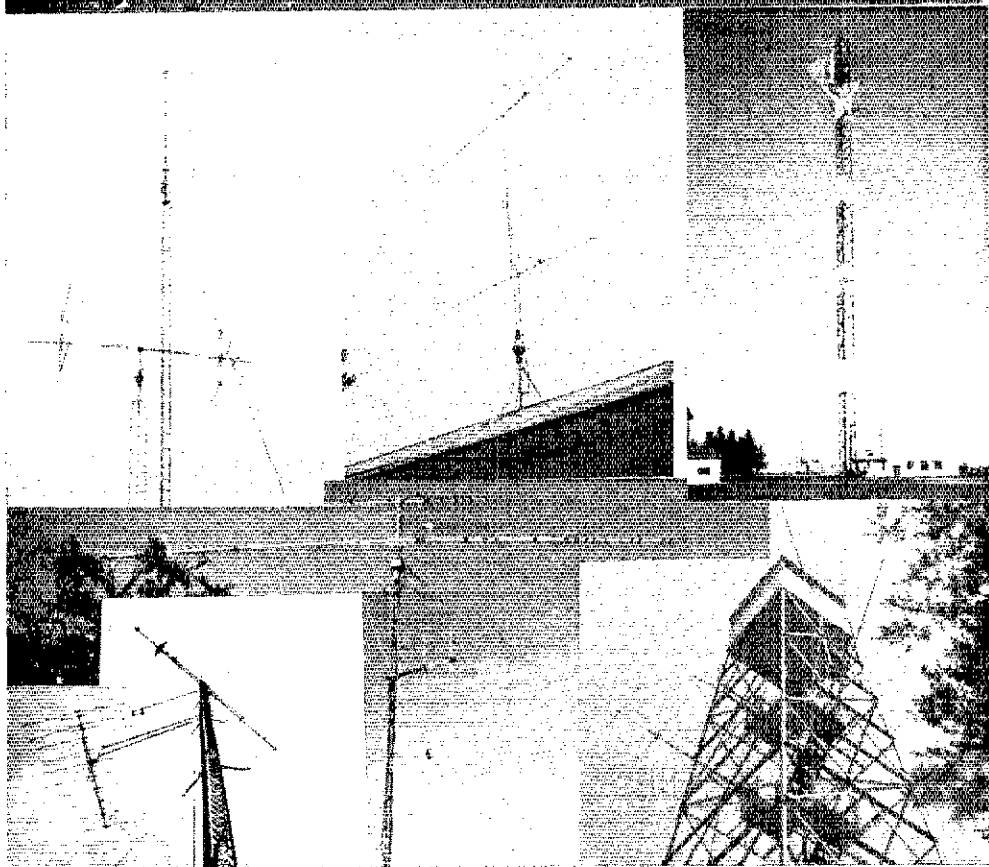
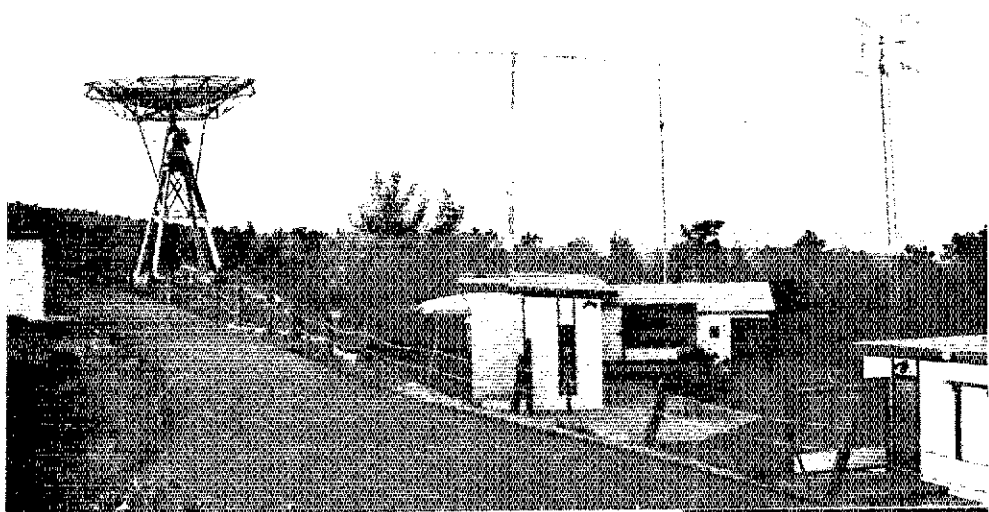
NORTHWESTERN DIVISION

Alaska

K 17AR (4 ops.) 1410- 94-15-A
 Idaho 518- 37-14-A
 Montana 3528-141-25-A
 Oregon 816- 60-12-ABCD
 K 3HJ 576- 21- 8-ABC
 E 7XW/7 (4 ops.) 8010-178-45-AB

Washington

W 3FN 4556-134-34-A
 W 3VH 4032-144-25-A
 W A 2FHG 1008- 61-16-A
 W A 2NGR 123- 41- 3-AB
 W A 2AWS 45- 15- 3-A
 W 3ZU/7 21- 21- 1-A
 K 3GTT (+W 6LGX) 3978-117-34-AB



Ever wonder where those big signals originate? (see above.) From left to right, top to bottom, we have: WA110X, K8MMM, W4SGI, VE6AHE, WA5RMS, WA6CPP and WB2GKE/1.

W7HAR/7 (+W7A) (G0D H0H)
 820-156-28-AB
 W7NBV/7 (2 ops.)
 744-144-17-AB
 WA7BAY/7 (36 ops.)
 148- 77-10-AB
 WA7HOG (+W7) (MZEK)
 107-123- 9-AB
 W7FKJ/7 (2 ops.)
 108- 18-14-A
 WA7WQJ/7 (36 ops.)
 184- 46- 4-AB
PAZ, INC. DIVISION

WA6FVZ (+WB6) (LUS)
 728- 89- 8A-10D
 Nevada
 K7UW 311-101-14-AB
 WA4RUK/7 (+WARUW)
 316- 32-13-AB
 Sacramento Valley
 WA4VJR 146- 55- 74-ABCDE
 W36MKS 145- 88-23-AB
 W40DP 121- 8-21-AB
 W36NKM 119- 27- 5-B
 WA4VJH 56- 14- 4-B
 WA7JUD/6 (3 ops.)
 783-118-24-AB

W6FAW 72- 12- 8-AB
 WA6000/6 (2 ops.)
 937-145-13-AB
 San Joaquin Valley
 WA6PP 587- 98-19-AB
 WA6NRV 260- 88-17-AB
 WA6SS 218- 89-14-AB
 WA6GKH 1- 1- 1-B
 K6KLY/6 (+W6) (YKM)
 978-728-42-AB (D)

K6ELU/6 (6 ops.)
 716-180-36-AB (D)
BOYAKA DIVISION
 North Carolina
 WB4LDO/4 246- 94-24-AB
 WB4HJ 148- 72-10-AB
 WB4GHR 151- 88-18-A
 WB4CLO 403- 31-14-A
 WB4GK 170- 37-10-AB
 WB4CFS 180- 16-10-A
 WA4LX/4 26- 5- 4-A
 WB4VLC/4 (3 ops.)
 349-179-11-AB
 WB4PAB/4 (4 ops.)
 444-147-45-AB

Fast Bay
 K6RNO 706- 21-26-AB
 W6RZG 18- 6- 5-B

San Francisco
 WB6TIO 1247- 66-18-AB (C)

Santa Clara Valley
 WA6KG 794-105-28-A
 WB4DQ 1414- 87-17-AB
 WA6ZL 50- 4- 5-B
 WA6RI 6- 6- 1-B

Minimum Sections

Minimums	30	15	4	3	2	WA3NUL*	29	12		5
MHz.	50	144	220	432	1215	K1SEFF/3*	27		8	10
K1AGB	24	11	11	7		WB2LZD/3*	28	15		
K1HTV		17		11		K4BNC	37	1		
K1JIX		4	7	5	1	K4GMP*	34			
K1PXE/1*	35	20	11	13		K4IUV	34	6		
K1YLU/1*	29	8	5	8		W4FJ	8	8		9
W1DC/1*	40	20	9	12	1	W4HJZ	15			4
W1EMP				10		W4QJU	35	1		
W1EUJ	26	13	4	4		W4PAR/4*	34	1		
W1JSM		16				WB4BND	38			
W1MX/1*		18	10			WB4OYJ*	36	1		
W1OOP			5	6		WB6HIL/4	42			
W1QXX		14	12	5		WA8TYF/4	12	12		3
W1YTW	14	13	7			K6ECG/4	32			
W1ZGO*	34	17	7	7		W5RAG/5*	57	4		2
WA1HHN	30	11				W5WAX*	43	7		1
WA1OX*	36	18	11	9		WA51YX/5	36			
WA1LNJ		15		5		WA5NOB/5*	48	5		
WA1MUG*	35	18	14	14		WA5QBX	40			
WB2GKE/1*	38	22	4	10		WA5RMS	51	3		
K9AQP/1			11	10		WA5VCF	49			
K2ACQ				11		WB5AEH	46	2		
K2BWR*	30	17	6			WB5AJM	41			
K2DEL/2*	31	10				K4VOW/5*	44	6		
K2JNG		1		5	4	K6BP/6*	29	4	5	4
K2OJD	27	19		7		K6GSS/6*	31	6		2
K2RIW				12		K6HXW/6	25	4		3
W2AQT		17				K6IBY	28	8	6	
W2BLV				11		K6KLY/6*	28	9	4	1
W2CNS	25	11	4	3		K6KSY	30	2	1	
W2CRS	31	16	12	4		K6QEH*	36	8	4	5
W2FCL/2*	26	15				K6TJL/6*	17	9	4	5
W2JKI*	37	19	14	15		K6YNB/6*	26	7	5	4
W2JKJ/2*	36	12	4	5		W6NLO	34	5	3	3
W2OMS				13		W6QED	32	6		
W2OW*	30	17	9	4		K7OFT*	33	1		
W2PFZ/2*	35	16	8	5		K7WXW/7*	43	2		
W2UFT*	36	22	12	13	6	W7FN	34			
W2UK		22				W7VDZ	31			
WA2BBS	38	11				WA7FPO	42			
WA2EUS	11	4	5	3		WA7JTM	31		1	
WA2UDT		15				K8MMM*	47	12		
WA2VTR				4	4	W8AFC		15		
WA2WEB/2*	38	17	14	16	4	W8CCI*	49	10		7
WA2YJF/2*	17	18		5		W8TTU	33	2		
WB2FKJ/2*	22	21	15	6	1	WA8PLZ*	43	9	4	
WB2SZW				6		K4RKA/8*	27	18		11
WB2VQK		15				K9KFR	33	8		
WB2YZV	33	13		5		K9HMB	51	5		3
K3HKK/3*	24	13	5	4		W9ABA	31	4		
K3MTK/3*	29	18	5	3		WA9SDC*	48	5		
E3OBU		19				K0PWR	30			
K3WJB	29	15	6	1		K0FLM	42	4		2
K3WRY	30	9	1			W0GNS	30			
W3AD/3*	31	17	10	9	2	W0PEP	36			
W3ARW*	20	20	9	7		WA0NQA*	39			
W3CCX/3*	36	18	14	15	5	WA0PBO	45	4		
W3CGV	19	12	7	9	1	VE2HW	1	11	5	3
W3HZU*	22	7	4			VE3CWT/3*	38	14	5	5
W3KWH*	33	9		2	1	VE4MA	33			
W3LUL		22				VE5US	34			
W3PGA/3*	22	13		10		VE6AHE	32	1		
WA3KLF/3	33	8								
WA3MDR*	36	10								

*Multioperator Station.

K4GMP (+WA4KB)	1230- 85-44-A	W4BHD	3390-111-30-ABD
W4G74 (9 ops.)	602- 43-14-AB	W4AHND	1092- 52-21-A
W4W1P4 (+WA4DUR)	230- 23-10-B	K4MTD	870- 47-20-AB-10
W84MWA/4 (+WA4H11)	112- 16- 7-A	K4OYJ (9 ops.)	7733-209-37-AB
Georgia			
South Carolina		W4VD4 (4 ops.)	1246- 78-16-AB
K4GL	3736- 68-36-ABD	West Indies	
Virginia		W1HOV/KP4	112- 14- 8-A
K210P4	4631-139-29-AB	SOUTHWESTERN DIVISION	
K41R04	2506- 92-24-AB	Arizona	
W41	1800- 57-25-ABD	W45FO	6594-157-22-A
W411U	836- 23-12-B	K4T1M	3064-172-32-AB
K4RCL4 (+WA4H11)	2106- 78-26-ABD	J4N4K	3150-126-25-A
West Virginia		W47BM	2436- 84-29-A
W4T1U	4550-130-45-AB	Los Angeles	
W441U	495- 33-15-B	K4YNB/6	11,592-760-42-ABCD
W4B4V	371- 24-13-A	W4GHM	4901-164-29-A
K4RKA/8 (18 ops.)	12,656-204-56-ABD	K4KSY	3960-119-33-ABC
W4VA (5 ops.)	2675-115-25-AB	K4SS2 (+W866 BPH/KZ)	9436-240-39-AB
W4R6SH (7 ops.)	1498- 88-17-AB	K4HXW (+WA6JOM)	8534-258-42-ABD
ROCKY MOUNTAIN DIVISION			
Colorado			
W4SYS	1936- 88-22-A	W461NW (+W461BI)	3920-296-20-AB
K4GHO/6	772- 44-18-A	Orange	
W43PH/2 (19 ops.)	3300-110-30-AB	K61BY	5560-109-42-ABC
W4YEL (+W1HDQ)	2052- 76-27-A	W6ABN	1786- 44-27-A
New Mexico		K6QEH (5 ops.)	17,240-495-00-ABD/1
K56FW	2225- 89-25-A	K6BPC/6 (15 ops.)	26,560-524-45-ABD/1
Utah		San Diego	
W4MTK/7	1738- 79-22-A	W6M1	9675-203-45-AB/1
Wyoming		W6QED	5166-136-38-AB
W4VDZ	7130-230-31-A	W6AAX/6	3510-135-26-AB
SOUTHEASTERN DIVISION			
Alabama			
K4WHP	1120- 80-14-A	W6DHS/6	1560- 59-26-AB
W6SEOW	132- 22- 6-A	W6W6C/6 (+W6BWRH)	4212-162-26-AB
W841S	70- 10- 7-A	W6A76 (3 ops.)	330- 33-10-AB
W641ZW (+W4LVP)	886- 24-37-A	WEST GULF DIVISION	
Eastern Florida			
Northern Texas			
W84HND	11,400-300-38-A	W4SZUC	1520- 76-20-A
K4BNC	9842-259-38-AB	Oklahoma	
W86HL/4	9282-221-47-A	W4SVHN	3509-118-28-A
W401U	9144-254-36-AB	W4SOHH	2910- 90-29-AB
W4HNP	5100-100-27-AB	W4SZV/6	251- 22-11-AC
K4FCU/4	4096-138-42-A		

DIVISION LEADERS

Single Op.	Division	Multiop.
K3WJB	Atlantic	W3CCX/3
K9HMB	Central	WA9SDC
W0GNS	Dakota	W0KHZ/1
W45RMS	Delta	WA5NOB/5
W88BGY	Great Lakes	W8CC1
W2CRS	Hudson	WA2WEB/2
K0TLM	Midwest	WA0PBO
K1AGB	New England	W1DC/1
W7FN	Northwestern	K7WXX/7
K71CW	Pacific	K6KLY/6
W8TTU	Roanoke	K4RKA/8
W7VDZ	Rocky Mt.	WA0PHZ/0
W4BND	South eastern	W84OYJ
K6YNB/6	Southwestern	K6QEH
W451YX/5	West Gulf	W5RAG/5
VE4SU	Canadian	K4RCW/3
.....	Foreign	ZF1RS

K4VDW/5 (7 ops.)	11,550-241-30-AB	VE4BSS	70- 35- 2-B
W4WAN (+K5WV3)	10,710-209-51-ABD	VE3CW7 (3 ops.)	14,632-218-62-ABCD
Southern Texas		VE3YHF/3 (3 ops.)	
W45VX/5	4500-125-36-A	VE3SAU (4 ops.)	5930-148-40-AB
W4SVV	704- 32-22-A	VE3VH/3 (3 ops.)	5882-157-37-ABD
W4RAG/5 (3 ops.)	20,601- 325-63-ABD	Manitoba	
K80ZF (+W4S2P)	2072- 94-26-A	VE4MA	5462-143-37-AD
CANADIAN DIVISION			
Quebec			
VE2AJ0	1924- 74-26-A	VE4SUS (VESUE, ops.)	6072-184-33-A
VE2HW	1120- 45-20-ABCD	Alberta	
VE2ALB	672- 48-14-AB	VE6AH	3665-105-33-AB
VE3P41	517- 47-11-AB	British Columbia	
VE31B2	500-100- 8-B	VE7ANP	810- 45-18-A
VE2A78/2		VE7HCF	390- 30-13-A
VE2BI/2	14- 7-1-D	VE7SM/7 (5 ops.)	709- 57-17-AB
Ontario	1- 1-1-A	FOREIGN	
VE30NR	432- 64- 8-B	Grand Cayman	
VE3VW	330- 28-11-BD	ZF1RS (1 ops.)	1072- 67-16-A



HIGH SPEED CODE TEST

(Sept. 21, 1970)

Every six months, culminating its high speed code proficiency program, the Connecticut Wireless Assn. conducts a certificate-qualifying test by special transmission from club station W1EIA and a number of volunteers from about the country. Such a test will be conducted on Sept. 21 starting at 0115 GMT (Sept. 20 at 2030 CDST). W1EIA frequencies are approximately 3637 and 7120 kHz. Look for simultaneous transmissions by volunteers W84GTS, WSOMJ, K6DYX, W6EOT and W0FA on 3525, 3640, 3653, 3665, 3690, 7025 and 7115 kHz, and maybe one or two transmissions on 20 meters or other bands. Plans are not complete at this writing, but W1EIA will carry a regular announcement prior to its weekly code practice session (Mondays at 0130 GMT) starting early in Sept. or late August.

Five speeds will be transmitted, starting at 40 wpm and progressing in 5-wpm increments to 45, 50, 55 and 60 wpm, with five minutes of plain English text at each speed. If you can copy one minute of the text *consecutively solid* you qualify

for a certificate at that speed. It is hoped that the same format as that used last March can be followed (see Mar. '70 QST p. 85).

The CWA program begins where the ARRL program leaves off, at 35 wpm, making it possible for those who have their ARRL 35 wpm certificates to get certificates for 40 wpm and above all the way up to 60; over 30 have already qualified for the latter speed. It's not a hard-sell program, but it's there for those who still consider codesped an art. Take a listen, Sept. 21, 0115 GMT!

MANITOBA CENTENNIAL AWARD

The Amateur Radio League of Manitoba (affiliated in 1957) will present certificates to amateurs submitting proof of the requisite contacts with VE4 hams, made after Dec. 31, 1969. Contestants must accumulate 100 points. W/K, XE and VE stations receive 2 points per contact, all other stations receive 5 points per contact. Contacts require an exchange of signal reports and may be made each different mode on each band. Cross-mode QSOs not permitted. Double points for designated "honus VE4 Hams" monthly, see Manitoba Station Activities. QSLs not required. Send a copy of log and two IRCs to J.N. Knowles, VE4JK, Box 365, Carman, Manitoba, Canada.

An aerial photo shows some of the destruction in downtown Lubbock after the twister had passed. (Photo by the Lubbock Avalanche-Journal)



The Lubbock Tornado

THERE ARE many destructive forces among the vagaries of nature: hurricanes, earthquakes, floods; but none of these packs a more ferocious, devastating punch into a relatively small area than a tornado. The finger-like funnel, a swirling mass of air and debris, moves along the earth at a relatively slow speed, seldom exceeding 30 or 40 miles per hour. The vortex, however, may reach speeds of 300 miles per hour or more — no accurate measurements are possible — and the vacuum created causes structures to explode as air trapped inside tries to escape and equalize the pressure.

For seventy years the bustling city of Lubbock, Texas, had escaped the ferocity of the twisters that frequently hit around the southwestern plains. It had to happen sooner or later, though, and on Monday, May 11, at approximately 2145 local time, it did. What was possibly the most massive tornado ever to hit a metropolitan area in the United States dipped out of the ominous green-colored sky and cut a swath a mile and a half wide and eight miles long through the heart of the city. Some reports say there were actually two, three or even four funnels whirling along side by side wrecking everything in their paths.

When the storm had passed and the residents began to dig out of the rubble, the full impact of the tornado was seen. Twenty-six persons had perished; at least 2000 were injured; thousands were homeless as the twister had destroyed 600 residences and 450 apartment units containing 3800 family dwellings. Two hundred small businesses were damaged or destroyed and total cost of

damages was estimated to be near \$200 million. Electricity was off leaving the city short of water because well pumps wouldn't function. Nearly all telephone service in the area, local and long distance, was disrupted creating a communications void. Amateurs went into action.

Almost immediately after the storm had passed, W5GHO, WA5JZE and WA5RTB, all members of the Caprock Amateur Radio Society, showed up at the civil defense headquarters to establish communications with areas adjacent to the devastated parts of the city through the CARS' 2-meter fm repeater, which, fortunately, had not been damaged. However, all the antennas on the roof of the city hall had been destroyed and it was necessary to trace the feedline before an emergency lash up could be made. Finally the problems were solved and the c.d. headquarters was on the air. Throughout the next few days the station was manned by Lubbock County, EC WA5WBK and WA5UNL.

While work was commencing at the c.d. headquarters, W4FEC/5 and WA5WBK set up mobile operations at Red Cross Headquarters. When an emergency receiving station was set up in the coliseum at the Texas Technical University campus, WA5WBK and K7CMI/5 departed Red Cross HQ to set up a station there. WA5WBK manned this station until 1200Z on May 12.

By 1800Z on May 12, K5RKG and WA5GRE had taken over at the Red Cross station and at the emergency receiving center. WA5WBK was now operating the control center at c.d. headquarters and several stations including WA5OEO, WA5VPL and WA5WSI were on the air handling the large load of health and welfare traffic coming in from outside.

To handle this large volume of traffic, a number of emergency nets were set up on eighty and forty meters and existing nets, such as the North Texas Emergency Net, were being utilized as well. NTEN operated about 20 hours between May 11 and 13 during which time more than 1300 messages were handled. Net control stations were WA5MKV, W5HMR, K5CSM, W5KRZ, W5PFG and K5BTZ.

In all, the best guess is that Lubbock area amateurs handled about 30,000 health and welfare inquiries and replies during the week or so following May 11. Much praise was bestowed on the amateurs as a whole, as evidenced by the letter from Texas Governor Preston Smith reproduced elsewhere in this report, WA5VPL, a sixteen year old YL, was awarded a special commendation from the Red Cross for her work in single-handedly moving nearly 400 messages during the disaster.

As always, in an operation of this size, it was not possible to mention everyone who participated, but all amateurs mentioned in the several reports we received will eventually receive Public Service Awards for activities during the Lubbock Tornado.

We'd also like to thank the publishers of the Lubbock *Avalanche-Journal*, which was used as a source for much of the material on the extent of damage etc. mentioned herein. - WA9HHH.

Governor Smith's letter commending amateurs for their performance after the Lubbock, Texas, disaster.

Dr. Karl Brownstein, President
Dallas Amateur Radio Club
7701 Stemmons Freeway
Dallas, Texas 75247

Dear Karl:

. . . It is to the credit of the amateur radio enthusiasts that they are always ready to serve in times of emergency. When a city like Lubbock is without communications, it is organizations such as yours which maintain the only contact with the outside world.

I am asking my staff to look into the matter of a proclamation and you will be hearing more about this in the near future. I did, however, want to take this opportunity to express our deep personal gratitude to you and the others who unselfishly gave of their time in this crisis. Please do not hesitate to let us know if there is any way we can ever be of assistance to you.

Sincerely,
Preston
Smith
Governor of
Texas

PSgmh

Strays

Feedback

Diode CR6 in Fig. 4, page 21, *QST*, August 1970, is shown incorrectly. The anode should connect to the Zener, and the cathode to the negative bus.

Fig. 4, page 36 of *QST* for May 1970 has an error in the length specified for the last section (to the right) of 2-inch boom. This piece should be cut to 5 feet 10 1/2 inches, not 4 feet 4 5/8 inches as shown.

I would like to get in touch . . .

. . . anyone interested in joining a Kentucky Novice net. WB4NQZ.

. . . amateurs interested in a Novice chess net on 7.185 MHz. WN2LYB.

. . . other hams who have cerebral palsied speech. W2PFK.

. . . anyone who would like to play chess on 40 cw or ssb. WB8CAC.

. . . other members of Alcoholics Anonymous for skeds. WN4QZQ.

. . . hams who are members of the Disciples of Christ church. W9ID (was W9JXQ).

. . . hams interested in trading army shoulder patch insignia. WA4WME/DL4VA, Vandegrift, MATCOM-DSO, APO New York 09052.

. . . anyone with photos, drawings and stories from civilian and naval radio operators who have served in Hawaii, Oahu and the outer islands. K2HBA, J.R. Adams, Naval Communications Station (RPIO), FPO San Francisco 96610.

. . . brothers of the Pi Kappa Phi fraternity interested in forming a nation-wide net. WB4LDO.
. . . net control stations of chess players' nets. W2EYG.

. . . radio amateurs who are Nobles of the Mystic Shrine. W.G. Bailey, Box 207, Hartford, CT 06101.

. . . anyone interested in a West Coast Novice net on 40 meters. WN7ONC.

. . . other operators interested in starting a cw net in the 15-meter Novice band. WN2NGC.

. . . amateurs interested in a daily cw sked to exchange honest readability reports. VE3CIB.

. . . anyone interested in checking into a Novice net. WNSAMJ.

. . . missionaries outside of the U.S. WB4LFL.

. . . anyone who would like to start a Future Scientists of America net. WB9AOF.

. . . any licensed amateur living on the East Coast, New England, or the Canadian Maritime Provinces who is interested in experiments toward the exchange of cloud photographs received from the ESSA, Nimbus or Itos satellites. GM3TDL.

. . . a U.F.O. net. WA3LFU.

. . . an amateur radio club comprised of law enforcement officers. Joe Heffler, 2200 Morris Ave., Bronx, NY 10453.

. . . visiting foreign amateurs interested in meeting local hams. Z11BAG.

. . . any hospital or related health care facility employee interested in forming a ragchew net. WA9YDO.

. . . anyone for an on-the-air chess game, 80 through 10 meters. WA2JNQ.

. . . other hams who have implanted cardiac pulse generators, demand type, to discuss mutual experiences and problems. WA4NMN.

. . . young people interested in starting a cw ragchew net to discuss youth social happenings. WA8YTM.

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity

CONDUCTED BY GEORGE HART,* WINIM

Another PSHR Reevaluation

YOU WILL recall that when PSHR was first started last year we promised to reevaluate the point system from time to time and perhaps make adjustments as necessity dictated. The process has been continuous since then, and a number of premises and indications seem obvious at this time.

First of all, the PSHR makes the BPL look small by comparison as it now stands. This was not the intention. Rather, it was intended to supplement the BPL, a public service honor roll in its own right, with additional honor listings which took into account the many aspects of traffic netting and organization which were not recognized in BPL. The idea was to make it a bit of work to achieve, but no so hard that an average amount of extra effort couldn't do it, or so easy that it could be achieved with little effort - about the same as the BPL. We started out with a requirement for 25 points, raised it to 30, but still the PSHR appears pretty "easy" and in some ways inequitable.

One of the principal complaints has been that cw check-ins and NCSing were given more points than similar functions using voice or RTTY. This seemed justified because the cw functions required not only skill in code but also knowledge of a number of special QN signals and other cw procedural signals not required on voice. It was also intended as a balance against the fact that cw aspirants could not handle phone patches.

However, as many have pointed out, whether or not cw check-ins and NCSing are more difficult than phone is a matter of opinion and that since an equivalent job is done on either mode the point credits should be equal. Otherwise, we are discriminating against the phone operator and, worse, aggravating a division between modes which has long been inimical to the effectiveness of amateur public service operating. It has always been felt desirable to reward versatility, but

* Communications Manager, ARRL.

making the point credits equal for phone or cw will still reward versatility on the part of the amateur who can and does operate both.

So, effective with *October* activities (January *QST*), PSHR points will be: (1) For checking into public service net on phone, cw, or RTTY, one point per check-in. (2) For acting as net control of a phone, cw or RTTY public service net, three points per function. (3) A maximum of ten points per month for check-ins by each mode. (4) A maximum of 12 points per month for NCSing by each mode. Thus, versatility will still be rewarded, and it will be harder to make PSHR by sticking to a single mode.

The requirement to "make" the PSHR will remain at 30 points, for the time being anyway.

We acknowledge other points raised about PSHR: (1) Some discrepancy and confusion regarding counting liaison also as a check-in and counting NCSing as a check-in. Unfair to the NCS? The NCS doesn't check-in, he simply checks *others* in, so he doesn't get the check-in point. On the other hand, the liaison station does check in, performs his liaison, then checks into another net and gets *another* check-in point - thus, getting two points the poor NCS doesn't get. Is the liaison function that much more creditable than being NCS? Shall we therefore raise the NCS points to compensate, or simply give the NCS a check-in point? (We predict a sharp difference of opinion between NCS and liaison stations.)

(2) If we give 5 points a month to the net manager, we ought to give similar points to SCMs, SECs, net bulletin editors, etc. Either that or eliminate the five points for net manager, which is mostly a paper function. Which should we do?

(3) Incorporate the BPL into the PSHR by granting 1 PSHR point for every 100 message handlings, or some such arrangement, so that all public service operating functions can be included in a single monthly honor listing. Maximum points for handling messages alone?

(4) Remove maximums for all points, make 75 points the qualification instead of 30. This would remove the versatility incentive.

Hope we haven't overlooked anyone; but no matter. If we have, we'll hear about it.

Attending a joint meeting of the Texas RACES and Army MARS on June 20 and 21 were, left to right, W5LLS, Fourth Army MARS Command Director; W5EYB, ARRL West Gulf Division Director; and WA5VTO, State Radio Officer. The three are studying a plan for coordination of services in time of disaster. Nearly 100 persons attended the joint meeting.



Public Service Honor Roll June, 1970

This listing is available to amateurs whose public service performance during the month indicated qualifies for 30 or more total in the nine categories below. Use CD-190 or submit equivalent information through your SCM. See page 75, Nov. '69 QST for details. Please note maximum points for each category.

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Totals
Max. Pts.	10	5	16	12	12	20	3	5		
KØLVB	10	5	16	12	12	20		5		80
WA2CAL	10	5	16	12	12	4		5		64
W6BNX	10		16		12	20	1	5		64
W7LBK	8	5	12	(0)	12	16				63
WANE LX	10	5	16	12	12	2		5		62
WA1MFB	(0)	5	16	12	9		3	5		60
WA7KJU	10	5	16	12	12	4		5		59
WAØEF	10	5	16	(2)			11		5	59
WA1HOL	10	5	16	12	12					58
WA1KZE	10	5	16	12	12					55
WA2EPI	10	5	16	12	12					55
WA2HMO	10	5	16	12	12					55
WAØWEZ	10	5	16	12	12					55
WØLCX	10	5	16		12		3	3	5	54
W7OCX	10	5	8	12	12			5		52
WAØVAS		5	12	12	20	3		5		52
WB2FEH	10	5	16	3	12			5		51
W3MPX	10	5	16		12		3	5		51
WAØROF	10	5	16	3	12			5		51
W2MTA	10	5	16		12			5		48
W5SBM	10	5	16		12			5		48
W6BGF	10	5	16		12			5		48
W6LRU	10	5	16		12			5		48
K7KSA	10	5	16		12			5		48
K7NHL	10	5	16		12			5		48
W8IMI	(0)	5	16		12			5		48
W8SUI	8	5		12	12	4		5		48
W9HRY	10	5	16		12			5		48
WA9WMT	10	5	16		12			5		48
W4SQQ	10	5	16		12	3				48
W4OGG	10	5	6	12	12					45
K3ZNP	10	5		12	12			5		44
W1EEW	10		16		12			5		43
WA1GCE	10	5	16		12			5		43
WA1HSN	10		16		12			5		43
K1POV	10		16	12				5		43
WA2DRH	10	5	8	12	8					43
W2FR	10		16		12			5		43
WA2ICU	10	5	16		12			43		43
W2RUF	10		16		12			5		43
W3FML	10		16		12			5		43
W3NEM	10		16		12			5		43
W4HFL	10	5	16		12			43		43
W5EIN	10	5	16		12					43
W5OJA	10		16		12			5		43
W5QMJ	10		16		12			5		43
K5ROZ	10	5	16		12					43
W8RALU	10	5	16		12					43
WA9ZKX	10		16		12			5		43
WAØJIC	10	5	16		12					43
KØMRI	10		16		12			5		43
WAØTZK	10		16		12			5		43

BR1Y/W4	10	5	16		12					43
W4SHJ	10	2	16		9				5	42
WAØKUH	5		6	6	20				5	42
WAUTM	10		16		12		3			41
W4ZJY	10	3	16		12					41
W1BVR	10	2	16		12					40
K1SSH	10	2	16		12					40
W1ZPB	10	2	16		12					40
WB4FLW	10	5	16		9					40
WAØOTQ	10	5	16		9					40
WA1LLB	10	5		12	12					39
K2KTK	10	1	16		12					39
W6INH	10		16		12				1	39
K6YBV	10	5		12	12					39
W7GHI	10	1	16		12					39
WA8ETX/3	10	5		12	6	3	3			39
WA1GFH	10		16		12					38
WA1LNF	10		16		12					38
W2EIR/5	10		16		12					38
W2QC	10		16		12					38
K3HKK	10		16		12					38
K3OIO	10		16		12					38
WA6SCE	10		16		12					38
W7GMT	10		16		12					38
K7QFG	10		16		12					38
K8LGA	10		16		12					38
W9QLW	10		16		12					38
WA9VZM	10		16		12					38
WØBV	10		16		12					38
WØHI	10		16		12					38
WAØHTN	10		16		12					38
W1DVV	10		16		6				5	37
WA3CKA	10	2	16		9					37
WA3SU	10		16		6				5	37
W4NOG		5		12	20					37
WA2VYS	10	5	16						5	36
WB6GJH	10	5	16	3	2					36
W6LPI	4		12		20					36
W6QAE	10	5	12		9					36
WB6ZVC	10	5	4	9	8					36
W8BYUB	10	1	16		9					36
K2KIR	10	1	16		3				5	35
WB6TYZ	10	5	12		6	2				35
K1SXF	10	5	12		12				5	34
K4KNP	10	5	12		12					34
W6FIT		5		9	20					34
WA8ETW/3	2	5		12	12	2				33
WAØVYV/Ø	10	5		12		5				32
WA2BEX	10		12		9					31
WBØBF1	10	5	16							31
WAØUTT	10	5	4	12						31
WA2FLX	10	5		3	12					30

The following stations had the necessary total of points for inclusion in PSHR, but no breakdown was furnished: WA6LFA 43; W6YBV 38.

Category Key: (1) Checking into cw nets; (2) Checking into phone/RTTY nets; (3) NCS cw nets; (4) NCS phone/RTTY nets; (5) Performing liaison; (6) Legal phone patches; (7) Making EPL; (8) Handling emergency traffic; (9) Serving as net manager.

Bring 'Em Up Right!

Alabama SCM W4WLG tells us that "the only thing that is saving the cw net this summer is the new novices that we have trained on our novice net and have graduated to general class. This little venture (he goes on) was started by the Huntsville Club and had produced about 200 new novices in the past four years. We got some 3725 crystals and loaned them out at a fifty-cent fee."

Alabama isn't the only section that has benefited from having a novice net. If you "bring 'em up right," you'll have more young apprentices for the section cw net than, in some cases, you can use. This could have its disadvantages, but the transition from one extreme to another is delightful if you can stop before you reach the opposite extreme. Young people of today accept challenges readily, if they deem the challenge a worthy one, and the challenge to become expert in

handling the code and using it for a beneficial purpose is a fascinating one to many youngsters. Try it, sometime. Start a novice net.

CQ Help?

WA1LK points out that there is no call between just plain "CQ" and "CQ Emergency" to indicate a requirement for help, although perhaps not of a dire emergency nature. For example, a mobile operator runs out of gas on a back road, has no idea where the nearest gas station is or how far. He wants to call for help on his rig. What call does he use? "Mayday"? "CQ Emergency"? No, both are too drastic, indicate a life-or-death emergency. WA1LK suggests "CQ Help," indicating that the caller is in need of assistance but not in any immediate danger.

Of course he could always report into one of the monitoring services and use a double break, if

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for June Traffic

Call	Orig.	Recd.	Rel.	Del.	Total
W3CUL	433	1691	1364	297	3785
K0GNK	195	885	827	24	1901
W7RA	8	688	622	61	1379
W4VVA	108	528	21	507	1164
W3VR	173	496	460	19	1148
W44SC	52	350	312	15	729
W0LXC	19	385	293	19	716
W4SGP	1	351	351	0	703
W4WVH9	3	305	283	18	569
W4ITM	74	232	177	14	527
W46DL	31	264	177	49	531
W44YS	49	240	211	20	520

More-Than-One Operator Station

W43XJ	0	2441	0	10432	12873
W2MK	0	366	0	0	366

Late Report:

W1M3(May 1)	8110	0	0	0	8110
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BPL for 100 or more origination-plus-deliveries

K5GDH 388	W8BBB 159	W2OF 106
W4SHZ 206	W8JIT 126	W1PL 105
W43TX 197	W3TN 122	W81VB 101
K80NA 189	W8OCU 110	W3MPX 101
W4MKH 188	W4TMB 108	KH6GN 100
W6WLV 175	W9WYO 107	Late Reports:
W8RBP 165		W42LV (Mar.) 106

More-Than-One Operator Station

W47LZ 101

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 origination 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.

his rig was on 40 or 80 meters within range and it was not during a time of day or night when or on a band where none of the monitoring services was active. Or, being a voice operation, he could call CQ followed by a vocal indication of his need, whether it be "help," "urgent assistance," "road service," or whatever. But "CQ Help" is about as short and meaningful as you can get. Anybody second the motion? - WINJM.

Traffic Talk

We cover many of the little societies of traffic handling in this column month after month, but the discrepancies in handling messages still continue and we continue to get requests that we cover the subject again.

The subject this month is when and why to cancel a message. Basically, the rule is simple -- don't! If you accept a message, you relay it or deliver it. If for some reason or other you can't do either, you service the originator and tell him your troubles, meanwhile filing the message undelivered. True, you may never hear from the originator, in which case the message remains "filed, undelivered." Isn't this the same thing as cancelling? In effect, yes, but it keeps the disposition of the message in its proper perspective.

Any amateur who peremptorily cancels a message without instructions to do so from the originating station should be wouff-honged, rettsnitched, boiled in transformer oil and made to send a long CQ on the uggerumph. How can we maintain the integrity of our service when we take it upon ourselves individually to be the judge of whether a message text is important or unimportant, in good or bad taste, commercial or non-commercial? True, there is no law that says an

amateur must relay or deliver a message once he accepts it (but many dedicated traffic men think there ought to be). It is a responsibility we have visited on ourselves -- an even more important indication of our dedication than obeying laws imposed from "outside."

Under this self-imposed rule, can an amateur refuse to handle a message when it is offered to him? Yes indeed! In fact, he *should* do so (i.e., refuse) if he does not intend relaying or delivering it. But such an amateur would hardly be welcome in most traffic nets, where amateurs gather for the purpose of handling traffic. Once a message is on the air, it's our responsibility, and our reputation as a public service depends on its ultimate delivery within a reasonable time. Far too many messages are never delivered because some relayer along the line decided that it wasn't important enough to justify expenditure of a stamp, or that it was improper, or that it didn't make sense (to him) or that it was too long or (and we suppose this happens more often than any of the above) he just couldn't be bothered or forgot. These are the amateurs who tear down a reputation for responsibility and reliability that the rest of us work so hard to build. A plague on them! - WINJM

Public Service Diary

When the student troubles broke out at Kent State University on May 4, long-distance telephone service into the immediate Portage County, Ohio, area was terminated. Many concerned parents were anxious to have health and welfare reports on students at the school, so W4BFQW started a special session of the Ohio Single Sideband Net. K8UQV was the first to check-in in search of a report on a KSU student, but a number of others followed. Amateurs also rendered assistance to several local radio stations in getting news data on the activities on campus. - W4BFQW, EC Summit, Portage, Medina Cos., Ohio.

On June 26 much of Ohio was under a tornado watch. Stark County EC, K8DHI, activated the local AREC net on ten meters while AEC W48UPI did the same on six with W48VKF acting as net control. The RACES weather net, with direct contact to the weather bureau on two meter fm was also on standby when at 2140Z a tornado was reported to have touched down at Navarre. Amateurs were asked to gather information on the funnel cloud's path but it dissipated before much action could be taken. An hour later a funnel cloud was sighted at Wooster. This one had touched down and the civil defense director of Massillon requested mobile assistance. While a number of mobiles were enroute to the area, still another cyclonic disturbance was sighted. W48VEV made the report to the AREC net and the weather bureau was notified. This final storm was not visible on radar and amateurs tracked it carefully until it dissipated. At 2345 the all clear was given after about three hours of operation. - K8DHI, EC/RO Stark County, Ohio.

On June 29, 23 cars of a Detroit, Toledo and Ironton Railroad train derailed in Maybee, Michigan. Two of the cars contained toxic gases, ammonia and chlorine, and twenty-five of the small town's families were evacuated because of the hazard. The Monroe County AREC was asked to supply communications between the fire station in Maybee and the American Red Cross headquarters

in Monroe and a number of messages were handled between officials at both ends of the link. Repair operations were soon under way and by the following day the danger had been removed with no serious consequences; the AREC net was relieved after thirty-two hours of operation. — W8NDM, EC Monroe County, Mich.

On May 3 a large number of British Columbia amateurs were busy providing communications for three "walk-a-thons." In Vancouver, 24 amateurs were active for four hours providing communications along the 25 mile route of the March for Millions. Eleven check-points were established to keep track of the approximately 30,000 marchers.

In Richmond, eight local amateurs provided communications for the Richmond Ramble. Three thousand people participated in this march, an effort to raise money for the poor. Amateurs were used for control purposes and in providing first aid assistance along the route.

Ten amateurs from the Cranbrook area helped out with communications aid during the local Lion's Club Walk-a-thon. The amateurs were used to keep track of the whereabouts and condition of the walkers. The amateurs were assisted in this operation by ten members of a code and theory class being taught by the local radio club. — VE7FB, SCM B.C.

On May 9, two amateurs helped direct about a dozen CBers in providing communications for the Barberton (Ohio) Cherry Blossom Parade. Beginning at 1430Z, K8VAK, stationed at the starting line, relayed the parade roster, listing 103 units, to K8EIO at the reviewing stand. The operation was secured at 1800. — K8EIO, AEC Summit County, Ohio.

On May 14 seven Johnson County, Kansas, amateurs participated in a tornado watch called by the weather bureau. Reports of several funnel sightings had been received from the southwest portion of the county, so using mobile stations, W0VVG, K0HYG, W0CLK, K0BHM and K0PFV went to predetermined locations to report conditions, which were radioed back to EC/RO W0RXD and WA0GNQ at the civil defense center. Several funnel clouds were sighted but none touched down. — W0 RXD EC/RO, Johnson County, Kansas.

Amateurs of the Inland Empire VHF Club of Spokane, Wash., participated in the annual Armed Forces Day Lilac Parade. Actually two parades were held, one a torchlight affair on May 14 and the main event on May 16. Amateurs furnished progress reports on the parades and reported any unusual occurrences.

K7PWK and W7WIL were the net control stations on the two meter fm net; K7PWK was located on the ground floor of the police station while W7WIL was out the roof five or six stories up. WA7ZD assisted at the control point. Mobiles were located at the beginning and end of the parade route as well as at a number of points in between. Two mobiles manned by K7LRD, WA7IKZ, K7LJG and WA7KMI were stationed at

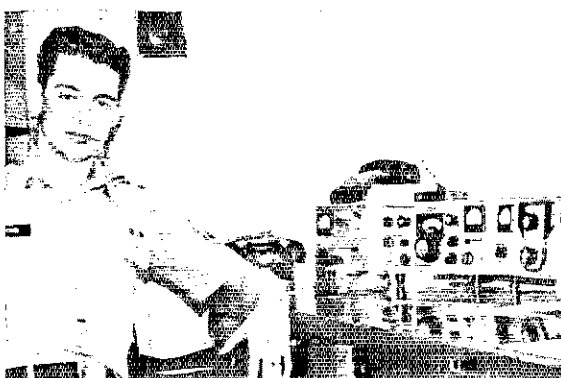
the Spokane Coliseum which was used as a gathering point for the out of town participants. A total of thirty amateurs participated in the parade communications exercise. — K7LRD, EC Spokane, Wash.

Forty-one SEC reports were received for the month of May, representing 14,366 members. We have to admit that this is somewhat better than the 37 reports of last May, but it still represents some 230 fewer AREC members and is below the average reporting level. Sections reporting: Alta, Ariz, Ark, Colo, Conn, EFla, EMass, EPA, Ind, Iowa, Ky, LA, Mar, MDC, Mich, Mont, Nebr, Nev, NMex, NLI, NNJ, NTex, Ohio, Okla, Ont, Org, Que, SDgo, SE, Sask, SDak, SNJ, SStex, Tenn, Utah, Wash, WVa, WFla, WMass, WNY, WPa.

National Traffic System. Judging from the reports received, one gathers that June may not have been the best month in NTS history. K2KIR says the prevailing summer conditions are making things rough on eighty and that he'd switch to forty except that certain of the reps have "proved their singular inability to QNY up and down 5 and 10 kcs without getting lost in the BC QRM". W2FK says June was the worst month on 2RN since September, 1966; November, 1969, which previously held the dubious honor, slipped into second place among the losers. RN6 manager W6LRU is active from his summer QTH in northern California and is handling the net from there until mid-September. "Ouch. . . ouch." says W9HRY, as he leads off his comments with three full lines of "ouches", one for each day of the month. Bob also bemoans the fact that 9RN missed a session during June—one which is known to have been held, but a report was not forthcoming.

June Reports					
Net	Sessions	Traffic	Rate	Avg.	%Rep.
EAN	30	1258	.982	41.9	96.7
CAN	30	703	.735	23.4	100.0
PAN	30	844	.933	28.1	96.7
1RN	60	600	.376	10.0	91.9
2RN	60	340	.503	5.7	98.3
3RN	60	372	.361	6.2	97.8
4RN	56	411	.316	7.3	88.7
RN5	60	473	.344	7.9	87.8
RN6	60	820	.641	13.7	100.0
RN7	58	273	.339	4.7	36.4
8RN	61	498	.376	8.2	91.5
9RN	59	334	.345	5.7	89.8
TEN	60	293	.338	4.8	63.5
EON	57	154	.171	2.9	96.7
TWN	46	165	.184	3.6	50.7
TCC Eastern	120 ¹	534			
TCC Central	90 ¹	470			
TCC Pacific	120 ¹	665			
Sections ²	1598	7758		4.9	
Summary	2385	16965	EAN	9.2	
Record	3242	23817	1,149	(5.9)	

Army MARS AE1BPM, club call DL5BP, Baumholder, Germany. Operator on duty is Sgt. Bob Ford, K0FIF/DL5FM. (Photo by WINJM)





The Twin City Hams Radio Club of Monroe (La.) recently set up a mobile trailer at a local shopping center and collected messages to be sent primarily to servicemen overseas. WA5ZCF, who is nearly hidden by a number of non-hams, prepares a message for transmission while WA5SXU operates and WA5QVN, at far right, looks on.

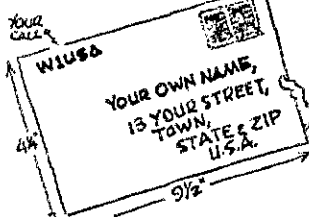
1 TCC functions, not counted as net sessions.
 2 Section and local nets reporting (46): VSBH, VN (Va.); ILN (Ill.); BN, OSSB (Ohio); WMN (Mass.); MSPN (Minn.); NYS (N.Y.); PTTN, EPA, EPAETN (Pa.); OMN (Mich.); BEN, BWN, WSSN, WBSN (Wisc.); TEX (Tex.); CN (N. and S. Car.); GN, VEN, FMTN, WEPN (Pa.); BSN (Ore.); KYN (Ky.); SGN (Me.); OZK (Ark.); MDCTN (Md.-D.C.); CN, CPN (Conn.); BUN (Utah); CHN (Colo.); W. Que VHF; DLZ (Ola.); PVTEN, NJN, NJSN (N.J.); WSN (Wash.); NCN (Cal.); GSN, GTN (Ga.); ALNB, AEND, AENH, AENO (Ala.); OKS (Kans.); RISP (R.I.).

Area	Functions	% Successful	June Reports	
			Traffic	Out-of-net Traffic
Eastern	120	95.0	1403	534
Central	90	96.6	958	470
Pacific	120	95.8	1330	665
Summary	330	95.8	3691	1669

Independent Net Reports

Net	Sessions	Check-Ins	Traffic
Eastern U.S. Traffic	29	123	58
Mike Farad F and T	26	328	221
North American SSB	26	594	213
All Service	4	65	30
20 Meter Intersta	22	447	2645
Northeast Traffic	30	405	213
Clearing House	26	425	240
ECTN	21	272	37
Hit & Bounce	-	261	292

IS YOURS ON FILE WITH YOUR QSL MGR?



A.R.R.L. 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 1/2 by 9 1/2 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

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

- W1, K1, WA1, WN1¹ - Hampden County Radio Association, Box 216, Forest Park Station, Springfield, Mass. 01108.
- W2, K2, WA2, WB2, WN2 - North Jersey DX Assn., PO Box 508, Ridgewood, New Jersey 07451.
- W3, K3, WA3, WN3 - Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, Pennsylvania 19385.
- W4, K4 - H. L. Parrish, K4HFX, RFD 5, Box 804, Hickory, North Carolina 28601.
- WA4, WB4, WN4¹ - J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.
- W5, K5, WA5, WN5 - Kenneth E. Ishell, W5QMJ, 306 Kesterfield Blvd., Enid, Oklahoma 73701.
- W6, K6, WA6, WB6, WN6¹ - No. California DX Club, Box 11, Los Altos, California 94022.
- W7, K7, WA7, WN7 - Willamette Valley DX Club, Inc., PO Box 558, Portland, Oregon 97207.
- W8, K8, WA8, WN8¹ - Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, Ohio, 43215.
- W9, K9, WA9, WN9 - Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.

W0, K0, WA0, WN0¹ - Des Moines Radio Amateur Assn., PO Box 88, Des Moines, Iowa 50301.

KP4 - Alicia Rodriguez, KP4CL, PO Box 1061, San Juan, P.R. 00902.

KZ5 - Gloria M. Spears, KZ5GS, Box 407, Bagboas, Canal Zone, KH6, WH6 - John H. Oka, KH6DQ, PO Box 101, Aiea, Oahu, Hawaii 96701.

KI7, WL7 - Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99667.

VE1 - C.L. Eader, VE1EQ, PO Box 663, Halifax, N.S.

VE2 - John Ravenstoft, VE2NV, 383 Thorncrest Ave., Montreal 780, Quebec.

VE3 - R.H. Buckley, VE3UW, 20 Almont Road, Downsview, Ontario.

VE4 - D.E. McVittie, VE4DX, 547 Academy Road, Winnipeg 9, Manitoba.

VE5 - A. Lloyd Jones, VE5H, 1348 Grant Rd., Kegona, Saskatchewan.

VE6 - Karel Tetteleer, VE6AAV, Sub. Po 55, N. Edmonton, Alberta.

VE7 - H.R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.

VE8 - George T. Kondo, VFR ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.

VO1 - Ernest Ash, VO1AA, PO Box 6, St. John's Newfoundland.

VO2 - Goose Bay Amateur Radio Club, PO Box 232, Goose Bay, Labrador.

SWL - Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

¹ These bureaus prefer 5x8 inch or #50 manila envelopes.

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

Changes of Address

Please advise us *direct* of any change of address. As our address labels are prepared in advance, please allow six weeks notice. When notifying, please give old as well as new address and Zip codes. Your promptness will help you, the postal service and us. Thanks.

List of Radio Museums



Bruce Kelley, W2ICE, secretary of the Antique Wireless Association, has assembled a list of radio museums in various parts of the United States. The list covers both public and private collections. Amateurs may wish to include a visit to one or more of these museums as part of their vacation plans.

The following are public museums:

Henry Ford Museum, Dearborn, Mich. One of the largest radio exhibits in the world, the material presented ranges from NAA spark wheel and broadcast receivers to the McMurdo tube collection.

Smithsonian Institution, Washington, D. C. This collection ultimately will be one of the finest in the U. S. Dr. Finn is currently arranging the radio exhibit, which will be open to the public.

Corpus Christi City Museum, Corpus Christi, Tex. This is a relatively new museum with an outstanding exhibit of rare commercial and broadcast equipment currently being laid out in a systematic manner under the supervision of Frank Smith, W5VA, owner of the local television station.

Canadian Bell Museum, Montreal, Que., Canada. Although emphasis is on development of the telephone, there is an exceptional display of early tubes and some radio equipment.

Signal Corps Museum, Fort Monmouth, N. J. This is a fine display of military communication equipment as well as some of a nonmilitary nature.

Electronics Museum, Foothills College, Los Altos Hills, Calif. Presently under construction, this museum will house the Douglas Perham collection and other material, including several Federal arc transmitters.

ARRL Museum, Main Street, Newington, Conn. (near Hartford). An outstanding exhibit of early amateur radio equipment displayed in several large glass showcases. It is open to the public on weekdays, 9:00 A.M. to 4:00 P.M.

Seattle Museum of History and Industry, Seattle, Wash. A continuous display of early wireless and broadcast equipment, which is changed every few months. Information on current exhibits may be obtained from Warren Green, W7JY, 7202 North Mercer Way, Mercer Island, Wash. 98046.

Thomas Edison Museum, Main Street, West Orange, N. J. A large public museum devoted to Edison's inventions; it runs the gamut from early light bulbs and generators to early phonographs and motion picture apparatus.

Deutsches Technical Museum, Munich, Germany. A large display of early German electronic and electric apparatus.

British Science Museum, Kensington (London), England. One of the finest radio exhibits in the world, it is carefully laid out to show development of wireless from the earliest days. The emphasis is on Marconi.

In addition are the following *private* museums. Those wishing to visit should write or call in advance as some are open only by special arrangement.

W6AX Pioneer Museum, 21120 Sullivan Way, Saratoga, Calif. 95070 Very early amateur and commercial wireless equipment plus unusual assortment of high potential apparatus.

Antique Wireless Association Museum (W2AN), Holcomb, N. Y. 14469 (near Rochester). A club collection of more than 30,000 items ranging from Fleming valves and early Marconi equipment to broadcast and World War I spark transmitters.

Gray's Museum of Wireless, Church Street, Mason, Ohio (near Cincinnati). An unusual private museum consisting of several rooms of broadcast, amateur, and commercial equipment plus a large collection of Crosley and Grebe receivers. It is operated by retired VOA/WLW engineer Jack Gray, W8JDV.

New England Wireless Museum (W1NTE), Tillinghast Road, East Greenwich, R. I. A museum of excellent quality with individual exhibits devoted to different pioneers (amateur, commercial, and broadcast).

W2ZI Wireless Museum, 19 Blackwood Drive, Trenton, N. J. 08628. Outstanding collection of rare commercial equipment, telegraph keys, and historical material.

Nelson Collection, Concord, N. C. A private collection in the home of Wayne Nelson, W4AA, owner of local broadcasting station. It includes broadcast, amateur, and commercial equipment.

Princeton Tube Collection, Princeton Junction, N. J. One of the world's largest collection of tubes. The owner, Howard Schrader, is in the process of laying out the display of 18,000 tubes in a separate building.

Pavek Museum (W0QEP), 55 South 12th Street, Minneapolis, Minn. Interesting collection of early broadcast and amateur equipment neatly arranged in showcases.

Freeman Collection, Yankton, S. Dak. A wide variety of early radio equipment and telegraph instruments in display cabinets. E. Freeman, K0MOA, is the curator.

Phillips Collection (W6GH), 1010 Monte Drive, Santa Barbara, Calif. A very selective exhibit of rare amateur and commercial equipment plus a collection of old-time wireless stock certificates.

England Collection, 6523 Repton Street, Los Angeles, Calif. A large private collection of classic broadcast and early commercial receivers.

Thompson Tube Collection (W9JWW), 1403 South Fourth Street, Effingham, Ill. 62401. A fine display of more than 1500 vacuum tubes plus 500 early lamps.

Lauren Peckham Collection, Ormiston Road, Breesport, N. Y. 14816 (north of Elmira). A large collection of early tubes, many of which are experimental types from Westinghouse. Also includes early radio and musical equipment.

In addition, there are those who specialize such as telegraph key collectors W2ZH and QST YL Editor WB6BBO, W6YPM and W7RD and W9AKH early spark equipment, Atwater-Kent specialist K4PI and early periodical authority W4ID.

This is but a partial listing — all told, there are over 400 amateur collectors and historians in the United States and Canada.

RET

Mandatory Considerations Relative to Expansion of American Phone Bands

BY A. PROSE WALKER,* W4BW

IT SEEMS there is continuous pressure on the Federal Communications Commission from various quarters to expand existing amateur sub-allocations for radiotelephone. This is nothing new, but probably the dB level of those who would like to bring this about is somewhat higher than in past years. Certainly, anyone who does any phone operating, or listening, would agree that the interference situation is pretty bad.

QRM varies with many factors such as the sunspot cycle, season of the year, time of the day, frequency band considered, whether there is a contest in progress (when isn't there one?), geographic location, etc. The same things apply to cw interference, of course, but there is a fundamental difference between the two emissions which enables an operator to handle cw easier than phone — *bandwidth*.

Practically speaking, the cw "advantage quotient" is from 15 to 20 times, depending on keying shape, transmission speed, and pass-band characteristics of receivers in relation to intelligibility. A relative comparison would also have to take into account similar aspects of the phone signal, such as side-band suppression, modulation level, audio clipping, etc. The amount of each of our bands to be used by the different emissions, permitted by the FCC, has always been controversial. Unfortunately, it is easier to let one's desires and emotions form judgments on the question, than for sound thinking to determine the course of action.

Earlier this year the President of ARRL, W0DX, asked me to give him my thoughts on this subject. I approached it with caution, knowing that it was

similar to having yellow-jackets in your britches in the middle of a hay field. The paper I prepared for W0DX was considered during the Board's discussion of this matter at the last meeting. I was not present and therefore any explanation of that action, if necessary, is up to others. The remainder of this article represents essentially the contents of that paper.

Basic Considerations

Our world has shrunk considerably since the early days of amateur radio, and any action in one part of the world now has a greater impact on other parts than ever before. The United States has always been the leader and champion of the amateur cause. Because of this, we must assume greater responsibility in respect to whatever we do here in the Americas. We must consider not only our own likes and dislikes, and needs for providing public service, but the resulting *worldwide* impact on both day-to-day operation and long term interests of amateur radio.

The following discussion will cover three main points:

- (a) *Domestic impact* of phone-band expansion on other sub-allocations, mainly CW;
- (b) *International impact* of U.S. phone-band expansion on other amateur radio societies and their members; and
- (c) Possible *international conference considerations* of such proposed unilateral action by the U. S. A.

Points (a) and (b) bear directly on the position of the ARRL for it would affect largely the attitude of its membership. The key premise of this discussion is that occupancy of a larger portion of the amateur bands by radio-telephone *must be at the expense of some other mode of emission*. Details of the domestic and international sub-allocations to phone, cw, etc. will not be discussed

* 12200 Pendercrest Ct., Fairfax, VA.
 † E.g., Chief of TV Allocations Branch, FCC, in preparation for 1947 Atlantic City conference; 18-year Chairman of Study Group 10, International Radio Consultative Committee (CCIR); CCIR National Committee, Department of State, and Chairman of its Aural and TV broadcasting preparatory work; since 1947, a member of U.S. delegations to 15 international conferences, and Head of two such delegations.

At the request of ARRL's President Denniston, international conference and allocations expert A. Prose Walker, W4BW, prepared a memorandum on the question of expansion of U.S. amateur voice bands for consideration by the Board of Directors at its May meeting. While many other points were also thoughtfully evaluated, "APW" has put the general subject in such sharp focus that it deserves reading by every amateur interested in long-term preservation of our bands.*

here. The crucial issues at stake will be discussed from a broad perspective.

DOMESTIC IMPACT:

Although this point is headed "Domestic", it also has similar repercussions on amateurs in other countries. Probably the greater the geographic proximity to the United States, the greater the impact, although by reason of the international character of hf transmissions, this would not necessarily hold for all locations nor for 100% of the time. Propagation conditions during the various seasons and portions of the sunspot cycle would have a bearing on this. We have just passed through the current sunspot maximum, and for the next several years there will be an increased load of activity on the bands in the lower portion of the spectrum.

It is well known that foreign amateurs tend to avoid operation within the American phone bands, although this is not entirely true and varies with many factors. However, foreign occupancy of non-U.S. phone frequencies is many times greater than that within our phone bands. Consider as merely an example, the case of 14 MHz, and a hypothetical expansion of phone from the present band of 14200-14350 to, let's say, 14150-14350. All foreign amateurs not wishing to operate in our phone bands would immediately shift their bands by an equivalent amount, (assuming they were permitted by their regulatory authorities) into the portion occupied by cw stations and some RTTY.

The QRM picture for cw would immediately become more intolerable. As it is, only about 75 kHz of the entire 20-meter band is generally occupied by cw by reason of RTTY in the upper 25 kHz, and foreign radiotelephone stations operating from 14100 (or lower) to 14200 kHz. Although it would require a lengthy statistical analysis to substantiate, an opinion based on knowledge of allocations and station assignments is that widening *any* American phone band by 25 kHz, or even 100 kHz, would not result in a significant alleviation of the crowded conditions in the bands.

The anticipated alleviation would result in more stations operating on phone, with the consequent increase in interference. The end result would be only the perpetuation of the same condition we now have, over an additional portion of the spectrum. Psychologically, the advocates of phone operation would be pleased by such a move, until it was realized that there was no real, lasting improvement in the interference situation. The same possibility has been considered many times by the High Frequency Broadcasting Service, but the expansion of their bands (to which agreement could be reached), would not make any valuable improvement in reception of their service. They can, and do, operate outside their allocated bands — but amateurs can not!

The consequences for foreign radiotelephone operation and cw stations world-wide, would be drastic and would merely bring about a more intolerable interference situation over the *entire* portion of the band. It should be stated that cw stations, notwithstanding the permissive operation throughout the bands, do not and can not make

use of those frequencies by reason of radio-telephone interference, except on an occasional basis and with generally anti-cw feelings on the part of phone operators when they do so.

By reason of the narrow-bandwidth of a cw signal, an argument could be presented that 75 kHz in the 20-meter band is sufficient for their operation. Such a viewpoint would perhaps prevail among those who are top-notch operators having modern equipment, with maximum available selectivity in their receivers. The percentage of such operators within the U.S. is quite low; not everyone has the means to obtain 100 or 200 Hz pass-band selectivity, and beam antenna discrimination from signals in unwanted directions. Rather than fostering amateur radio, such an expansion would bring about unbelievable chaos. I am sure that the Commission would not proceed with such a move without most carefully substantiating the dangers involved. It is my firm opinion that the conditions outlined here would prevail, to the overall detriment of amateur radio.

INTERNATIONAL IMPACT:

The operational impact of the subject expansion on other countries has generally been taken into account in the previous discussion. The ARRL is the Headquarters of the International Amateur Radio Union and therefore cannot disassociate itself with the international impact of such a move.

There are currently about 80 member societies of the IARU. The League is engaged in sponsoring interest and activity on the part of new and developing countries in the Amateur Radio Service. These are primarily on the continent of Africa, but there are other countries coming more fully to a realization of the importance of the training function of amateur radio to their electronics industries and consequently their national interests. Speaking on behalf of amateur radio and operation of LAIITU at the final CCIR Plenary session in Oslo 1966,¹ I took the occasion to emphasize, to the assembled heads of telecommunication regulatory bodies, the background of many delegates in amateur radio and the great benefits to be derived from sponsorship and encouragement of their young people in amateur radio.

It is important in this work, that the United States remain the "Amateur's Champion", and not appear to run rough-shod over considerations held by member societies in other countries. A unilateral expansion of our phone bands, even on a "foot in the door" basis, would undoubtedly create justifiable ill-will among a large percentage of IARU member societies. Past experience in similar situations would certainly serve to raise the flag of caution.

INTERNATIONAL CONFERENCE CONSIDERATIONS:

It is unknown at this time when an Administrative Conference of the ITU may be called to consider re-allocation of the hf spectrum. The current practice is to hold only service conferences which do not consider allocation, but only assign-

¹ QST, October 1966, p. 91.

ments and operations within their present bands. Such a conference was held nearly two years ago for the Maritime Service, and another is scheduled for the Space Services in June 1971. The latter will consider allocation of the spectrum to Space Services, amateur included. Sooner or later, the impact of the transition from use of the hf to transoceanic cables and satellite communication, will make it inevitable that countries of the world take into account these developments in allocation of the hf spectrum. Whether re-allocation will then be considered by Service Conferences or a World Administrative Conference remains to be seen, although the latter would seem to be the only practicable means of doing the total job.

The work of the ARRL through its President and others, in helping to establish amateur organizations in the three ITU Regions, is a most significant step in helping amateurs of the world to realize the hard facts of life bearing on allocations to the Amateur Radio Service. The Region I I.T.U. (European) group has been established for some time, but those in Region II and III are just getting off the ground. This effort, while considerable, is *only the bare minimum* which should be devoted to this aspect. My recent trip to India, Thailand, Hong Kong and Australia revealed how far we yet have to go as an integrated group of amateurs. The mechanics of developing positions of countries for an ITU conference are crucial in respect to the end result for amateur radio. These regional organizations constitute the first step in the liaison which could result in favorable influence on the positions of countries in their Regions.

Of great importance is the feeling of a unified and harmonious relationship with their counterparts in other countries, especially the ARRL in the United States. Anything which would tend to destroy the hard-earned respect and feeling within and among these organizations (and countries) would be a most undesirable and unfortunate event. The work which has gone into this endeavor

must not be jeopardised by any precipitous action to expand the U.S. phone bands. Such a move would only create consternation, ill-will, mistrust, and certainly in large measure, negate the efforts already expended toward a *long-range* solution of our problems, the consequent benefit to the Amateur Radio Service, and a unified modus-operandi for amateurs in all countries in dealing with allocations of the ITU.²

The long-range aspect of *anything* to be done must be of paramount consideration. Short-range pseudo-solutions can only result in harm to amateur radio, with the consequent possibility of its dissolution or deterioration into something not pleasant to contemplate. Our criterion for statesmanship must be the long-range goal, not one which might seem desirable for short-term reasons. Part of this goal would be intensive investigation and work which might produce justification, at some time in the future (three to five years) for requesting *additional amateur bands* as and when much current hf spectrum occupancy has been shifted to cables and satellites, ever on the alert for expansion of other services into portions of the spectrum to be vacated by those now occupying them. Such a goal could be approached with optimism only through close coordination and liaison with other countries of the world in their efforts to influence the positions of their respective governments before the ITU. *We must not jeopardize these efforts.*

Conclusion

For the reasons discussed, it is recommended that the ARRL assume a statesman-like position, consider paramount the long-range implications of an expansion of the American phone bands, and therefore oppose any proposals for such action by the FCC. QST

² Walker, "Two Plus Two Equals Four," *QST*, October 1948.

Strays



When Jamie White, 14-year-old junior op of W1VYM and W1CW, decided to try for Novice (after only ten days of study on the code) he asked Chuck Bender, W1WPR (or W1AW), to be his examiner. Chuck obliged — in spades: here's the text Jamie copied and sent.

"The metropolis at the confluence of the Monongahela and Youghioghney is McKeesport while Zelonople is on the Connoquenessing and Kittanning is on the Kiskiminitas"

Try that on your electronic key!

SBWAS No. 7

KH6BZF (left) did the honors just recently awarding SBWAS No. 7 to KH6SP. That's chief operator Les, K5LTH, accepting on behalf of the Sub-Base crew. To date, sixteen SBWAS Awards have been issued. In order, starting at No. 1: W1AX, W4IC, K9LBQ/7, W6ISQ, K0GJD, KH6SP, K4GHR, W4YWX, XE1WS, K4IEY, WA1IHN, W3WGH, W0WLO, W8BT, W2PV.

QST for

Strays



The Motor City Radio Club of Michigan (affiliated in 1933) recently honored Ralph Thetreau, W8FX, at their meeting. "Tate" (right) was presented with a plaque by MCRC President Dr. Robert Bruder, WA8VSO, in appreciation for his ten years of service (1959-1969) as SCM of Michigan.

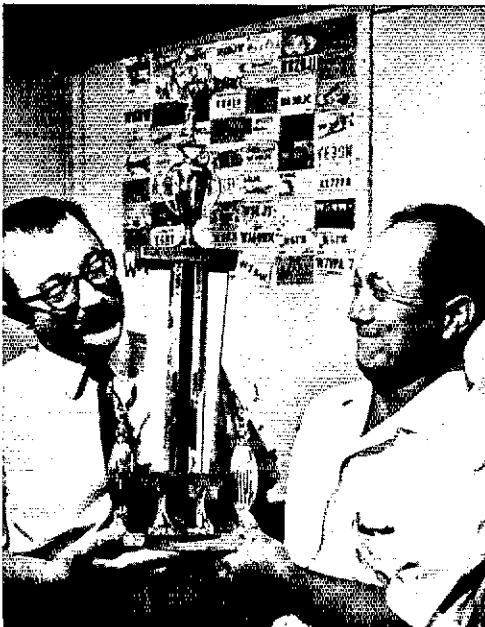
SWITCH TO SAFETY!

An amateur in Cleveland lost his life recently, trying to unstick a sticky relay with a pencil with the power on — 4000 volts on a linear final. His other hand wandered, and . . .

Another ham in California was working on a tower platform adjusting a multi-stacked array, when the antenna tilted and an element touched a 12,000-volt line. Miraculously, he escaped with third degree burns.



Good looks and charm alone could have won the West Virginia Amateur of the Year award for Kay Anderson, W8DUV, but actually the selection was based on outstanding contributions to organized amateur radio in the state — including an assistant directorship, and chairmanship of last year's Roanoke convention. Here presenting the award is Don Morris, W8JM, while proud husband Ed, W8DUW, looks on.



This beautiful trophy donated by KH6BM, Thomas Teruya (right) and sponsored by the Honolulu Amateur Radio Club, was awarded to WH6HDW, Peter Bissonette (left), Hawaii section winner in the 1970 ARRL Novice Roundup.

Happenings of the Month

DIRECTOR NOMINATIONS OPEN

HIGHER LICENSE FEES ADOPTED

ADVISORY COMMITTEE NOMINATIONS

JAMBOREE ON THE AIR

ELECTION NOTICE

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 21.

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 8 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 a 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 1971-1972 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 implementation, 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 21st day of September, 1970. 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 for 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 8 and November 20, except that if on September 21 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:* Harry J. Dannals, W2TUK and Stan Zak, K2SJO. *New England:* Robert York Chapman, W1QV, the vice-director's office is vacant. *Northwestern:* Robert B. Thurston, W7PGY and David O. Bennett, W7QLE. *Roanoke:* Victor C. Clark, W4KFC and L. Phil Wicker, W4ACY. *Rocky Mountain:* Carl L. Smith W6BWJ, and Thomas G. Banks, W5HJ. *Southwestern:* John R. Griggs, W6KW and Arnold Dahlman, W6UEL. *West Gulf:* Roy L. Albright, W5EYB and Lester L. Harbin, W5BNG.

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

For the Board of Directors:

July 1, 1970

JOHN HUNTOON, W1LVQ
Secretary

LICENSE FEES RAISED

Paying only the slightest attention to the protests of virtually the whole communications

service of the U.S., the Federal Communications Commission proceeded to adopt on July 1 the fees it had proposed on February 18, 1970. (In fact, the Citizen's Radio Service found itself facing — with most of the privately-owned "Safety and Special" services — a fee of \$20 for a five year license, up from \$19 proposed in February and \$8 prior thereto.)

Amateur fees have gone to \$9 for a five-year term, including renewals and upgraded licenses; \$4 for modifications such as change of station location; \$25 for those special callsigns authorized by Section 97.51 of the amateur rules. (It is worth mentioning that even with payment of the extra money, you can only get a special callsign if you're a previous holder of it; or you are applying for a "two-letter" call having held one earlier; or you are an Extra Class licensee who was first licensed as an amateur at least 25 years ago, or in the case of a club trustee you are asking for a call in memory of a deceased former holder of the call. It's not possible to "buy" a call you like if you don't meet one of these criteria.)

Continuing in the no-fee category are Novice licenses, RACES authorizations and military recreation station tickets. Strangely, the Commission let commercial operators licenses continue at the past rates: \$5 for Firsts, \$4 for Seconds, \$3 for Thirds, endorsements, \$2. The lifetime Restricted Radiotelephone permit has been raised from \$2 to \$8, and new \$2 charges are levied for verification cards Form 758-F and posting statements Form 759; for alien restricted radiotelephone and provisional radiotelephone third class, both of which are one-year documents.

Though there are grounds for amateurs to be very unhappy about these increases, virtually all other radio services have been hit, too, in the Commission's attempt to cover its whole budget of \$24,500,000; until now, the FCC has gotten about that amount from the Treasury but returned only about \$4,500,000 in fees to it. An example: a new TV station license for vhf in a "top 50" market area will now cost \$5,000 to file and \$45,000 if the license is granted! And while it will only cost \$500 to apply for authorization to build and launch a commercial communications satellite, the fee if the authority is granted will be \$100,000.

The Report and Order in Docket 18802 effective August 1, 1970, is 25 typewritten pages, with another 20 pages of appendix. We reproduce here, therefore, only that part of the order which directly relates to the amateur service.

Safety and Special Radio Services

38. In the hundreds of comments filed discussing the fees proposed for the Safety and Special Radio Services, the most common objection was that the fees do not reflect the Commission's actual costs of processing these applications. However, as stated in the Notice in this proceeding, the fees we have proposed are designed to cover the entire range of regulatory costs of the Commission and not simply application processing costs in particular services. They also take into consideration value and personal benefit to the recipients of licenses. The fees adopted herein meet these criteria. Thus, while the comments are accurate in

suggesting that the fees exceed application processing expenses, there is no merit to any contention that they are excessive, unrelated to the costs of these services, or beyond the scope of our authority.

39. Another contention made by many was that the general public is, in fact, the principal beneficiary of the activities of licensees in the Safety and Special Radio Services and, therefore, the general tax revenues should be used to support at least a part of the Commission's expenses. A variation of this argument presented by some was that it is unfair to raise the fees for most Safety and Special licensees while continuing the fee exemptions for some categories of licensees in these services. In particular, it was urged that the public, through the general tax revenues and not the other Safety and Special licensees, should bear the expenses related to regulating these categories of non-fee-paying licensees. Under the current fee schedule which has been in effect for several years, several categories of licensees have been exempt from fees and propose to continue these exemptions. To a large extent, they cover stations connected with public safety activities, state and local government services, disaster, emergency, and rescue activities, some educational work, regulatory work connected with the compulsory safety at sea program, and beginning Amateur radio operators. We consider these exemptions appropriate and in the public interest at this time and we note that objections were not directed to the specific exemptions themselves. The objection made reflects the mistaken notion that some licensees will be paying for the regulatory costs of other classes of stations. Our total fee schedule has been adjusted to cover all Commission costs, taking into account the regulatory expenses connected with particular services and also the value of the radio authorization to the licensees. In every instance of the new fees adopted herein for the Safety and Special Radio Services, there is no case where the fee is excessive, unreasonable, or unwarranted when value to the recipient is taken into account along with regulatory costs. Under these circumstances, there is no merit to the contention that some licensees are bearing the expenses of others.

40. Another objection was that the revenues raised through the collection of these proposed fees would exceed the "Bureau's share of the Commission's budget." A short answer to this contention, as more fully set forth in paragraph 4 above, is that there is no requirement in the statute that the "Bureau's share" of fee revenues shall not exceed its share of the Commission's budget or the cost of the Commission's activities involved therein. As set forth above, the Commission's breakdown of activity costs was an important, but not an exclusive, factor in establishing the fee charges adopted herein. However, there is no merit either in fact or in principle to the contention that Safety & Special Service licensees will be subsidizing other services. It has been clear for some years that a major portion of the Commission's fee revenues since the adoption of the fee schedule in 1963, have derived from the Safety & Special Radio Services. But since this apparent disproportion was not based upon discriminatory factors, the validity of the existing schedule had passed the test of judicial review, as cited above. In the same vein, the fee schedule adopted herein is no less valid because the estimated fee revenues from the Safety and Special Radio Services fall some \$93,205 short of the \$7,843,500 of Commission costs allocated to such activities.



Postal zones, freight tariffs, truck routes, United Parcel rates and delivery points, REA Express, Leonard's Guide, tape shooters, glue, reinforced tape, Corriflex, back issues of *QST* — these form the working world for ARRL's Traffic Manager, Sam Cowles, ex-WNICKZ. Sam came to the hq. twenty five years ago this month as a shipping clerk and since 1953 he has been in charge of our shipping operations in their entirety. Last year he and his crew (seldom more than three!) moved out 70 tons of *Handbooks*, 8 tons of *Antenna Books*, 44 tons of booklets and 18 tons of membership supplies. It's a complicated job; the right man

can save the League hundreds of dollars in the course of a year through wise selection of the carrier to use for a particular shipment — and Sam has proven to be such a man.

His shipping knowledge makes him valuable to the League, but his large collection of shirts and ties — most of them quite vivid — provide conversation for his fellow employees. His hobbies include an occasional round of golf, frequent duckpin bowling, taking movies and color slides, following the fortunes of the baseball Yankees — and an annual attempt to get tickets to the Colts-Redskins NFL football games! He follows the Indianapolis 500 closely, where he's always ready to cheer for cars with Offenhauser engines. Always pleasant and good natured, Sam has a sharp sense of humor. To an employee asking for an adhesive bandage, he replies: "Do you want the ones in the safe, or the ones in the refrigerator? The refrigerator? "Yeah, they're for cold cuts!" On the wall a sign hangs: "Tomorrow is half-price day at the Post Office." And another sign lays down rules for the shipping room: "No roller-skating on the ceiling."

But Sam's most lasting claim to fame has to be the homemade cheesecake he concocts for the Girls' Club picnic — and any other celebration the ladies can think up as an excuse. Dast they ask him to make one to celebrate his 25th anniversary on the job?

41. Some concern was expressed that the Safety and Special Radio Services fees will increase in the future if the Commission is to recover its budgetary costs through the assessment of fees. It is reasoned that so long as governmental expenditures rise, the Commission will have to resort to higher fees to remain substantially self-sustaining. In this context, concern was expressed that present and future spectrum management costs would be included in the Safety and Special Radio Services activity costs. In fact, the Safety and Special activity expenses now include its share of spectrum management costs and will continue to do so in the future. If the regional spectrum management project now under development and experimentation is continued and expanded, it may be expected that the costs of this program will be borne by the beneficiaries thereof. In any case, the Commission is obligated to keep the matter of fee schedules under continuing review, and if expenses of regulating these services rise, it may be expected that fee schedules must be adjusted upward.

42. The opinion was expressed by some that the fee to renew a station license should be considerably less than the \$19 fee which was set forth in the Notice of Proposed Rule Making as a basic fee for most of the Safety & Special Radio Services. Contrariwise, broadcasting interests noted that the ranks of the land mobile licensees include some of the largest and most profitable corporations; that land mobile users report substantial savings as a direct result of the use of land mobile

radio; and that, under these circumstances, land mobile licensees should be required to pay more than the \$19 fee. As previously set forth, the standard fee we proposed to establish in the Safety and Special Radio Services reflected the tremendous number of applications received in these services. Further, the benefits and value of a radio license to a Safety and Special Radio Service licensee is not readily comparable to the benefit and value of a radio license to a communications common carrier or to a broadcaster, and the same criteria are not applicable. For most Safety and Special Radio Services licensees, the authorized use of radio facilities is an adjunct to the licensee's principal business or for safety purposes, and the regulatory programs connected with these services are different from those associated with the regulation of the broadcast and common carrier services. However, in order to more equitably distribute respective shares of estimated fee revenues amongst the various services, the fee schedule adopted herein provides for an increase in the basic fee for most Safety and Special Radio Services to \$20, as against the \$19 previously set forth in the Notice of Proposed Rule Making. As indicated above, this further change will still leave Safety and Special Radio Service's share of fee revenues below the amount of allocated activity costs set forth in paragraph 4 above.

43. Since the proposed fee schedules for the Safety and Special Radio Services were first published in the Notice of Proposed Rule Making,

certain changes to Section 1.1115 have been made in response to the comments we have received and as the result of our own further reflection:

(a) The fees we will require of Operational Fixed stations using frequencies above 952 MHz have been raised from \$35 to \$75. We have reconsidered our original proposal, and feel this increase is warranted in view of the administrative effort devoted to the licensing and regulation of this category of station.

(b) Many amateur radio licensees stated that the basic fee proposed for the Amateur Radio Service (\$9) was too high, especially when compared to the fees that must accompany applications for commercial operator's licenses. We believe, however, that this difference can be justified by the difference in the services involved (i.e., the commercial operators' license is necessary to employment as a commercial operator, while the amateur is essentially a hobbyist, although oftentimes performing an important service). We also considered the suggestion that in the Amateur Radio Service there should be an examination fee and a license fee, rather than a single fee for all Amateur applications. We deny this suggestion because of the impracticability of administration.

(c) Another exception to those requests which do not require a fee has been added. A licensee will be permitted to file a request to correct clerical, typographical, and other similar errors made in an application for license, without submitting an accompanying fee, if the request is filed within 60 days of the grant.

(d) A new subparagraph has been added to permit a refund whenever a formal application not required by our Rules is filed by a current licensee in the Safety and Special Radio Services. A typical situation covered by this new provision would be where a corporation files a formal application to change its name without any concurrent change in its corporate structure or ownership, instead of simply notifying the Commission of this change by letter, as permitted by our Rules.

(e) At the present time, our rule covering the Safety and Special Radio Services reads in terms of "formal applications" and except for requests for duplicate licenses, STA's, and waivers, there was no intention to extend the applicability of fees to other than formal applications. Although the word "formal" was left out of our proposal by inadvertence, we are using it again in the rule herein adopted. Otherwise, the rule might be construed to have broader application than intended.

FCC RULES ON "INSIDE BAND EDGES"

In response to a question raised by an amateur, the Commission once again confirms that all components of a signal must be confined to the subbands permitted to the particular licensee. The text of the FCC letter:

If the sideband intended to be radiated falls outside the subband allocation for a licensee's particular operator class but on an amateur frequency, the operator would be in violation of Sections 97.7 and 97.63 of the Commission's Rules

Bienvenue! Here is a good way to make hams welcome at your next convention. The girls, (l. to r., the XYLs of VE2AXO, VE2WP and VE2DAK) served coffee and snacks to hams as they waited to register for the RAQI 1970 Quebec City convention.

for operation on an unauthorized frequency. If an unwanted sideband component falls in an unauthorized frequency band, it would be considered a violation of Section 97.73 for emission of a spurious radiation, in addition to being a violation of Section 97.63.

All parts of a signal, i.e., carrier and sidebands, should be contained within the authorized bands and subbands permitted by the class of the operator's license. Likewise, all unnecessary sideband components and other unwanted signals should be reduced or eliminated in accordance with the good practice requirements of Section 97.77 and the requirements of Section 97.73. — James E. Barr, Chief, Safety and Special Radio Services Bureau.

COMMISSION EXPLAINS CB ENFORCEMENT

Replying to a complaint by ARRL Director Sumner Foster, WØGQ about violations in the Citizens Radio Service, the FCC said:

We are aware of the widespread abuses of license privileges in the use of Class D Citizens radio stations and it is a matter of serious concern to us. The problems described by you are typical of those existing in the Citizens Radio Service.

We are making every effort to resolve these problems with the resources available. We impose monetary forfeitures or revoke the station licenses of proven rule violators when such action is warranted. However, we have only limited staff available at the various Commission offices to do the monitoring and investigative work necessary to prove rule violations. These offices handle a large volume of other work, including duties required by statutes and treaties which have been given higher priority. Consistent with other priority duties, we do devote a substantial amount of time to Citizens Radio Service problems. Realistically however, we simply do not have the personnel necessary to enforce the Citizens Radio Service Rules adequately.

Undoubtedly, we could enforce the Citizens Radio Service Rules more effectively if Congress were to authorize money for additional personnel and facilities. We have pointed out the problems existing in the Citizens Radio Service in the last four Annual Reports to Congress, but to date no material increase in funds for this purpose have been forthcoming. . . — E. J. Galins, FCC Engineer-in-Charge, Chicago, IL

Almost as if to punctuate the letter from Engineer Galins, we received the following news release from FCC's Washington office:



George Bennett of Detroit has been convicted of violating a U.S. District Court injunction against operating an unlicensed Citizens Band radio station and has been given a six-months suspended sentence and one year's probation in addition to having his radio equipment confiscated.

Bennett, known to other Citizens Band operators as "Unit 909," had his license revoked by the FCC last September for flagrant violations of Commission rules. Despite severe warnings from the FCC and an injunction issued by the Court, Bennett continued his radio operation. He was arrested and was sentenced on July 1 in Detroit.

FCC CHANGES WASHINGTON EXAM SKED

Amateur examinations are now conducted in Room 216 of FCC building, 1919 M Street N.W., Washington, on Fridays from 8:30 A.M. to 2:30 P.M. Code tests are given only at 9 and 10:30 A.M. No previous appointment is necessary to take an examination on regularly scheduled days, but groups of 12 or more going together should call for advance scheduling.

ADVISORY COMMITTEE NOMINATIONS

The League now has three advisory committees in specialized fields, VHF Repeaters, Contests, and DX. Rules adopted for these advisory committees can be found at Minute 19, 1970 Board of Directors Meetings, page 70 of July *QST*, and as an addendum to the Articles of Association and By-laws, June 1, 1970 edition.

Candidates for committee membership may be nominated at any time by three sponsors, each of whom is a Full Member of ARRL. Each candidate must have been a League member for a minimum of two years; licensed as a Technician or higher for three or more; and currently and consistently active and qualified in the specialty area of the field served by the advisory committee.

This is a call for nominations; convenient forms may be obtained by writing the secretary at ARRL Hq. The President, in consultation with the committee chairman and liaison members, on or about November 1 of each year, will select replacements for members whose terms are expiring, or shall reappoint them for a subsequent term as appropriate. A file of eligible nominees will be maintained for use as a source of replacements.

A member's initial term of office will be either for one or two years, as designated by the President, with approximately one-half the initial members having one-year terms and the remainder having two-year terms. Members may be reappointed for no more than two consecutive two-year terms, but are again eligible for appointment to committee membership after a lapse of one year.

The incumbents are:

V.H.F. Repeater Advisory Committee

- Gilbert J. Kowals, W9BUB, Chairman, 216 Belle Plaine Ave., Park Ridge, Ill. 60068
Taylor Shreve, W0CXW, 1230 Valentia St., Denver, Colo. 80220
Arthur M. Gentry, W6MEP, 7832 Jellico Avenue, Northridge, Calif. 91324
H. H. Lang, VE3ADO, 12 Orchard Drive, Port Colborne, Ontario

- Jon Marcinko, W7FHZ, 26501 18th Pl. So., Kent, Wash. 98031
George F. Munsch, W5VPO, 11314 Janet Lee, San Antonio, Texas 78230
Jon J. O'Brien, W6GDO, 6605 Fifth St., Rio Linda, Calif. 95673
George D. Rose, Jr., W4GCE, 105 Middleboro Place, Lynchburg, Va. 24502
Howard L. Lester, W2ODC, 8 Bath St., Alplaus, N.Y. 12008

Contest Advisory Committee

- James A. Maxwell, W6CUF, 18125 So. Santa Ana Rd., Los Gatos, Calif. 95030
Leonard Chertok, W3GRF, 8301 Temple Hills Rd., Washington, D. C. 20031
Roger Corey, W1AX, 60 Warwick Drive, Westwood, Mass. 02090
Jack duBois, K2CPR, 5667 Birch Ave., Pennsauken, N.J. 08109
Reno W. Goetsch, W9RQM, 929 So. 7th Ave., Wausau, Wisc. 54401
E. V. Gulden, W8DB, 4710 E. Rte 571, Tipp City, Ohio 45371
Jack Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec
Thomas A. Russell, WA0SDC/9, 300 Highland Ave. No. 8, Algonquin, Ill. 60102
Gene Sykes, W4BRB, 6510 Carambola Circle, West Palm Beach, Fla. 33406

The DX Advisory Committee was authorized at the 1970 Board Meeting, but appointments have not yet been made. Nominations are therefore particularly sought for this new committee — remember, the nominee and his three sponsors must be League members, and the nomination should arrive at Hq. before the end of October to qualify for this year's appointments.

JAMBOREE ON THE AIR

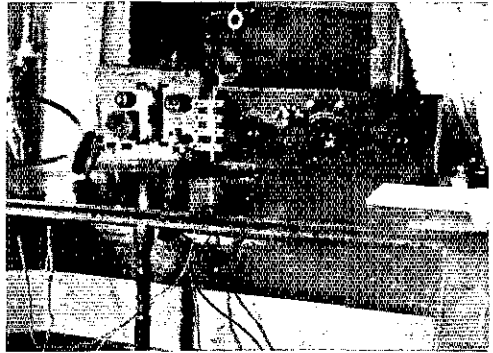
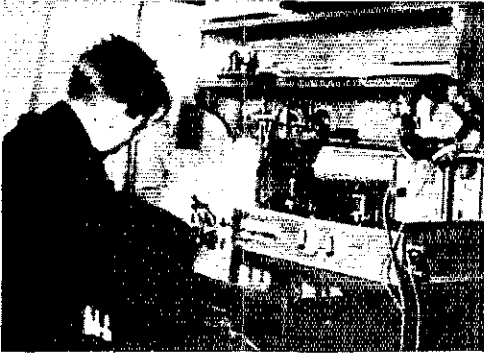
A concerted effort is made one weekend each year to demonstrate amateur radio to the boys and girls enrolled in Boy Scout/Girl Scout/Girl Guide programs throughout the world. The 13th Jamboree on the Air will be held the weekend of October 17-18, the full 48 hours being available starting at 0001 GMT. There are two main kinds of participation: an individual amateur who is enrolled in any of the Scouting programs may get on the air and chat with any other participant; any amateur, in Scouting or not, may make his station available to one or more Scout units, demonstrating amateur radio to the boys (and girls).

Calling frequencies include: 3590, 7030, 14,090, 21,140 and 28,190 kHz cw (but on 20, a QSY is suggested to avoid QRM to/from RTTY); 3940, 7290, 14,290, 21,360 and 28,990 kHz phone. In addition, stations outside the US will be using 7090 and 3740 for phone. After contact is made, ragchews should be moved off freq. to make room for other pairs to hook up.


The event is not a contest, but a certificate will be issued for participation by the National Organizer in each country. For the U.S., it's Harry Harchar, W2GND, BSA Hq., New Brunswick, NJ 08103. For amateur operators wanting to give a hand, local Scout council offices are usually listed in the telephone directory of a large city in each area.



Strays



Here are photos of early amateur stations owned by a couple of old timers who are still licensed amateurs today. At left is the operating position of 8WZ. The transmitter, located in the basement, was controlled from here. Doc is still licensed as W8WZ. The photo at right is 9BV at Lake Geneva, Wisconsin, circa 1912. Van now operates W4YM, Temple Terrace, Florida.



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(From the "Yellow Pages," Newton, Iowa Telephone Book)



An amateur radio station was established in the Tektite II Habitat, 50 feet below the surface of the ocean recently and is believed to be the first operated from a habitat. This Tektite project is a multi-agency cooperative man-in-the-sea program, headed by the Department of Interior, and co-sponsored by General Electric, NASA, U.S. Navy, Smithsonian Institution, the National Science Foundation, the Government of the Virgin Islands, and a number of universities. The station operated with the call sign W2YRQ/KV4 on 20 meters with the antenna on the diving barge above. Many contacts were made during the some seven hours of operation. Donna Lee Ferguson, XYL of W2YRQ reported that the effort was well received by all amateurs. "Only one contact thought it to be a hoax."

Membership in the Royal Signals Amateur Radio Society is now open to past and present members of the U.S. Army Signal Corps who have, in the past, been attached to or worked in close liaison with Royal Signals. Full details from General Secretary, RSARS, 15 Valley Road, Blandford Camp, Blandford Forum, Dorset, U.K.

The Squaw Island Amateur Radio Club of Canandaigua, New York set up and operated a ham radio display as part of the second annual Scout-O-Rama of the Arrowhead District Boy Scouts of America. The show was held at the N.Y. State Police barracks in Canandaigua (Troop "E") on April 11, 1970.

Operation was in the 20-meter band with the call sign WB2WYO/2. Using cw and ssb, seven countries were logged and nine states. Scouts and their parents were allowed to talk over the air, and a great deal of interest in ham radio was evident.

Also participating were trooper Doug Wakeman and WA2AOD, WA3NKF/2, WN2MKL and WA2BMM.

Microwave DX—

California Style

BY DICK KOLBLY,* K6HIJ, AND ED MUNN,** W6OYJ

THE SAN BERNARDINO Microwave Society was chartered solely to promote amateur communication on frequencies above 1000 MHz. To this end, SBMS has developed equipment and techniques that can be used by average amateurs, for effective communication over interesting distances. From time to time expeditions to desirable sites have been conducted, to demonstrate the utility of this gear, and to set new microwave communications records. An unwritten rule is that SBMS record activity will be with amateur-owned equipment only, to avoid unfair advantage over amateurs who do not have access to government- or company-owned gear.

Plans and Preparation

Since K6HIJ was to be in Northern California the week of June 13-21, 1970, this set the date for attempts at new records for the 3300- and 5650-MHz amateur bands. Terrain studies indicated that Mt. Hamilton, about 20 miles east of San Jose, and Mt. Breckenridge, 25 miles east of Bakersfield, were likely locations. Mt. Hamilton, elevation 4380 feet, is the site of Lick Observatory, and Mt. Breckenridge, 7580 feet, has a Forest Service lookout and two TV stations, so both mountains have road access. The distance, 214 miles, was a good extension of previous record distances for these bands, and the path looked favorable, though it is beyond line of sight, even without two known obstructions in the form of mountains in between.

Plans called for use of a 6-foot trailer-mounted dish at Mt. Breckenridge, and a 4-foot tripod-mounted one at Mt. Hamilton. Crystal-stabilized klystrons were to be used at both ends,¹ with provision for both narrow- and wide-band reception. With our available equipment, the fade

*26335 Community Blvd, Barstow, CA 92311.

**217 W. Old Mill Road, Corona, CA 91720.

¹ Jensby, "Stable Microwave Oscillators," July, 1966, *QST*, p. 33.

margin was calculated to be some 60 dB, but an inversion layer over the valley below us, or a critical frequency problem, could eat up that margin, and then some!

These rigs were developed by SBMS members, primarily the late D.L. Thompson, W6IFE, whose call the Society now holds as a memorial, and George Tillison, K6MBL. The system is shown in block-diagram form in Fig. 1. Called ROCLOC (Relative Or Crystal Local Oscillator Control) it allows the klystron oscillator to be frequency-locked to either the incoming signal (relative) or to a harmonic of a stable crystal oscillator (crystal). Use of a tunable afc receiver allows the klystron oscillator to be moved accurately in frequency without losing frequency lock.

The ROCLOC system is full duplex, through use of the "polaplexer" approach described several times in past issues of *QST*.^{2,3} The oscillators of the two stations are 30 MHz apart in frequency, serving the dual functions of transmitter power source and receiver local oscillator. The feed system, a circular waveguide of a size appropriate to the frequency band used, has probes that polarize the transmitted and received signals 90 degrees apart. Microwave engineers call this an orthomode transducer, but SBMS and most other hams like the more clearly-descriptive term, polaplexer. For 3300 MHz the "waveguide" is a half-quart beer can, and 1 1/2-inch copper pipe is used in the 5650-MHz version.

The Mt. Breckenridge group used a 2K28 klystron on 3335 MHz, and a 6I15A klystron on 5890 MHz. At Mt. Hamilton a 707B was used on 3365 and an X-26E on 5860 MHz. The 707B has a power output of about 200 milliwatts, the others about 100. The K6HIJ receiver has a 1N21D mixer, with a 30-MHz preamplifier having a cascode 2C51 and two 6AK5s. The 30-MHz i-f is fed into a BC-683 fm receiver, with an 80-kHz bandwidth. The 2.65-MHz i-f of the BC-683 is fed into a BC-348R, with an effective bandwidth of 2 kHz, using a crystal filter. The W6OYJ setup is similar, but with a 1N21F mixer, Nuvistor cascode preamp, BC-683, and a Drake 2B receiver for narrow-band reception.

On the day of the June SBMS meeting, K6HIJ and W6DSL loaded their microwave gear into (and on top of) K6HIJ's Volkswagen Bus, and drove the 100 miles from Barstow to Corona, where Society meetings are held. W6OYJ had his trailer-mounted 6-foot dish and all equipment ready to go, in his driveway, so the gear was checked out thoroughly on both bands. DX: 20 feet!

On June 12, the VW once again loaded with the

² Early polaplexers used by SBMS members were described in *QST* for December, 1957, p. 45, and June, 1958, p. 11.

³ Peterson, "Practical Gear for Amateur Microwave Communication," June, 1963, *QST*, p. 17.

Ed Munn, W6OYJ, operating from Mt. Breckenridge, near Bakersfield, California, during the 214-mile communication with K6HIJ/6, on Mt. Hamilton, on 3300 and 5650 MHz. Part of the 6-foot trailer-mounted dish antenna is seen in the left foreground.



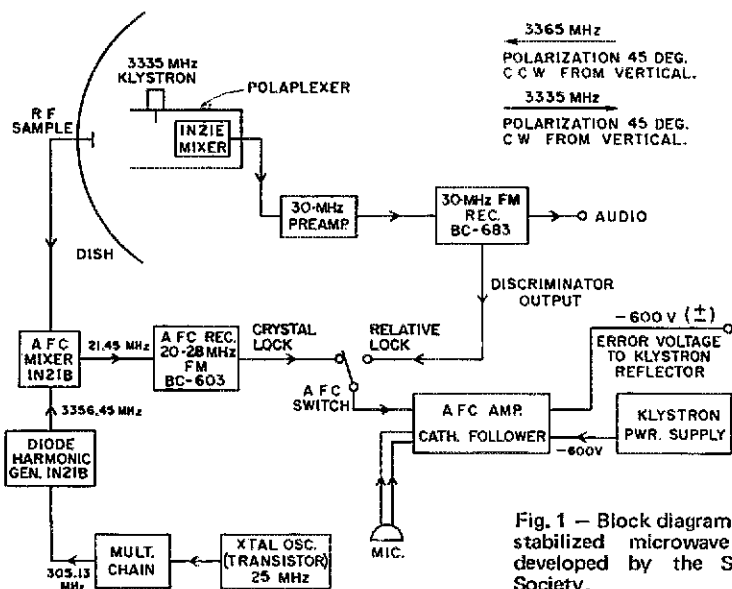


Fig. 1 — Block diagram of the ROCLOC frequency-stabilized microwave communications system developed by the San Bernardino Microwave Society.

microwave gear, hf liaison rig, and family, K6HIJ drove to Gilroy, where a base camp was established. W6DSL flew to Gilroy on the 17th, to assist at the Mt. Hamilton end. On the same day, W6OYJ, W6NVV and WA6ZKY packed the equipment to be used on Mt. Breckenridge and headed for the mountain, picking up WA6QYR in Mojave. Bill had scouted the road up the mountain, and possible operating sites, previously, so the happy caravan arrived at the summit without incident. By 2010 PDT the 75-meter rig was set up, working K6HIJ/6 in Gilroy, to ascertain that everything was satisfactory at that end. The 3300-MHz gear was tested, and the antenna bore-sighted for the record attempt. Then the portable barbecue was finetuned and loaded, and the party settled down to await the following morning.

The Big Day

K6HIJ, W6DSL and XYLs were up at 0330 PDT, ready for the drive to Mt. Hamilton. A test at 0700 had been scheduled, in case a morning inversion layer settled over the valley, with possibly excessive path loss. Earlier work was impractical, as we did not want to risk interference with the work of the astronomers using the observatory.

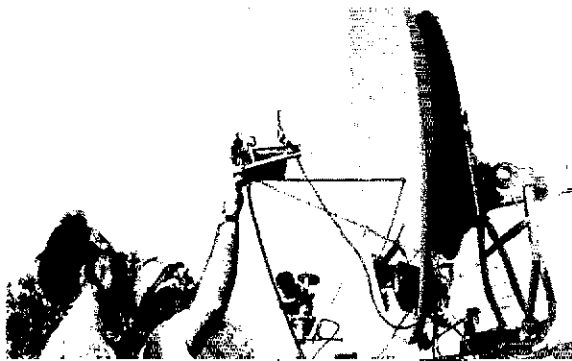
Arriving at the site of the Lick 120-inch telescope at 0620, K6HIJ set up the microwave station on 3365 MHz, and W6DSL prepared the 75-meter liaison rig. At 0650 a call to W6NVV/6 on 75 brought no answer, and the same again at 0700. But at 0705 K6HIJ heard a strong signal at

3335 MHz. The antenna was peaked quickly, and the signal was strong enough to quiet the wide-band receiver. At 0710, modulation, in the form of the voice of W6OYJ, using the call W6IFE/6, was heard calling K6HIJ/6. Signal reports and call signs were exchanged immediately, to assure a legal contact, in the event of a catastrophic equipment failure!

Signals peaked more than 40 dB over threshold, with fading at about 1-minute intervals, causing signals to drop into the noise for brief periods. Using 3335-3365 MHz we arranged communication on 75 meters, in case this was needed for further tests, an odd reversal of the usual hf and microwave roles. We then moved frequency in 100-kHz intervals to determine any sensitivity of the path for small frequency changes. After moving about 1 MHz, no significant differences were noted. W6OYJ then inserted a calibrated attenuator between the preamplifier and the wide-band fm receiver, and determined that 46 dB was required to bring the K6HIJ/6 signal down to threshold. This indicated that, with the narrowband receivers, the two stations should be able to communicate with one of them sitting on the surface of the moon! The 3300-MHz work ended at 0740, with a change to the 5650-MHz band.

Changing bands with the SBMS ROCLOC rig involves changing of the polaplexer, klystron osc-

Marvin Sass, W6DSL, left, and Dick Kolbly, K6HIJ, set the frequency of the 5650-MHz klystron, used by K6HIJ/6 on Mt. Hamilton, in the microwave record-breaking expeditions of the San Bernardino Microwave Society.



illator, and possibly the reference oscillator and mixer assembly. These tasks completed, the rigs were fired up and allowed to stabilize. Boresight and focus adjustments were checked at both ends. Initial contact was made, with K6HIJ/6 on 5860 MHz and W6OYJ/6 on 5890 MHz, at 0819. W6OYJ then locked relative to the signal of K6HIJ, instead of to his reference oscillator, thereby establishing a probable amateur record for the longest afc loop. Signals on the higher band were not quite as strong as on 3300 MHz, and fades occurred about every 20 to 30 seconds.

No difficulty was experienced in copying at either end, on either band. In no case was the hf liaison gear required. After a bit of ragchewing and talk of future plans, contact was terminated at 8:35 PDT. Two new records for SBMS, in an hour and a half! Perhaps more significantly, this was the first time that stabilized equipment, with its improved sensitivity, had been used in setting amateur DX records this high in frequency.

After the 5650-MHz QSO, K6HIJ returned to Gilroy. W6OYJ/6 shifted back to 3335 MHz, turned his 6-foot dish to a new bearing, and attempted for the next hour and a half to contact K6VYC, at his home in Corona. Site obstructions at Mt. Breckenridge, and several intervening mountain ranges, prevented any success over this 124-mile path. W6OYJ/6 closed down at 1020 PDT, and the group returned to Corona and China Lake.

Conclusions

From the signal strengths prevailing in this experiment, it seems obvious that the ROCLOC

gear could be used for very long-range over-the-horizon communication on amateur microwave bands. The expedition proved that the low-power narrow-band techniques are practical. The equipment used is well-documented, and it could be duplicated at moderate cost by the average radio amateur.

One thing that would help to promote amateur microwave communication would be to have more amateurs operating from their home locations. Most of the members of the San Bernardino Microwave Society maintain regular communication between their homes, which in most cases are not within line of sight. Low-band liaison and the telephone are not required. It is now well-established that amateurs *can* communicate over long paths on all frequencies up to at least 10,000 MHz. Despite this consistent performance, the line-of-sight myth dies hard. We need not go back too far to recall when similar limits were thought to prevail for our vhf bands. It is hoped that this SBMS team record, the result of years of effort and months of planning, will help to dispel the myth of narrow horizons for the microwaves, and encourage more ham activity on the "flashlight frequencies."

In closing, we would like to express our appreciation to John Bumgarner, K60IJ, and John Sylvester, of the Lick Observatory staff, who made space on the Observatory grounds available to us, and to Ranger John Marker of the Sequoia National Forest, and Verne Shatte, W6RJE, and the staff of KERO, Bakersfield Channel 23, who cooperated in the use of the Mt. Breckenridge location. QST

COMING A.R.R.L. CONVENTIONS

September 19-20 - Georgia State, Augusta.
September 25-27 - NATIONAL, Boston, Mass.
October 17-18 - Hudson Division, Tarrytown, N.Y.
Oct.31/Nov.1 - Roanoke Division, Raleigh, N.C.

ARRL HUDSON DIVISION CONVENTION

Tarrytown, NY October 17-18, 1970

The scenic Hudson River Valley, with its panorama of inspiring views that border the broad sweep of the historic river, will be the locale of the 1970 ARRL Hudson Division Convention on October 17th and 18th, sponsored by the Hudson Amateur Radio Council.

Focal point for the Convention's array of exhibits, demonstrations, lectures, contests, initiations, hamfests, banquet and just plain "eyeballing" will be the Hilton Inn at Tarrytown, N.Y., a picturesque hamlet made famous by Washington Irving's Ichabod Crane and the Headless Horseman, and so named three centuries ago by piqued

housewives whose men-folk were wont to "tarry" at the inviting taverns and inns.

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

Highlights of the affair will be lectures and meetings on MARS, DX, fm, ssb, traffic, antennas and, of course, YLRL, ARRL Hq, representatives will be on hand. Special contests will provide fun and prizes.

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

Registration is \$3.00 and is required for attendance at the meetings; there's no admission charge to the exhibit area. Banquet tickets are \$10.00 in advance and, if any remain, \$12.00 at the door. A check or money order to Mrs. Larry Strasser, Registration Chairman, 3591 Bainbridge Avenue, Bronx, N.Y., 10467, will speed your advance tickets to you.

Room reservations \$24 single, \$28 double, go directly to the Hilton Inn, 455 South Broadway, Tarrytown, NY. QST



Correspondence From Members-

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

STUDENT NETS, ETC.

● The anti-civil-libertarian attitude represented by the editorial in the July, 1970 issue of *QST*, which seems to be shared by a large segment of the ham fraternity, was primarily responsible for my abandoning ham radio as a hobby.

The essential feature of freedom of speech is the right to discuss and advocate any cause, including unpopular political causes. Limitation of this right is the hallmark of a police state, whether the limitation is imposed directly by the state or is self-imposed for fear of "consequences".

The right to freedom of speech is meaningless if it is allowed to exist only when it is ineffectual. Banning controversy from the ham bands limits the topics of discussion very severely. It justifies the argument that the public interest would be better served if the amateur portion of the spectrum were reallocated for more urgent needs. In a technical hobby such as ham radio, it is easy to forget that radio is not an end in itself, but a complex tool aiding the free interchange of ideas. — *Daniel Ross, ex-W6SDW, Palo Alto, CA.*

[EDITOR'S NOTE: "Radio" in general, and amateur radio in particular, are — thank goodness! — two different things.]

● I agree very strongly with your editorial on the National Student Information Net. We must keep politics and jammers off the amateur bands. A political discussion on the amateur frequencies is as inappropriate as a political speech on an air traffic control channel. We are a technical, point-to-point communications service. Leave the politics to the broadcast stations!

(In case any one from the New Left or the Radical Right thinks that I am an irrelevant old foggy; I am 25 years old and I am studying for my PhD in political science at Johns Hopkins University.) — *Nickolaus Leggett, WB9BVI/3, Baltimore, MD.*

● I resent your slur on the name of the former Senator Joseph McCarthy. Senator McCarthy was a great American who sought to call attention to some dangers besetting the United States. He was meticulous and accurate in all of his assertions. After he was hounded to his death by the anti-anti-communist wing he was proven correct in every case, usually by the admission of persons involved.

Individuals who interfered with the clearly illegal broadcasts of NSIN should remember that two wrongs do not make a right. But, you should remember that those who vented their frustrated feelings in that way, were at least, not collaborating with rioters or those who were destroying property. Neither were they advocating mass disobedience to the law of the land. — *William O. Muff, WN6KCO, Newport Beach, CA.*

● While I don't particularly hold with deliberately creating QRM I can well sympathize with those who have QRM'ed these creeps — particularly in view of the fact that the FCC would appear to have been overly tolerant of this sort of

(mis)use of the 40- and 20-meter bands. — *R. W. Hammond, K6SGQ, Long Beach, CA.*

● I'm ashamed to call you Hq. men brother hams! You advise us not to discuss politics on our bands. Why? Gentlemen, we have a piece of paper called the First Amendment. It amplifies my God-given right to say what I please, where I please, and to whomever will show an interest in what I say.

We've still got the United States Constitution in back of us. It's a beautiful document: think of it when you are on the air and don't be afraid to express yourself! — *Tracy Diers, W2OQK, Elmhurst, NY.*

● A controversy has recently arisen over the use of the ham bands by those opposing the Vietnam War. I support an amateur's right to discuss opposition to Vietnam on the air, just as I would support the right of an amateur to support the ABM on the air.

For that reason, I have filed RM-1631 with FCC. RM-1631 calls for the FCC to recognize explicitly in its regulations that we do have a right to frank and open, peaceful discussion of any matter on the air, be it political or otherwise. RM-1631 also calls for an end to the military's attempt, through MARS, to encourage complicity with a war which I believe illegal. — *Gerry Cohen, WA1CYT, West Hartford, CT.*

● Your latest editorial "No Vigilantes Wanted" is a much needed correction to the February, 1969, editorial. It is most welcome, even if we had to wait seventeen months for it! — *James M. Lomasney, WA6NIL, Palo Alto, CA.*

● Amateur radio's prime *raison d'être*, is public service. There is no denial that the older generation in the amateur radio has contributed heartily to this end. However, the younger members are stirring up the cobwebs, and maybe the shake-up will be good for us all. The one disturbing thing are those amateurs who deliberately interfered with the students' net. Violations of the law are up to the FCC, not some amateur with a "hard hat." — *Michael Lefkoe, K3LWY, Philadelphia, PA.*

● Two wrongs have never equaled a right — thanks for expressing my sentiments so precisely in your article. Most of us are truly ashamed of the emotional immaturity displayed by a few of the fraternity. The ARRL description reads ... "practically every worthwhile amateur in the nation" ... and those who were responsible for the childish tantrums during NSIN (which appalled me as much as it did others) and who have not realized the error of their ways would do well to excuse themselves from the League and our fraternity to pursue rock collecting, bird watching or something. — *George Hicks, WB6JFT, Fairfield, CA.*

● The NSIN editorial showed a tremendous insight, intelligence, thoughtfulness, and a remarkable understanding. In short, it amazed me. I actually found myself agreeing with 90% of what it said.

The student strike of last May and the NSIN occurred during extremely emotional times. Unfortunately, when people get emotional, they get carried away sometimes. The NSIN was not meant to be political, but did turn out that way. I half expected to see an outright condemnation of it in the next issue of *QST*: how surprised I was at the fairness of the editorial! — *Daniel Ostroy, WB2TUL, NY University ARS, Bronx, NY.*

FIT PUNISHMENT!

● Concerning the use of obscene language by amateurs: Whenever violators are found, assign them a four-letter call! — *Chris Mayo, WA5THN, Kemah, TX.*

BRIDGE TO COMMUNICATIONS

● As with other remote locations that have limited commercial communications facilities, Kwajalein Island has an active ham club which tries to provide a community service via phone patches and other activities.

Reading the friendly letter Hq. sent with my membership renewal has moved me to enclose a copy of a booklet recently issued so that the Kwajalein population would know of the club. This booklet was brought into existence by Stan Fierston, KX6FJ, and Ves Fulp, KX6VF. Each of these dedicated hams has served as president of the Kwajalein Amateur Radio Club.

While the hams here at Kwajalein are to be commended, the real heroes of the story are all the boys back in the states that unselfishly dedicate the hours to the patches. — *Charles C. Wilhite, KX6HW/WB2JLV, Kwajalein Island*

FEE INCREASE

● Come on now, gang, you didn't really think the FCC would relent on its increased fee proposal — in light of the skyrocketing cost of labor, the post office strike and the wage increases of other government workers!

It's like the cw requirement — if someone wants something bad enough, they always seem to get it, regardless of the hurdles. — *J. B. Flippin, K6FPR, Whittier, CA.*

OLDEST NOVICE?

● On oldest Novice — my brother Hugh, WNSABD, Shreveport, LA, was 71 on May 1, 1970. — *Vamie B. Lacour, WA5TQA, Baton Rouge, LA.*

[EDITOR'S NOTE: Any more challengers?]

THANKS — FOR WHAT?

● Well, I have been cranking the old HR-10 to WIAW's announced frequencies for a little while now, and I want to thank all you out there. Thanks for the practice in copying one station through a pile of QRM. Thanks for the practice in tuning in ssb, am, pulse, jamming, and RTTY. And thanks for teaching me what the FCC people should be called on the air, what you think of religion, government, Agnew, and incentive licensing.

But, fellows, if you don't get that S-1 cw out of there, I'll have trouble copying the SSTV over it! — *Scott Schrader, WNØ???, Fargo, ND.*

NEW INCENTIVE!

● Before January 1970, I didn't know what ham radio was — now I am one.

I'm not an electronics engineer, either; I'm a pharmacist, age 40, and I never learned the code before in my life, but I worked like a nut for five months, because I wanted to.

I think I have discovered the true definition of incentive licensing — if you want to get a ticket, go

out and purchase a complete ham station. Put up the antennas and everything. With that thing sitting there and you not able to use it, *that's* incentive!

— *Charles K. Ross, WN9EJV, Glenwood, IL.*

REPEATER DOCKET 18803

● I agree 100% with League's proposed repeater rules. Definitely shows interest, concern, and good common sense. — *William F. Guennewig, Jr., WA9WOB, Arcola, IL.*

8JK BACK AGAIN!

● Sure was a thrill to see an article by John Kraus again. Seems like a hundred years since W8JK was writing about his wire antennas in *QST*, and *Radio*. Hope he has some more articles. — *E. G. Taylor, W6DOR/W7BYF, North Highlands, CA.*

A WINDFALL? UGH!

● I have just received a check for \$2,300 — all because I am an amateur radio operator. Great, isn't it? But wait til you hear the rest of my story.

A few weeks ago I signed a contract to buy a new house in a housing development which is under construction. After I signed the contract, the builder sent me the building restrictions. One provision was that no antenna more than four feet in height could be erected without written approval. I made formal application for a 75-meter dipole and an 18-ft. whip. In a few days I was called to the office and told my application could not be approved. I argued a while, and finally the developer made a concession: he would approve my request if I would sign an agreement that if he received any complaints of TVI, I would take down my antennas for all time. I thought about it a few days and finally decided I didn't want the house that badly. So that was when I got the \$2,300 — the refund of my deposit.

We hear a lot about discrimination for race, color, religion, national origin, etc., but isn't this discrimination against ham radio operators? — *Willard J. Prentice, W3VBM, Baltimore, MD.*

BOOK RATE

● I recently ordered and received promptly a copy of the 1970 Handbook which seems as good or better than previous years.

However, I was a little saddened to see that it cost \$.70 to send thru the mail when as far as I know, it could have gone by the "Book Rate" for something like \$.22. This could amount to a pretty big waste if much of this goes out incorrectly. *H.F. Trautmann, W1GK, Islesboro, ME*

[EDITOR'S NOTE: Wish we could send the Handbook at "book rate" but since it contains advertising, it's not eligible for that special subsidy.]

GETTING THERE ... (ENCORE!)

● It is rather amusing to read the gripes recently published in *QST*, concerning late mail deliveries. Down here on this remote island we often receive, for example, the March issue of a magazine before the February issue. A delay of one or two months in boat mail is not unusual. (However, *QST*, has so far been right on schedule.) Your members who gripe about a few days delay don't realize how lucky they are! — *Joseph H. Miller, PJ9AB/WAØODX, Netherlands Antilles*

● Your comments in the April and May issues concerning mailing troubles were particularly interesting to me because both magazines were delivered *simultaneously*, on May 27th. However, *QST*, is always worth waiting for! — *Jack Cooper, G5VT, Bishop's Stortford, England*

● After reading "Getting There Half The Fun" and listening to everyone complain about getting *QST*, late, I say they should be happy that they get their *QST*, in the right month and not 3 or 4 weeks before like other magazines. Just because they come a few days into the month don't mean they are late. *QST*, is the best for everyone. Keep them coming. — *Gary H. Somnitz, WN8GED, Madison, OH.*

● The letters you receive on late delivery of letters and magazines are absolutely ridiculous! At most it takes a first class letter 3 days to cross the country! Second class mail takes only one or two days longer (such as *QST*), and if you're lucky, exactly the same amount of time as first class mail. Of course it might take one extra day during the holiday season. The post office could not deliver a letter late, even if they tried.

Hope you have a Merry Christmas and a Happy New Year. — *James Rautio, WN2LQW, Barton, NY.*

HAIL AND FAREWELL

● I regret with sorrow the passing of Albert J. Lee, K7JMV, of Salem, Oregon. Al was lean and lanky, in style with the historically fine men who come from Illinois. At 55, he was young in spirit and laughter, but his heart was older than his years and gave out no doubt having worn down from giving too much of itself to many people. I first met Al Lee eleven years ago when I was a stranger in Salem, having moved into that city to get married and go to work. Al shouted a "hello" to me from the far side of a supermarket parking lot and followed that with a quick stride up and a firm handshake. I thought I must have known him from some other city, for I knew almost nobody in Salem. It turned out that he had seen the call tag on my car and in his own style and the best hospitable form of amateur radio, welcomed me into the city.

In the years that have passed, he staked me to equipment to keep me on the air while I was a student in the University of Oregon and always seemed more interested in my minor ham work than he was in the high-style systems he was constantly designing and building. Although he worked hard hours with his hands for the gas company welding pipes, he could touch just the right amount of heat to wires in a critical electrical circuit. The heart attack cut Al's life untimely short, for he had just started setting up a radio shack in the Salem Boys' Club. Now, those young fellows will never know his kindness and wisdom, nor will it be passed on. Al and his XYL Grace had no children.

In my job as a television reporter, I cover riots, daily deal with death in many forms, and have become hardened to tragedy, but when I heard of Al's death while I was on a special assignment in New York, my thirty-plus years were reduced in composure to tears. It is in his memory that I apply for a Life Membership to the ARRL in hope that I may help in whatever ways I might to add some extra luster to the hobby that Albert Lee loved and lived so well. — *Dick Dougherty, W6BDU, San Rafael, CA.*

MISDIRECTED QSLs

● A QSL card addressed simply to "ARS K7XXX, Seattle, Wash." or to "Chief Operator 'Bertie' WN3XXX, Baltimore, Md." just won't get delivered! Call letters on a card are of no value to most postal clerks.

A QSL card (any mail for that matter) must carry a complete name and address. Post office

regulations do not permit return (or forwarding) of post cards and they have no alternative but to destroy them! — *Howard S. Pyie, W7OE, Mercer Island, WA.*

TEENS

● Your magazine is truly great, with the columns for DXers, Novices, YLs and many more, but why not make it better by having a teen column? I think it would be fun and worthwhile — what do you other teens think of this? [If enough people write in, maybe something can be done about this.] — *Tom Schwartz, WN1LSH, Rockville, CT.*

KIND WORDS

● Lewis G. McCoy, W1ICP, Beginner and Novice Editor, does an excellent job. His efforts are appreciated. — *John E. Walker, WA6SCE, Bakersfield, CA.*

● Too many hams complain about the ARRL and that they are doing this and that all wrong. These complainers are the ones that never use the services that the ARRL offers. I wrote asking for awards information and I received my information. I wrote asking only for information on where to write to in order to get an application for a French F0 license. The Hq. did not send me the address; instead they went one step farther and sent me the application. I have a terrible problem with stereo and TVI. I wrote asking for help and Lew McCoy, W1ICP, of your staff quickly answered my letter and helped me solve my problems. If I had the money for a Life Membership I would be glad to pay the fee, but I am only 18 and that kind of money is hard to come by. Keep up the good work; I for one appreciate it! — *Richard E. Dorsch, Jr., WB8ABN, Rochester, MI.*

● I would just like to thank the ARRL contest committee and all the wonderful Novices for a real nice Novice Roundup. I have found the ARRL very enjoyable since I joined last year with your contests, ham gear articles in *QST*, and of course, the WIAW code practice transmissions. If any hams need Arkansas for a WAS or 5BWAS I am usually on 21 MHz cw from 2300 to 0300 GMT. — *Don Banta, WN5ZKE, Green Forest, AK.*

● The 1970 Handbook is unbelievable in scope and depth: congratulations on an excellent editorial work! — *Roger H. Caldwell, K7QQH, FPO Sa Francisco, CA.*

NOVICE NUISANCE

● I am well aware that Advanced and Extra licenses entitle hams to use the Novice frequencies but nevertheless, I feel that it is selfish to do so. Most Novices at 75 watts with crystals can not compete with 2000 watts and a vfo. They can move elsewhere; we can't. — *John B. Franklin, MD, WN1NCJ, West Hartford, CT.*

WORKED ALL PLANETS?

● As a young ham, age 15, I am interested in the exploration of Space. Well, how about the day we terrestrial hams can QSO some astro-hams with such QTHs as Tranquility Base or Oceanus Procellarum? Sure, astronauts on the moon could take along some portable ham gear and work mobile on the way up for some real good DX, hi. Terrestrial hams could even run phone patches for them. You could even form a WAC, Worked all Crater, certificate or WAP, Worked all Planets, certificate for the ambitious ham.

If you should decide on the latter, I have one contact for it already — Earth, *Randy Buckspan, WN5BK, Austin, TX*

I.A.R.U. News

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

SPACE CONFERENCE PREPARATIONS

With less than one year until the start of the ITU World Administrative Radio Conference on space telecommunications, IARU member-societies are accelerating preparatory efforts. The Conference, to be held in Geneva beginning June 7, 1971, will examine the frequencies allocated for the use of space communications techniques, including those for the amateur service. No significant change in our band allocations is contemplated. However at stake is the international authority for the amateur service to use its allocations for space communications purposes.

There currently exists a footnote to the Radio Regulations specifically authorizing transmissions from artificial satellites in the world-wide two-meter band. Some countries take the position that inasmuch as there are no similar footnotes elsewhere, such activity is permissible *only* in that band. If amateur satellite transmissions remain limited to 144-146 MHz, the development of amateur space communications techniques will be unduly constrained. Thus it is an objective of organized amateur radio to seek greater freedom for the use of space techniques.

Initial indications are that the amateurs' request for more permissive space communications regulations will not go uncontested. In fact, even countries whose attitude toward the amateur service is described as being favorable have expressed serious reservations to amateur space operations! Unfortunately, many nations appear to feel amateur satellites should be permitted to operate only in exclusive world-wide amateur allocations (7, 14,

21, 28, and 144 MHz bands). The reason behind this view is to protect other services from interference in bands shared with amateurs or allocated only on a regional basis.

In order to obviate such a frequency restriction, ARRL, joining with the Radio Amateur Satellite Corporation (Amsat), has proposed we be allowed to operate satellites in all amateur assignments, consistent with the radio regulations of the respective countries, provided that an adequate means such as ground control is provided to prevent harmful interference to other services, and indeed, to terrestrial amateur communications. It is felt that the operation of Australis-Oscar 5 clearly demonstrated that amateurs are capable of controlling a satellite by ground command, and that through this technique, harmful interference to other communications can be effectively alleviated. The full text of the ARRL/Amsat comments appeared on pages 89-92 of *QST* for August, 1970.

WIA's 60TH ANNIVERSARY

This year, IARU member-society the *Wireless Institute of Australia* celebrates the 60th anniversary of its founding. It was in 1910 when the Wireless Institute of Victoria (which includes the Wireless Society of Victoria) and the Wireless Institute of New South Wales banded together to share and advance their common interests through formation of the *Wireless Institute of Australia*. WIA's membership now totals 4430 including 2900 licensed radio amateurs, and publishes a monthly journal, *Amateur Radio*.

HAM HOSPITALITY

An interesting plan for displaying hospitality among U.S. and foreign amateurs is in operation.

The "Ham Exchange" was originated by Fred Trode, DL8VQ/W2, 225 Candee Ave., Syracuse, NY 13224. The basic idea of this program is to provide volunteers to offer room and board to visiting hams in the program. A pilot program has operated for two summers now, between the U.S. and Germany, and the exchange has taken place in both directions. Based on the excellent results, future participation in the "Ham Exchange" is hoped to be on a world-wide basis.



This badge was produced in 1909 by the Wireless Institute of Victoria, one of the participant-groups in the formation of the present *Wireless Institute of Australia*.

These are the participants of the 1970 DUØDM expedition to Corregidor Island sponsored by the *Philippine Amateur Radio Association* in February. From left are WA6KCD, DU1GF, DX1HMI, DU1RTI, ex-KA1DL, ex-KA1GZ, DU1SA, and DU1BEN.



FREQUENCY MANAGEMENT SEMINAR

Biennially the International Frequency Registration Board of the International Telecommunication Union holds a frequency management seminar at its headquarters in Geneva, Switzerland. This year's seminar is to be held September 7-18, and as in past years IARU headquarters will be represented by W1IKE.

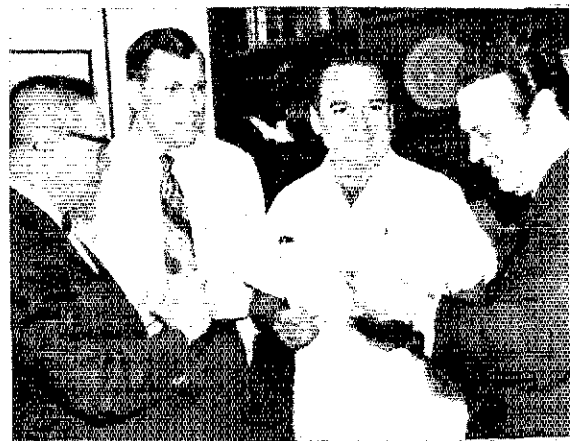
The Frequency Management Seminar is aimed at assisting administrations, particularly in the developing countries, more efficiently to manage their use of the radio frequency spectrum. Thus, a good opportunity is provided for representatives of the amateur service to meet with telecommunications delegates from other countries for the purpose of increasing the awareness of the values of the amateur radio service.

REVISED REGULATIONS IN TF

The *Islenzkir Radioamatorar* (Iceland) reports several favorable changes in their regulations concerning amateur radio. A novice license is now available to applicants at least 14 years of age. It carries a two-year term and permits operation using crystal control, five watts, cw, and transistors only!

Other regulatory changes include a power limit increase to 500 W PEP output, additional spectrum allocations of 430-440 MHz, 1215-1300 MHz and an extra 75 kHz on 75 meters (was 3775-3800; now 3700-3800).

IRA attributes the favorable rules changes to close liaison with the licensing authorities.



Here are officials of the *Club de Radio Experimentadores de Nicaragua* meeting to discuss the society's official QSL cards. Shown from left are CREN secretary YN1LH, YN1AL, CREN president YN1NT, and Lcco, Jaime Morales, Indesa General Manager. CREN will serve as the host club of the annual convention of the *Federacion de Radio Aficionados de Centro America y Panama*, to be held in Managua, September 11-13.

NOTES

The 1970 VK/ZL/Oceania DX Contest sponsored by the *New Zealand Association of Radio Transmitters* and the *Wireless Institute of Australia* will be held during October. The phone section will be from 1000 GMT October 3, to 1000 GMT October 4, and the cw section from 1000 GMT October 10, to 1000 GMT October 11. Full details are available from the WIA, Box N1002 GPO, Perth, W.A. 6001, Australia.

The International Amateur Radio Club announces that its annual convention will be held from September 18 to 20, at ITU Headquarters, Place des Nations, Geneva. The convention theme will be "The Radio Amateur and Education," and will consider both the education of radio amateurs and the radio amateur's aid to education.

DL6WD recently visited ARRL/IARU headquarters and was surprised with the presentation of the March, 1970 *QST* Cover Plaque award for his article, "An Engineer's Ham-Band Receiver." Above, Rudy (left) is shown receiving the award from W1LVQ.



The World Above 50 Mc.

1115-1500 2300-2450 3500-3550 4550-5925 10,000-10,500 21,000-22,000 35,000-?

CONDUCTED BY BILL SMITH,* KØCER

LAST MONTH we set the record straight regarding the best 2300-MHz DX worked in the United States up to that time, but before the correction could appear in print the 2300-MHz world DX record was extended to 249 miles. The new holders are W4HHK and WA4HGN/4.

Equipment and antennas used have been described in these pages previously. The W4HHK 18-foot dish is shown on page 31 of August, 1967, *QST*, and the WA4HGN trailer-mounted 10-footer is pictured in September, 1969, page 86. Both stations use high-stability crystal-controlled cw rigs.

On July 10, WA4HGN set up for business on Sunset Rock, an 1860-foot elevation east of Sparta, Tennessee, in the Cumberland Mountain country. W4HHK is in Collierville, just east of Memphis, more than half the state away. The first attempt that evening was unsuccessful, but whether this was the result of poor antenna aiming or propagation conditions is not known. Two-way communication was established on 2304 MHz at 1326 GMT, July 11.

WA4HGN/4 has operated from various high spots in the past, gradually extending the best two-way communications distance with W4HHK. Lest anyone think that merely getting up at some choice site is the sole key to working long distances with this kind of equipment, it should be pointed out that this path is more than 160 miles beyond line of sight, even if there were no hills in between. Terrain at the eastern end is rough, and at the western end W4HHK's dish "sees" the horizon within a few miles.

Line of sight is long-gone as the sole requirement for uhf and microwave DX. Even the 214-mile path used by the San Bernardino Microwave Society teams in the record-setting expeditions reported last month is well beyond visual,

*Send reports and correspondence to Bill Smith KØCER, ARRL, 225 Main St., Newington, Conn. 06111.

even without the high points that intervene along the way. With all our microwave records up through 10,000 MHz now well over the 200-mile mark, it should be obvious that equipment design, operating expertise, and propagation conditions are at least as important as high locations, in microwave work as well as on lower frequencies.

Moonbounce in New Zealand

An editor is constantly probing the interests of his readers. Some topics find wider acceptance than others, and more often than not they aren't what the writer would have guessed. In February *QST* we published most of a letter from John Morgan, ZL1AZR, describing 2-meter moonbounce experience that led to the DX record he now holds with SM7BAE, in Sweden.

John writes that May was a "vintage month" at ZL1AZR. He and SM7BAE completed contacts on five consecutive schedules. These were on cw, but Kjell's ssb was good copy in New Zealand, on May 15. Their May 30 contact was their 20th, which must be some kind of record for an 11,000-mile path on 2 meters!

ZL1AZR worked K6MYC on July 7, for the first 2-meter work between New Zealand and California. They had worked toward this since 1967. This contact was heard in Vancouver, BC, by VE7BQH.

In the February letter John mentioned his 3N140 preamplifier, and has since received many requests for more information. His circuit is practically identical to that used in the first stage of the W7HCV receiver in *QST* for May, 1970, page 13. Similar transistors with protective diodes built in are now available. These should be especially desirable in antenna-mounted amplifiers.

Another New Zealand 2-meter moonbounce station, ZL1MO, is operated by Irving Spackman. He is not far from his EME contact and I think you'll find his story interesting.

"I have been interested in EME for many years. Ten years ago I was active in a vhf group here in Auckland. We were going to try moonbounce on 2 meters using the facilities of the Auckland University's Radio Research Centre. No echoes were received and nothing further came of this as overall interest waned. I later considered 432-MHz moonbounce and even had a 1-kW permit issued, but my main troubles at that stage were noise figure and feedline loss. After some months of playing with antennas for 432-tropo work I decided to duplicate one of my 432 antennas and try it for EME on 2.

I have known John, ZL1AZR, personally for many years and with a little prodding from him, finally got cracking about 18 months ago. In May of last year I was in the States for a couple of

Known for their Louisiana six-meter exploits are Mary, WA5TTH, and husband John, K5AGI. (KSMDV photo)

QST for



weeks and dropped in on Mike, K6MYC, Bob Sutherland, W6UOV, and Bill Orr, W6SAI. Mike gave me more encouragement and I got more enthusiastic. Firstly I had to build a suitable receiver for the job. This I did using all MOSFETs and a VXO on 13.45 MHz, covering only 10 kHz. The existing 2-metre converter coming out on 14 MHz seemed quite stable so the only requirement was a low-noise preamp for mast-head use. An RCA 3N140 had consistently given good noise figures, so this was put into service.

The transmitter was a little more of a problem. I was lucky to be given a pair of 4CX250s by Bob Sutherland. I had to get a blower from England to suit. Then we had problems getting a suitable power transformer. This was solved by an ex-Navy employee who had some surplus transformers and chokes which he donated to the cause. I then had to build a very stable frequency source for my exciter. This is a transistor VXO, and it is excellent.

Finally the antenna was built. It is 48 elements, dipoles extended and end-fed in collinear fashion, with reflectors and directors spaced in 2 bays of 2 sections, at $3/4$ wavelength, and phased with 300-ohm open-wire line. Two full bays are spaced $5/8$ wave between inner ends to give best gain versus clean pattern.

This antenna seems to be giving the design performance and plans are to try to get another couple of dB out of it by increasing the length of Yagis from 3 to 6 elements, as bay and collinear spacing will still be satisfied. A narrow-band audio filter and tape recorder completed the list.

Well now, what are results to date? Until recently I did not have a good antenna relay suitable for the power at 144. All of mine were 100-watt plus types. I have managed to get one which is quite good. With this now to hand we will be putting the kW on the air shortly. However I have done a lot of listening and got a lot of good signals on tape. I am able to process all the altitude-azimuth data on a computer. Incidentally, I work in the electronics section of the Chemistry Dept. of the University of Auckland, and pass this information on to ZL1AZR.

I have had some signals from SM7BAE on about 8 schedules, with some good copy for a whole 2-minute period. I would have been able to give "O" reports on several occasions however."

Mike, K6MYC, reports growing interest in 2-metre EME in Japan and Italy, and another stateside station is ready for schedules. Details in the Operating News.

2-Meter E_S

Reports of 2-metre sporadic E are beginning to filter in from this summer's record-breaking E_S season. W5ORH, Oklahoma City, questions whether short E_S on 50 MHz is necessary for 144-MHz E_S . Jay heard or worked 2-metre E_S on May 10, 16, July 1, 9 and 11. On each occasion, 50-MHz E_S signals were heard from only the normal 800- to 1200-mile range.

On July 1, Bob Cooper, W5KHT, who has been doing a series of propagation experiments the past several months, tipped off Jay at 0100 GMT that E_S was forming to the northeast. W5ORH put his 144.1 beacon on the air and at 0137, was answered by W9AAG. The 600-mile signals from Illinois were strong, but as if the transmitter was being keyed on and off, words or sentences would be lost as the muf would drop briefly below 144 MHz. W5KHT was seeing similar characteristics on TV



Pictured is John Morgan, ZL1AZR, known for his 2-metre EME work with SM7BAE. Information on current New Zealand moonbounce activity appears in this column.

signals from the same area. At 0146, W5ORH worked WA9DOT, Wisconsin, over a 743-mile path, and W9YYF, Illinois, at 0152, 630 miles, with similarly erratic signals typical of unstable E Strong 50-MHz E was heard over similar paths, but no short-skip signals.

July 11, around 1400 GMT W5ORH was hearing strong E from W2s on 28 and 50 MHz, but nothing shorter than 1200 miles. Jay again activated his 144.1 beacon, and was almost immediately answered by K2RTH, about 1300 miles. Bruce's signal peaked S7 in Oklahoma City and was copied for about 5 minutes. Suddenly it disappeared and a check on 50 MHz showed that band had shifted to the third call area. Jay heard other signals, but none loud enough to identify. He also heard E_S on 144 from California July 9, but not strong enough to work.

W5ORH wants to stress that 144-MHz E_S is probable much more often than it is worked, and that the most likely way it will be worked is if 2-metre operators will utilize 144.1, and transmit when E_S is intense at 50 MHz. Operators should use the common meteor-scatter sequencing: western stations transmitting the first 30 seconds of each minute and eastern stations the second 30 seconds. Jay says, "the openings may be short-lived, and result in one or two contacts, but working E_S is much easier than m.s." He also emphasizes tuning during the listening periods. W5ORH missed a contact with W3LUL, Maryland, who was calling him on 144.114.

W5SEW, Amarillo, had 2-metre E_S contacts with W3RUE and W8KAY between 1710 and 1740 GMT, June 28, and I have second-hand reports of 2-metre E_S work between California and Texas on the same day. Any other 2-metre E_S observations?

Operating and OVS News

50 MHz in a word has been wild! The band began opening for E_S skip during the last week of April, and it was open for some 90 consecutive days, somewhere. DX? Here is just a sampling of what has been worked from stateside in the past three months: ZF1AA, ZF1RS, ZK1AA, KH6NS, KL7ABR, KL7FNL, KL7GFB, CO2CI, XE1GE, XE1PY, XE1P, XE2XN, VP7NA, many KP4s, and

RECORDS

Two-Way Work

50 MHz: LU3EX - JA6FR
12,000 Miles - March 24, 1956
144 MHz: W6NLZ - KH6UK
2540 Miles - July 8, 1957
220 MHz: W6NLZ - KH6UK
2540 Miles - June 22, 1959
420 MHz: WØDRL - K2CBA
1185 Miles - July 16, 1969
1215 MHz: W6DQJ/6 - K6AXN/6
400 Miles - June 14, 1959
2300 MHz: W4HHK - WA4HGN/4
249 Miles - July 11, 1970
3300 MHz: W6IFE/6 - K6HIJ//
214 Miles - June 18, 1970
5650 MHz: K6HIJ/6 - W6OYJ/6
214 Miles - June 18, 1970
10,000 MHz: W7JIP/7 - W7LHL/7
265 Miles - July 31, 1960
21,000 MHz: W2UKL/2 - WA2VWI/2
27 Miles - Oct. 24, 1964
Above 30,000 MHz: W6FUV/6 - W6ICJ/6
2.3 Miles - Feb. 9, 1969

all Canada, including VO1 and VE8. Also there are scattered rumors of Japan being heard or worked in California, New Mexico and Texas, but we haven't seen supporting evidence for these claims.

In addition to the DX to date, WB2RLK was scheduled to air FPØLK on Miquelon Island during mid-August. The island is off the coast of Newfoundland. We didn't learn of the operation in time to give advance notice or details. We do have notice that K20JD will be operating as FPØCA, on 50.105 and 144.019, Sept. 7 to 17.

WASZYF writes he is active from Thule, Greenland signing OX5AP. Harry began operation July 1 and immediate notice was broadcast on W1AW. He will be in Greenland until at least the end of the year, and possibly until April 1, 1971. Harry transmits for five minutes on the hour between 2200 and 0200 GMT daily on 50.15. He then listens for five minutes. OX5AP was using a Swan 250 and 3-element Yagi, but planned on an amplifier and larger antenna for this fall. He should be workable during periods of auroral propagation

and this column is interested in reports concerning OX5AP. His address is Harry Leggans, P.O. Box 12, ITT/ASI BMEWS, APO New York, 09023. He is available for 14-MHz schedules between 2100 and 1100 GMT.

We have several letters this month from DX stations. Bill Boykin, HL9WI, writes from Korea about working Japan on many occasions during June and July, both on E and F layer. With his report, Bill included copies of his log showing pages of JAs. On May 4th, Bill heard California stations but was unable to attract their attention. The 6s were also reported to have been heard by JA1MRS. HL9WI operates on 50.1 with 25 watts, ssb or a-m. The HL9WI beacon is on from 2200 to 0900 GMT. Bill listens during pauses, through an intercom between his room and office. At other times he is at the rig.

During the KL7ABR operation, we had the pleasure of meeting KL7GFB. Bill's interest was stirred and we have a number of reports of his activity since late June. Bill's first contact was June 25 with WA4KUK/6, Sacramento, and between then and around July 26, he worked several dozen stations in California and the 7th call district. KL7GFB has now moved to Sitka where he joins KL7GLL. He will put a larger antenna and amplifier on the air there and is considering 2-meter operation. He reports that KL7GCN contemplates 6-meter DXing from Ketchikan soon. Bill, you have made statesiders happy with your operation!

A final comment or two about KL7ABR. We received several heard reports after returning home, some of which I rather question. One, however, appears genuine. W8UCI, Michigan, reports hearing a KL7ABR CQ on June 12 at 0200 GMT. Gerry heard the Alaskan signal while listening for ZF1RS, but while swinging his antenna towards Alaska, the signal faded into the noise. K5MDV was operating KL7ABR at the time and we can verify the report because of operating techniques characteristic of K5MDV and noted by W8UCI. Gerry and K8EFS report hearing KL7ABR weakly at 0500 GMT, June 16.

KL7FNL, west of Fairbanks, was worked by stations in the "lower 48" on several days. Two of the best were June 9th, when Bob worked W7VDZ, Wyoming, W5ORH, K5CFM and others in Oklahoma City, and July 11, to Southern California.

From Cuba, CO2CI was periodically workable this summer, using a Communicator on 50.4 a-m. His English is poor (but much better than most W/K Spanish) and contacts with him were not easy. Activity from Cuba has been rare for several years, and we hope CO2CI will stay active. Also in the Caribbean, this was the summer the KP4s went ssb, assisting many of them to work throughout the states. A dozen or so KP4s were reported active.

During the June contest, ZF1RS worked 26 states from Grand Cayman Island. They were

In June the Southern California ATV Club held a hidden video-transmitter hunt. Sought was Tom O'Hara, W6ORG, shown above, who was assisted by W6KAA. They were first found by the team of K6VLM and W6FXG. California law says mobile TV receivers may not be seen from the drivers seat, hence the two-man teams.



followed one month later by more activity from ZF1AA. Jack was successful during mid-July in working 6, 7 and 8, not worked by ZF1RS.

Several similar Caribbean operations are planned for next summer. It might be wise to publicize plans so that two or more groups aren't on the same island at the same time. Publicity on the operations should be withheld until plans are beyond the "dream" stage, however.

Canadian operation on six has been extremely active. All VE districts were reported, and many transcontinental contacts were made, such as VE7 to VO1, VE2AIO, VF4MA, VE6AHE, VE6OH, VE7ANP, VE7BLF and VE7XF were the most often worked. VE7ANP worked KL7FNL off the back of his beam, while listening to K1JRW on June 10. VE7ANP has worked 29 states on ssb, with a 6146 and S-element Yagi. He is now looking for scatter schedules for his new amplifier. VE2AIO had a good summer, working many multihop openings to W7s and ZF1RS. Geoff reports aurora on June 18 through the 21. On July 8, VE2AIO and VE3FHU heard ZK1AA between 0247 and 0312 GMT.

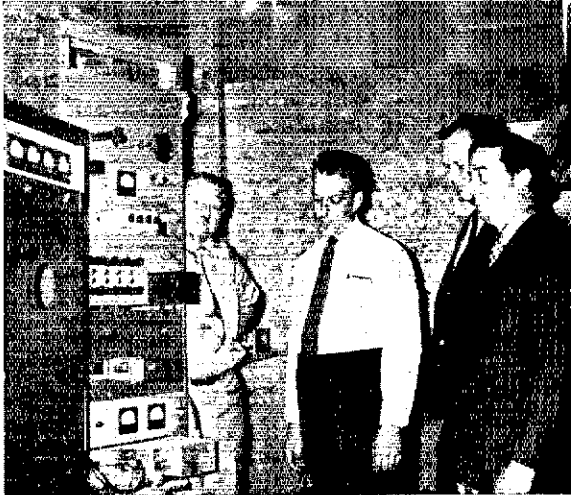
From stateside we have the following reports. K1JRW noted a multihop opening June 10 to the West Coast when no stations in between were heard. Among those worked by Rick include W7DY, Idaho, and K7RWT, Oregon, bringing him to 48 states worked.

W2BOC was sent a copy of the KL7ABR log and was most interested in June 14th. Mel solicits any available report of other stations worked from the western states, giving accurate times. He is attempting to collect *E* cloud-movement data for that date. Mel says also he would appreciate receiving contact data from any station working into Alaska this summer. Be sure to read Mel's article on the mechanics of sporadic *E*, soon to appear in *QST*.

K7HIX/4, Georgia, reports working Oregon and Washington on July 3. K5AJK, New Orleans, worked KP4s, with 15 watts of ssb on July 4. W8SAEH, New Orleans, has erected an array of four 6-element Yagi at 80 feet. K5MDV, Metairie, LA., heard ZK1AA on July 3, and worked KP4s and ZF1AA on July 8, followed on the 9th by a good West Coast opening.

WA5IYX/5, San Antonio, sent his usual detailed report. Pat observed multihop on June 28, to New England and VE2AIO; July 2, between Georgia and California; and July 5, 6, 7 and 8, to 6s and 7s. On the 8th Pat worked K7LWE/7, Idaho, for his 45th state. During June, he logged 51 openings during 25 days, for a total of nearly 88 hours, but he says this was his second poorest June since 1964. Last year was the poorest. Just depends upon where you live, Pat.

From California, WB6KAP worked ZK1AA 13 times between March 26 and April 20, and 5W1AR, Samoa, on May 27. Vic says 5W1AR's beacon frequency is 50.100, ZK1AA's is 50.101. Vic has been running a tape recorder on ZK1AA's frequency and is preparing a *QST* article on its reception. Vic says he will be sending 6-meter equipment to Pitcairn Island soon, and perhaps Easter Island. Calls of the stations or frequencies



Here inspecting the 250-watt transmitter of VE2LB, a new repeater at St. Foy near Quebec City, are (l. to r.) George Spencer, VE2MS, ARRL Canadian Vice Director; Benard Cote, VE2AP, Secretary of the Radio Amateurs of Quebec; F. M. Steers, Director of Information and Public Relations for Telesat Canada; and Robert Loranger, VE2AXO. The receiver is remoted via telephone lines from a site one mile away. Repeater frequencies are 146.64 input and 147.14 MHz output.

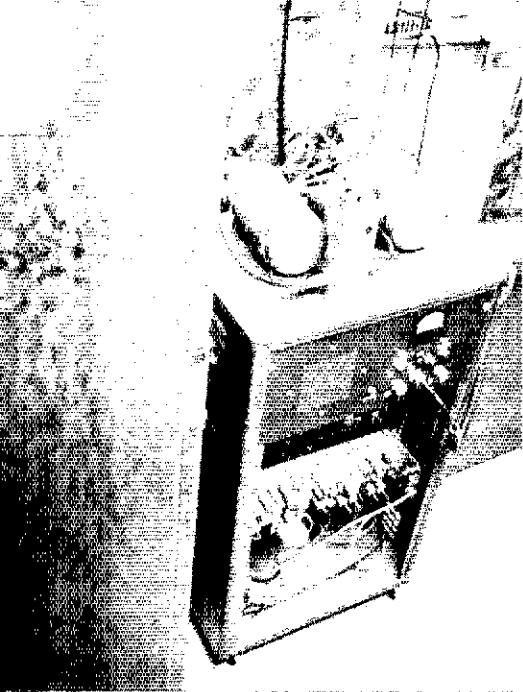
were not given. Vic uses an array of four 5-element Yagis spaced 20 feet. WB6NMT/6 noted multihop on several days, including to the East Coast on June 4, 9, 10 and July 3, 4 and 5. Louis worked or heard Alaskan stations on June 15, 16 and 24 and July 4.

WA6HXM reports excellent openings June 13, 14, 15 and 28 and July 5 and 11. On the 11th Pete worked east to West Virginia and north to KL7FNL, near Fairbanks!

I have two second-hand reports of WB6ZEI working FP8CS, Miquelon, on July 9th at 0330 GMT. The contact was made as a strong W6-to-Michigan opening was fading.

This is the K7DVK antenna site. The repeater antenna is atop an 80-foot tower. In the background is the KPOK-FM tower.





Pictured is the 450-MHz fm repeater built by K7SJQ and operated at K7DVK, Mt. Scott, Oregon. Added on July 1 was a 250-watt amplifier built by W7PVV. Eighteen stations in the Portland area use the repeater. Frequency information is available from K7DVK.

W2CUX again brings forth that age old question, why don't more stations tune above 145 MHz? Orville listened to the July 9 aurora for 3 hours! That can be discouraging to Technician and Novice licensees, and we need all the activity possible.

The Miamisburg (Ohio) Wireless Association, WA8PLZ, seeks EME schedules for their new four 17-element Yagi array. Inquiries may be directed to WA8DZU, 165 Enfield Road, Dayton, Ohio.

WN1LYT, Conn., is a newcomer to 2 meters and judging from his letters, Tom is quite enthusiastic about 144. He reports excellent tropo the evening of July 9 from Maine to New Jersey.

220 MHz produced three reports this month. W7CNK, Washington, ran late-July and early-August meteor scatter schedules with W0EYE, Colorado. He built a 40-element collinear for this work, and we hope to report the results next month. Lucky is doing some work on his 220 EME 160-element collinear array, and is hearing 6 or 7 dB of sun noise. WB6NMT has completed an array of four 14-element Swan Yagis for tropo and perhaps ms work, and is progressing on a new EME array of sixteen 6-element Yagis.

In the East, VE2HW and K9AQP/1, Mass., have been holding 220-MHz schedules, successful most nights. VE2HW runs a single 4CX250B and a 16-element collinear.

420-MHz and Up activity increased during the summer. K8DEO and K8REG both reached 21 states worked on 432, with June 30 tropo contacts with W5RCL, Mississippi. K8DEO modified his Parks 432-3 converter, per W0EYE's instructions in the May column. Don says the conversion works fine. K8REG, in addition to the contact with W5RCL, reports working W0DRL, Kansas, June 21, 22, 27 and 28, and K4GL and W4VHH on the 29th. K8REG was heard by K0TLM, Kansas City, on the 22nd. K4QIF reports tropo to the New York City area from southeastern Virginia on July 8. During the June contest, K2RIW worked W3CGV, Delaware, for state number 10.

One of the most interesting reports comes from W1VTU, Connecticut. John sent QSL proof of contacts with 14 states, while running less than 2-watts output to 14-over-14 J-slots! Now John says he is going to high power.

In Minneapolis, W0LER maintains the following 432-transmitting schedule: 0300 GMT, schedule with W0BJ, North Platte, Nebraska; 0310, CO South; 0320, CO Northwest; 0330, again South; all near 432.0.

WA2VTR writes that the June contest featured more 1296 activity from stations in New York and New Jersey than ever before. W2UFT and WB2IOE covered a 100-mile path, with the former running three watts and a converted 5-foot TV dish. WB2IOE was using a similar antenna. Both follow WA2VTR's article in June, 1969, QST. Others have reported similar success from the WA2VTR design, and it's a simple and economical way to start on 1296.

W6ABN heard Alaska twice this year on E_3 , the first KL7s he has heard on E_3 in 23 years of 6-meter work. He and about a dozen others worked KL7FNL for 30 minutes on July 11, beginning at 0355 GMT. The path is some 2500 miles. June 14 was the day at WB6UWY. He worked Florida, South Dakota, Wyoming and Alaska, among others. Not a bad day's work. Bud! WA6HOT reports a June 24 contact with VE6AHE. K6IBY worked KL7GFB July 18.

K7ICW worked KL7ABR for state number 49 and is now concentrating on working Maine, to complete WAS. Al suffers from many stations seeking Nevada while he is looking for specific DX. The problem is not uncommon to operators in other relatively rare states, Al!

K8CLA/0 was popular from North Dakota last year, but has found his Cincinnati location good enough for 44 states this summer. He still needs North Dakota. Tom owns one of those impressive Ohio scatter signals heard in the Midwest. Some of the scatter crowd will welcome the end of Saturday and Sunday morning E_3 , so they can go back to working the weak signals.

W0MTK, Colorado, also big in the scatter field, sent a lengthy report of E_3 , highlighted by a July 7 90-minute roundtable with stations in Texas, Kentucky, Oregon and California.

144-MHz reports haven't been plentiful this summer. Indications are that tropo was not particularly good. W1AZK says there has been a lack of activity, but Don reports random meteor scatter contacts with K4GL, S.C., during the June contest and again on June 28. They have a standing Sunday schedule, 1230 to 1300 GMT. W1AZK is on 144.143, K4GL on 144.104. W4ISS, Georgia, reports hearing K4GL during the South Carolina station's nightly schedule with W8NUB, Ohio.

Several summer auroras were widely worked from Minnesota to New England, but we have only one report: on July 9 K2ZAT/8, Ohio, worked W0RLI, Minnesota, and W1YTW, Maine, for states 25 and 26, from an apartment location.

Detroit Area Repeaters

The following information on fm repeaters serving the Detroit area was furnished by Glenn A. Pohl, Secretary-Treasurer of the Great Lakes Repeater Association, Inc. All are open community repeaters, with no restrictions except for the membership requirement for operators in the local area served.

WA8BDD, Clarkston, Mich., serving Detroit, Flint and Southeastern Michigan.

WB8CQS, Detroit, serving southern areas not covered by WA8BDD. Proposed 450-MHz links from Trenton, Grosse Pointe and Farmington. Both repeaters have 146.34 MHz access and 146.76 output. There will be a 6-meter repeater in Farmington after August, with output on 52.525 MHz. The trustee of these licenses is WA80XK.

Chicago Area Repeater and Calling Frequencies

CFAR (Society Radio Operators): Fixed-station input - 147.5 MHz; mobile-station input (has priority) - 147.45. Output 147.75. Membership.

Chicago FM Club: 146.34 in, 146.76 out. Single-tone 0.4-second burst; 1800 Hz north, 2000 Hz south. Membership.

MAPS: 146.1 in, 146.85 out. 100-Hz tone squelch.

Quincy and Rock Island: 146.34 in, 146.94 out, open access.

AFAR (Aurora Club): 147.4 in, 147.81 out. Membership.

Sierra: 146.28 in, 146.88 out; 1800-Hz access. Membership.

JFAR (Joliet): 146.28 in, 146.987 out.

Chicago FM Club: 52.76 in, 52.525 out.

The following frequencies are used direct: Chicago - 147.3, 147.5, 146.94, 146.64, 146.82, 52.525 and 449.5. DuPage County - 53.6 and 146.88. Villa Park CD - 145.35. 147.06 is used for teletype weather bulletins.

Colorado Repeaters


The following Colorado information is from Hank Rael, WAØVTO., of the Pueblo Ham Club, Inc.

Pueblo, WAØSNO - 146.34 in, 146.94 out.

Colorado Springs, WAØVTV - 146.16 in, 146.76 out.

Denver, WØWYX - 146.34 in, 146.94 out. 52.525 in, 146.94 out. 444.5 in 449.5 out.

Boulder, WØIA - 146.16 in, 146.76 out.

Note to other repeater groups: we'll be happy to publicize the essential information on your repeaters, and accumulate it for eventual use in a repeater directory. Please bring us up to date. 



Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

ex-WICMH, George F. McDonough, South Boston, MA

WIEDO, Robert M. Wood, Danvers, MA
WIEJ, Peter A. MacIntyre, Providence, RI
WJLF, Alan G. Gilbert, Barre, VT
WJRR, James B. Richardson, Weston, CT
WILEP, Rowland C. Neelans, Somers, CT
WNILVA, William C. Ansen, Pembroke, MA
WNIMEP, Curtis Creed, Yalesville, CT
WIMPX, Edward Thibault, Medford, MA
WIOKY, Eddy C. Erisen, New Britain, CT
KIRRN, Henry J. Browne, Dedham, MA
WITOL, William Brigham, West Roxbury, MA
W2AJX, Henry Marcus, Flushing, NY
W2AKK, Carroll W. Andariese, Ho-Ho-Kus, NJ
W2AXN, Alvan R. Dean, Portland, NY
W2BFM, John Asaro, Woodhaven, NY
W2CPS, Alfred J. Furtaw, Rosedale, NY
K2FS, Roy K. Smith, Montour Falls, NY
W2PEL, Harry Fendt, Great Kills, NY
W2ZQV, Carl W. Gebhardt, Burnt Hills, NY
K3CYV, Robert E. Peiffer, Annville, PA
W3EJU, Walter MacKenzie, Newport, DE
K3HNJ, Thomas P. Loose, Jr., Lebanon, PA
W3JO, Joseph P. Guy, Rockville, MD
K4AFB, Charles L. Davis, Clearwater, FL
K4BUW, Sam M. Murray, Miami Shores, FL
WA4EYI, Inman Howell, Dunedin, FL
WA4GMB, William A. Parker, Jr., Kinston, NC
WA4KFW, Kenneth W. Horne, Margate, FL
WA4LSI, Roswell C. Pattison, Memphis, TN
K4RX, Charles M. Morenus, Hernando, FL
K4QLX, Elbert Norris, Griffin, GA
W4TBO, Edward L. Rollings, Alexandria, VA
K4VGL, W. Odell Reynolds, Jacksonville, FL
W4WBH, Le Roy F. Trott, Augusta, GA
W5DFM, G. O. Dixon, Kerrville, TX
W5HGK, Roy A. Rogers, Albuquerque, NM
W5HSI, Paul Merritt, Vicksburg, MS
W5JQ, Anthony J. Sievers, San Antonio, TX
W5LOW, Charles E. Goeckler, Oklahoma City, OK
W5MKT, Arthur L. Watson, Houston, TX
W5RCF, Will R. McCutchan, Collierville, TN
W5UKV, W. A. (Bill) Venisat, Vinton, LA
W6AKW, Lee Roy Potter, Lancaster, CA
W6DAX, Art Baylor, La Jolla, CA
W6IAZ, Raymond Duncan, Lodi, CA
ex-6NZ, John R. Redman, San Francisco, CA
W6USS, Lynn A. Jones, Palm Springs, CA
WA7ARP, Al Edwards, Tucson, AZ
WA7HD, Carl T. Barth, Scottsdale, AZ
K7JMV, Albert J. Lee, South Salem, OR
W8AJH, Geo Miller, Cleveland, OH
K8BHV, Charles Wise, Weston, WV
W8EQS, Don Maxwell, Charleston, WV
K8HMJ, Joseph E. Nachman, Stratton, OH
W8IU, Vernon Madill, Cincinnati, OH
W8JJY, Wesley Springer, Wakeman, OH
K8WPJ, Randall Smith, Lorain, OH
K8PQZ, John C. Magly, * Kettering, OH
W8ZAW, Lawrence D. Sallee, Cincinnati, OH
K8ZVD, Charles F. Klima, Sistersville, WV
ex-9AIR, Allen Roetken, Covington, KY
ex-9ATO, Erv Nickel, Milwaukee, WI
W9INX, Edward A. Rehberg, Fort Wayne, IN
W9LH, J. McWilliams Stone, St. Charles, IL
W9LFB, Melvin I. Karpe, Springfield, IL
W9LTA, Charles A. Guider, Barrington, IL
W9OOL, Theodore S. Lively, Madison, WI
W9MGP, Edward C. Lingren, Maple Park, IL
W9FEC, James M. McIntosh, Missouri Valley, IA
W9TKQ, Gerhard Hanson, Eagle Grove, IA
W9UL, Carl S. Tunwall, Fort Dodge, IA
K9UZM, William C. Coupland, Tribune, KS
WNØVLN, Mary Adams, Lake Crystal, MN
VE3WH, John H. Head, Picton, ON
VE5DS, Oscar Olson, Sturgis, SK
HP3RL, Ralph G. Lewis, Cerro Punta, Chiriqui, Panama
VK2JZ, A. S. Mather, Singleton, NSW, Australia
YN4RWE, Robert W. Edwards, Puerto Cabezas, Nicaragua
9H1O, John Scicluna, San Pawl Tat-Targa, Malta
*Life Member, ARRL



YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

WEBSTER CAN be depended upon to put things in exact definition with no dependence on a euphemism to make a word seem more palatable or interesting. The dictionary gives us a choice of many meanings for the word "service," one of which defines the public service we as amateurs render, for it reads "helpful, beneficial or friendly action; an act of giving assistance to another." The Eye Bank Net is service in this meaning for three times daily a group of very dedicated operators meet to provide the vital service of the priceless gift of sight through their facilities.

For YLs like K2DJN, K3AIF, WA3ATQ, K4CRU, K4JGU, K4JGW, K4LMB, K5BNH, WA5LUX, WA6AOE, WB6BSE, K7UJV, WØATO, KL7DLA, it is daily participation in one, or all, of these nets on 40 to 80 meters.

These gals have assisted in procuring an eye for a woman who, when the emergency arose, had only one. They have been of help in locating eyes to go to the *S.S. Hope*; and two special technique clinics in New York City. For this net DX has meant sending eyes to Hong Kong, China, or the El Salvador experiments. YLs like WA3ATQ remember the time when there was a request for tissue after the net had been secured, but thanks to an alert participant in the southwest who, as most of us, was still monitoring the frequency, the required eye and the backup were obtained. Thanks to the state police escort that is provided in these emergencies, the eyes were rushed to the hospital in a neighboring state. By the time the one operation had been successfully performed, there was a second request that again required fast transportation of the backup eye, so that in 24 hours one shipment had filled two urgent requests.

*YL Editor, *QST*. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.

The need for this emergency net became obvious to WØGET, Dr. Alan Braley, in 1962 when a patient lost his sight because no donor eye tissue could be located for corneal surgery. From this the net was organized as a once-a-day activity that has expanded to three sessions on two bands, and by 1969 had provided over three thousand eyes for Eye Banks all over the world. The most active cities in the net are those with a participating Eye Bank.

The net meets on 3.970 MHz. at 1200 GMT in the summer, and 1300 GMT in the winter, and again at 0100 GMT both summer and winter. The 40-Meter Net is active on 7.294 MHz at 0045 GMT. Every operator must represent an Eye Bank. These nets exist to alert Eye Banks of emergencies, and of eyes available in the shortest time possible. Net sessions are not long in duration; they usually last 15 minutes.

To many people the term "service" is a dusty dry work connoting duties that are about as tempting as the thankless job of cleaning the attic or weeding the garden. To amateur radio operators, "service" is the ability to help others with assistance through their skills and facilities.

Every day every session is an "emergency" with the Eye Bank Net. Some of the members have never had to participate other than to check into the net because the Eye Bank in their area has never needed the facilities; others are extremely busy because of the need, or the ability to provide the service. To the women who join with the others of the net, "happiness" is the great satisfaction of being able to provide the means by which someone may have sight.

31st YLRL Anniversary Party

Cw Section: Starts: Wednesday, Oct. 21, 1800 GMT

Ends: Thursday, Oct. 22, 1970 1800 GMT

Phone: Starts: Wednesday, Nov. 4, 1970 1800 GMT

Ends: Thursday, Nov. 5, 1970 1800 GMT

Eligibility: All licensed women operators throughout the world are invited to participate. YLRL members only are eligible for the cup awards. Non-members will receive certificates. Only YLRL members are eligible for the Corcoran Award. Contacts with OMs will not count. Contacts on nets do not count.

Procedure: Call "CQ YL"



Eileen Ross, WN6QVD/CT1 working the station CT10W in Lisbon, Portugal.

QST for

Operation: All bands may be used. Cross-band operation is not permitted. Only one contact with each station will be counted in each contest.

Exchange: Station worked, QSO number, RS or RST, ARRL section or country. Entries in log should show time, band date, transmitter and power. Logs must be signed.

Scoring: A. Cw and Phone will be scored as separate contests. Submit separate logs for each contest.

B. All YLs located within an ARRL Section, score one (1) point for each QSO with another station located within an ARRL Section. Score two (2) points for each contact with a station not located within an ARRL Section, i.e. DX. Definition of DX: All stations not located within an ARRL Section. DX YLs shall score two (2) points for each contact with a station located in an ARRL Section. Score one (1) point for each contact with another DX station. (Note: ARRL Section list on page 6 QST.) Multiply number of contact points by total number of different ARRL Sections and/or countries worked.

C. Contestants running 150 watts, or less input at all times, may multiply the results of (B) by 1.25 (low power multiplier)

D. Ssb contestants running 350 watts PEP or less at all times may use the low power multiplier.

Awards: Highest cw score . . . Gold cup (YLRL member only anywhere in the world.) Highest Phone score . . . Gold Cup (YLRL member only anywhere in the world.) First, second and third place cw and phone (not combined) and highest cw and phone log in each district and country will receive a certificate. Corcoran Award: Highest combined cw and phone score (YLRL members only within an ARRL district). DX Only: Highest combined cw and phone score from North and Central America including the Greater and Lesser Antilles, will receive an award from W4HLE-Arlie Hager. Highest combined score from any other part of the world will receive a duplicate award.

Logs: Copies of all logs must show claimed score, be signed by the operator, be postmarked not later than November 21, 1970, and be received no later than December 5, 1970 or they will be disqualified. Mail copies to: Audrey Beyer, K5PFF, 6202 Reed Road, Houston, Texas 77017 U.S.A.

Don't Forget

YLRL Howdy Days September 23-25, 1970, get acquainted contest open to all YLs as a start of the fall activities and a good way to meet the gals who will be working in the Anniversary Party. See August QST for rules.

W8DUV - Hamvention Amateur of the Year

When a YL speaks people listen, and 650 people listened at the 1970 Dayton Hamvention banquet when Kay Anderson, W8DUV, of Huntington, West Virginia was presented the

WA6QHV, April, age 14, the only YL who assisted in communications for the 1970 inter-collegiate towing races.



1970 Midwest YL Front row: W8DUV, Kay; VE4ST, Bubbles. Back Row W8ENW, Thelma; VE3CLT, Thelma; W8ARJ, Bobby; K8LHF, Marion; W0RAW, Bertha. (WA2FGS photo)

Amateur of the Year award. This is the first time a YL has been so honored in the fifteen year history of this activity.

1970 - Midwest YL Convention

Marion Bees, W8UAP, might well have been listening to the advice Aeneas once received from the Sybil, for Murphy is in kindergarten class when he has to buck a determined YL who is planning a convention. Give him credit, he tried, even to a last minute change of convention headquarters, but the 48 YLs and their OMs found business as usual, and the excellent hospitality that has become a trademark of the Midwest conventions over the years.

There were special tours of antique automobile exhibits, as well as a vocational school that included such things as repair of jet engines to entertain the 22 long-suffering OMs who accompanied their ladies to this affair. For the gals it was a business meeting, a tour, a time of YL meeting YL and chatting with them without all the problems of tuning a receiver and chasing a weak signal. It sparked interest in radio for two visitors and even provided kennel accommodations for pets which came along with their families.





WA3ATQ, Harriet; WA2FGS, Rose Ellen; WA8UAP, Marion; K3ZDN, Jane. Marion was the busy general chairman of the convention.



Kay Anderson, W8DUV, center, with K3YJK, Harry left and W2CDZ, Bill right at the 1970 Midwest YL convention. (WA2FGS photo)

They came from all over the country and Canada and for those who were unable to attend, the next one will be hosted by the Buckeye Belles. Plan ahead, gals - vacation time 1971 could also be Midwest YL, and those who attend are walking advance guarantees of that old phrase "a good time was had by all."

W7QYA - Florence Majerus

A school teacher by profession, a former FAA radio operator, and also a former night club musician is a hint of the person behind the key at W7QYA. Add to it a private pilot's license with membership in the 99s, and an Amateur Extra Class License and the picture comes up bright.

Florence was licensed in 1950 in Alaska while she was working with CAA, now FAA, but never held a KL7 call. She and the OM transferred back to the home state, Montana, and W7QYA went on

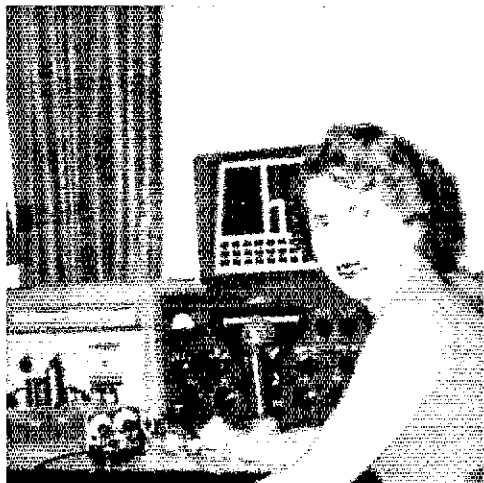
the air as a General Class in 1950, Advanced in 1952, and in 1968 she passed Extra Class.

W7QYA is primarily a cw operator but is also found on 20 or 75 ssb with membership in YL.RI., MINOW, FHC, and ISSB and A-1 Operator Club. She also holds DXCC.

Florence has traveled around the world and has found it most interesting to meet some of the people she has talked to on the air. Sometimes it can be more than just interesting, as the time when she tried to renew an acquaintance with someone who was having a ball with the DX-prefix of a person she had met in her travels, but the contact was unable to follow any of the personal touches - resulting in the discovery that it was someone from an entirely different country operating illegally with the call!

The pet activities at W7QYA are rag chewing and DX with more interest in collecting friends than certificates.

QST



W7QYA, Florence Majerus

Strays

WIRELESS INSTITUTE OF AUSTRALIA PROJECT AUSTRALIS
RADIO AMATEUR SATELLITE CORPORATION

AUSTRALIS - OSCAR 5

AUSTRALIS IS THE FIRST AMATEUR RADIO SATELLITE
LAUNCHED FROM CALIFORNIA U.S.A. 23RD JANUARY, 1970

Confirming Reception by _____ of the _____ MHz Beacon
(Call Sign)

on _____ 1970 _____ AM. G.M.T.

I HEREBY ACKNOWLEDGE THIS REPORT AND YOUR SUBSEQUENT REPORTS.

Did you get your Australis-Oscar 5 QSL? Cards are now on their way to those who submitted reception reports for the amateur satellites. But, if you haven't yet submitted your report, there's still time. Send your report to Amsat, PO Box 27, Washington, D.C. 20044.

How's DX?

CONDUCTED BY ROD NEWKIRK,* WØBRD

When:

Could you whisk your receiver dial back an even quarter century to September, 1945, you'd find the DX bands a lonesome place indeed. WW-II had just rumbled to an end. Good old WIAW's specially authorized nightly bulletins were there to keep the anxiously eager informed. Those walloping signals from Newington on 80, 40 and 20 were reassuring to say the least.

Some noncombatant countries had produced scattered amateur signals right through the conflict but the DX art, like Sleeping Beauty, awaited the princely kiss of peace after five lost years of suspended animation. Upon which, we war-weary amateurs felt confident, she would spring back to life with greater zest than ever.

This came to pass, of course, when 10 meters was declared open in mid-November. Despite the inopportune state of the sunspot cycle 28 MHz came through admirably for fast-rising countries totals in the months before 80, 40 and 20 were finally cleared for our pleasure.

A joyous juncture for hamdom, to be sure. It was moreover a period in which few of us who had tuned those eerily emptied bands failed to comprehend that amateur radio is a precious privilege; and that such a privilege, like a right, demands prudent conservation by those who would enjoy it.

Ham radio's unique status is scarcely better illustrated than in its 1970 DX aspects. WA9SQY dwells on this in recent correspondence, impressed at length by the otherworldliness of his shack QSL display. How do you

explain to nonhams, filled to their gills with daily news of international tensions and mayhem how 4X4 QSLs get on the same wall with an SU1? An EI7 near a GL3? That KG4 beside some CO2s, etc.?

Which world is for real? Oh, *both* worlds are for real, all right. Perhaps the one shows there's real hope for the other.

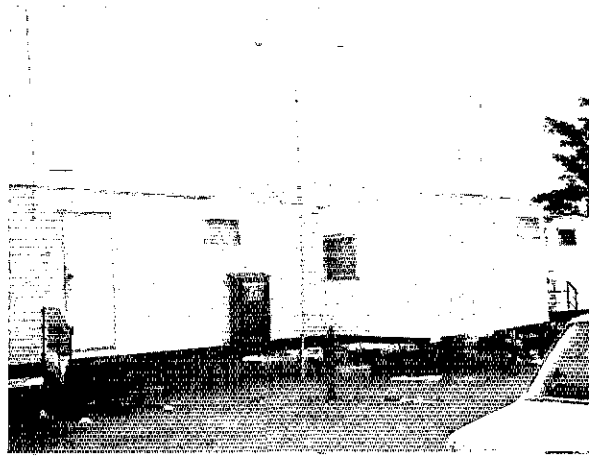
What:

Longer nights and diminishing atmospherics bring lower DX frequencies back on stage up our way. Then, too, there's a vast and fervent 28-MHz following nervously watching their 8-meters for signs of another big 10-meter season. Will they be disappointed for the first time in years? Or will the sheer momentum of worldwide activity carry them through the QSB onslaught? Anyway, let's take a few core samplings of DX strata from 3.5 through 7.3 MHz as mined by "How's" diggers far and wide. "9M2RT (18) 5" means that 9M2RT was logged active near 7018 kHz around 0500 GMT if the paragraph treats forty.

40CW is a 11X mother lode for Ws (BMR, 1BV, IPI, 4YOK, 5GR, 5KKW, 7YTN, 8YGH, 9BY, Ks, 10ME, STRF, WAs, 1FHU, 1RY, 1JMV, 2BCT, 2FOS, 2HRZ, 2YWE, 3QVE, 4CZM, 5UAX, 9SQY, WBs, 4GAH, 9CJS, IER, and VE3GHO with some precious gems among CEs 2DU (5) 1, 2CR (3) 8, 3CF (3), 3ZV (1) 23, CMs 2FV (10) 11, 2MC (28) 9, 3LN (33) 6, 7FT (27) 1, COs 2FC (8), 2LD/7 4, 2JY (10) 1, 2VG (5) 5, 7CD (28) 2, CPs BR (4) 1, GN (1) 3, CRs 4BR (30) 2, 6A1 0, 6GO (7) 1-2, 9A1 (3) 21, 9AK (4) 3, CTs 11Q 0, 1LN (3) 8, 1MU (8) 1, 1UM (10) 23, 1UT 23, 2AK (14) 23, 2AO (14) 22, 2AT 9, 3AS (13) 10, 3AW (10) 0, CX3AN (3) 1, fifty DJ-DK-DLs and a dozen DMs, EAs 1AB, 1CP, 2DM, 4IR, 4IS, 5HM, 6RO (8) 1, 7NE 8, 8BF, 8DV (26) 8, 8FE (27) 7, 8FF (12) 23, 8FJ, 8FO (32) 8, 9EJ (2) 25, EEs 2VBW (5) 23, 4BK (4) 11, ELs BE 22, BZ (37) 1, Y, FP2BQ (10) 3, two dozen Fs, FB8XX (2) 1, FG7TG (11) 0, FH0VP (1) 14, FM7s WH 10, WU (10) 10-11, FP8s AP 0, CT, sixty-eight Gs, GC2FMV (9) 8, GDs 3A1M (10) 7, 3TXF 21, 5APJ 1, 6UW 22, GLs JEX (20) 8, OJL (5) 23, GM3s CFS (3) 0, 3PFQ 23, GWs 3BQY, 3FSP, 3JI, 3NJW, 3OAY, 3S8K, 3XJC, 5TW, three dozen HAs, a dozen HB8s, HCs 1CS (4) 2, 2JR 9, 7GG (7) 5-6, HIs 3PC (8) 10, 7JM (10) 16, 7JMP (1) 5, 7JRC (8) 12, 8JM, 8NAF (5) 4, 8NMA (2) 5, Hks 1BDE/4 (43) 2, 3AVK (18) 5, 3ASJ (25) 5, 3BKV (8) 5, 4RX (7) 23, 6ROV, 7XI (2) 0, HPis AC (10) 1, BR (4)

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

VQ9RK became a Seychelles desirable in January from these compact Mahe quarters. Bob, who previously signed ZD8RK, prefers 15 and 20, phone or code. (Photos via W9VNG)



2, XHG (10) 0, HRs 2GK (38) 2, 2HH (8) 5, 4ET/1 (80) 2, HSSABD (5) II, II & ALU BDV ER IBM MMR PEP PIP ROA RSC, TIAGA (10) 1-5, JAs 1AEA (7) 12, MHE IKKH 1LDS 1WHT 2DXZ 3LEJ 4IGP 5BJT 7CXX 9APS 9DEE ØES (27) 5, JRICOP (4) 10, KG4s AA DS 0, KHGs AHQ BW 11, EPW (15) 5, GLU 10 GPQ JJ (24) 5, SP (27) 11, RS 5-6, KJGs BZ (15) 2, CD (4) 6, KL7JDO (5) 9-10, KP4s DJI UW (40) 0, KV4s CJ (5) 9, FZ (6) 3, KZSs KN 4, NK 1, NR, LAs 1H 1K 10A (38) 7, 3UF 4ZC 5S 6U 7FJ ØAD, LG5LG, LUs 3EX (7) 1, 4KV (9) 1, 1DMW (10) 0, 8DKA (5) 23, 8FEQ (43) 1, twenty-seven Bulgarians, OAs EK (19) 6, MS (10) 7, UO (15) 0, OEs 1MEW 3PWV 3REB 3UP 4SZW 5FBL 5NT 6KZ, ODSI.X, OHS and OKs by the dozen, ONAs IE (1) 7, UN (7) 23, XG 6, OX3s AX (4) 2, ZY (5) 3, OZs 1LO 1W 3PO 4FF 4H 5CI 5CV 7X, OY9LV (13) 7, PAOs BW (8R, 1AU 1SA RE, PJs 3HT (12) 5, 2FS (5) 4-5, 2VD (4) 2, 7JC (20) 1, forty PVs including ØAD (12) 4, PZIs AP (3) 2, DD (26) 2, SKs 3BP 5AJ 6AB 6CF, fifty-odd SMS and SPs, SVØWOO (1) 0, TFS 2WKE 3Z, 2WLW (4) 2, 5TP (3) 11, TGs 4SR (2) 2, 9CD (3) 3, TIAP (4) 7, TIIs AW (3) 1, QO (3) 0, TFBS (3) 4, TU2CX (3) 23, UAs 1KAG 1EBW 1KDK ITL 1ZV 2BZ (27) 5, 2CM (3) 3, 2EC 2Z 2KBR 6, 3KAO 3KFA 3LM 6KAE 6NY ØRB 10, ØIW (4) 11, ØKFG (9) 8-9, UBSs BB CV HY HE 1F KUM HR TI, UC2s AB AI CK AY JJ KNU XU, UFG6A, UJ8BB (20) 5, UKs ITAA 5YAK, UNIKUL (25) 1, 5IAZ 6ITZ 5YAB 6LAC 6WAA 9ABA, UNIKUL (25) 1, UOs AO (26) 2, GS (9) 1, PK (40) 1, WT (8) 4, UIPs KBC 6, OM 6, SW (1) 3, UQZs KAA KAX KBF KCR NN OF ON PG PP, UR2RL, UTs BP (7) 1, KCU (3) 4-8, KDP 0, MD (33) 23, RF (5) 5, YP (17) 4, UWs 3FU 3LZ 3VN 4AT 6NQ ØBX (2) 2, UYSs CM DV DX JK OC UM KX all 0-6, YKs (and AXs) 2BLK 2EO 2LW 2NS 3OP 3QI 3NO 6HD 7GK 78M mostly plus or minus 7, VPs 1VR (10) 2, 2MU (3) 1, 7DX (8) 1, 9BK (5) 2, 9BY (30) 22-4, 9DL 9GD (9) 1, VØSCR (12) 4, VR2s DK (4) 6, IO (10) 6, Vu2s BEO 8V 2, WIRDF/KH6, WAGNOM/KG6 (1) 1, WBBHYQ/VV5 (8) 4, XEs 1DDM 1FFC 1JO 1SNH 2PJL ØYLY, XW8BP 21, YN1AA (9) 3, twenty VOs, YSIXEE (31) 5, thirty-two Yugoslavs, YVs 3UK (28) 4, 4AU 4OY 2, 48N (3) 4, 5RLP/1 (10) 10, 5BPP ZBAZ (87) 2, ZLs (and ZMs) 1AAT/6 (38) 5, 1AIR (7) 8, 1AMO 7, 1RFF (27) 7, 1BN (34) 7, 1DS 11, 1IR (5) 11, 1P5KA (50) 1, ZSs 1A (26) 5, 1JS (5) 3, 10 PF (15) 4, 1AC (5) 4, 1DE (6) 5-8, 1LB (9) 4, 5OU (10) 3, 6OS 2, 48TAB, 4UHTU (28) 0, 4X4s UF (10) 2, VN (3) 23, YM (22) 21, 5T5BG (5) 7-8, 6WRs RA (10) 23, EJ (21) 1, 6YSs GS (30) 0, SR 0, 7PBAB (77) 5, 8P6s AE (31) 1, 1G (33) 10, CG (30) 11, 8RIJ (3) 3, 9H1BL (8) 2, 9M2RT (8) 5, 9Q5VM 23, 9Y4s DS (10) 9, NN (7) 2 and VU 2. By the way, WYGR, KIOME, WAs 1KZ 1JMR and 5UAX report plenty of goodies available above the Extra segment on 40 cw.

40 phone is no bed of DX crosses, however, or would you believe there's a rose or two among the whoa hamk! patch? We IPI, (ex-WAIFHU), 8YGR, WAs 1KZJ 1JMR 9TZD and the clubs press mention CNSAH (155) 7, CO2DC, CR6GA 2, CTs 1RH (67) 1, 2AF 22, DLs 8WE (72) 2, 8PF (33) 1, EAs 41H 2, 6HN 8HA (80) 20, 84H (83) 22, EL2s 8D 0, BZ (15) 23, EPXDZ (85) 23, F2MO 21, GM3JDR 27, HFs JC 6, XHG (208) 6, HRIW5G (240) 2, HTFESS 6, 11AJ 0, JA1AEA (88) 2, KH6UL, KP4s AGD (251) 6, AST (218) 3, DGO (245) 1, 4V4FZ (252) 3, KZ5s DA (235) 2, NLE 2, LA1K (84) 3, LUBES (278) 7, LX1BW (60) 12, OD5BA 2, PYØAD of Fernando de Noronha, SK6AB (98) 3, FEs HP 2, 1ISA (222) 2, TR8DG (83) 21, UR2AO (93) 3, VK3HW, VPs ICP (287) 2, 2AA 1, 2IDAN (228) 4, 2LA (225) 2, 2VI 23, 9BK (87) 1, 9BO (220) 4, 9BY 9DL (210) 4-5, VU2BEO 22, XE3EB (261) 6, XW8DS 22, YN4NK (225) 1, YV4UA 1, ZCHS 2, ZD9BN (285) 6, ZFICQ (230) 3, ZS4RN (80) 5, 4M1A (250) 3, 5V4IS (88) 23-0, 9J2PV (88) 20, 9Q5DG 5, 9V1PP 23 and 9Y4KR.

80 CW is dredged successfully by Ws IPI, 18WX 8YGR 9EY, WAs 1RY 2YWR and 4CZM for loglits of CM2HAC, CPIGN (1) 5, CR6s EJ (14) 1-3, (HO (12) 0, CTs 8H 2AT 8, 3AS (9) 7, DJs 28W (5) 5, 5DT 5VY 681, DKs 1HP (20) 3, 1NL (4) 0, 2VA (14) 4, DLs 1BK 1ES 1FP 1QT 1RK 1YA 3HC 4SA 6TQ 7AA 7BQ 7CT 8DF 8PF (ØFL ØAB all 2-8 near the low edge, DMs 2ATD (18) 22, 2BJD (9) 5, 4ROL (1) 6, 4WH (2) 5, 5XO (15) 4, 6SAK (5) 3, DU1FH, EAs 1CP 4CR (1) 7, 5HM 8FO 9EJ, ELs 2S 4BK 6, 8H 9J (2) 23, EL2s BE (25) 23, GB (8) 5, ET3USA, Fz 2PO 2WV 3DM 3NB 5IE 5OL 5HL 8OH 8SF 8VJ 9LK, FBEXX FHOVP (3) 0, FPRAP, sissy G-men, GC2FMV (4) 3, GDSAIM (2) 7, GL3s CDF JEX 6, GMs 3K6Q 3TVS (15) 4, 6NX (8) 6, GWs 3AK 3ESP 3NJV 3OAY 3TOW 3WCG 3WVG 3XEJ 5TW, HAs 3GE (2) 3, 3GO (7) 2, 4KYB (7) 5, 5DI 5KPA 5KHE 5UG 5VAG, HØ9s AKM B BX CM DX GX KP MD NL, HC2G/1 (10) 1, HIECP (1) 0, HPLs 1E XHG (7) 5, H55ABD, JAs 1EYB 5BJC, JX5CI, KHGs AQ EQW



4Z4BG, 4X4AE and 4Z4AI, left to right, mingle pleasantly in 4X4AE's Beer-sheva hamshack. Amnon, Rafael and Eron are among Israel's most widely worked DXperts. (Photo via K2BYB)

GLU HAM 1J SP, KL7JDO 8, KP4s AN (8) 0-2, ANQ CRT, KR6NB, KS6DH, KV4s EY FZ (8) 3, LAs 3UR 3XI 4ZC (1) 23, 5S 6U (3) 4, 7AE XXI (9) 6, ØAD 7, 2UAs 1BB (4) 0, 2ECC (11) 23, 8DKA (1) 4, ØA4KF, ØEs 1GFW 1M 6HPG, ØDSLX (2) 4, ØHs 1AC (10) 2, 2RY (2) 5, 3DX, twenty-five ØGs, ONs 4DY (2) 6, 4UN (2) 1, 5VW, OX3WQ, OZs 1LO 1W 2NU 2K 5CV 7DX 7EP 7X SN, PAs 9KC ØBN ØLC ØHHV ØLQU ØRU ØXPQ ØZEZ, FJs 2HT 7JC, PVs 1BCA 1BTX 1DMQ 2EJH 2DFR 2DL 2DO 2DTV 2EUY 2FCJ 5XQ ØAD, PZIDB, SK6GF 7, SMs 1CXE (22) 6, 3BYA 4CMG 4DJE 5API 5BZB 5CUN 6CAO 6CRX 6CUB 7BIC 7WT ØAHQ ØCCE ØDSG ØGEM, SPs 1DUA 2BNJ 3ART 3CDD 5JAU 6AKK 6ARD 6CIT 7ABE, 8T28A, TA2E, TFs 2WRF 8TP 8, UAs 1DZ 1KMO 2CD 2DM (2) 5, 6KAE 6KOD (2) 2, 9GW ØAG, UBSs CV KDS (16) 2, UC2s AR (2) 4, XT, UG64D, UH8CS, UKs 5MAZ ØCAE, UL7GW, UO5AP, UPTKPN (7) 3, UQ2OM, UR2s KAY (4) 4, ZN (3) 4, UZ5s DL KAS (2) 4, KDP, UV9CA, UW3HV, UY5XH (12) 2, VKs 2BKM 2NS 3ABR 3APN 3AXK 3MR 3QI 3XB 6CW 6HD (7) 23, 7GR 2M 2LD all 3-7, VPs 2GLE (4) 6, 2MT (1) 3, 2V (2) 2, 2VL (3) 6, 8JT 9BK 9GJ (5) 4, VR2DK, XEs 1WS (4) 5, 2FJ, XW8CS, YN1s AA CW (5) 2, YOs 6GZ 7ARZ YSIXEE (3) 6, YUs 18W 18PQ 18Y 1MV 2REC 3APR 3AT 3BDC 3DM 3EY 3GHI 4AAW 4VNX, YV5s CKR 1, KL 7, ZC4AK, ZEZJJ, ZLs (and ZMs) 1AAT/6 (26) 6, 1AFW 1AUA 1XX 3AAY 4FK 4IE 4JY, ZP6GS, ZSs 1A (7) 5, 1MH 1WK 5LB (1) 3, 5XA, 4S7DA, 4UHTU, 6Y5SR, 8RIJ, 9H1s BL and GB.

75 phone is worth checking all year long, judging by reports from WIs HMR, PL, WQC, 8VAJLMR, VE3GHO and club literature: CO2FA 10, CRs 4BC 1, 61V 22, CTs 2AK 21, 34W, DU1FH 22, EAs 41H 4, 6BK 22, EL2BD 3, FY7YM 10-11, GX3YB 21, G16TK 23, GW3AX 23, HA5CQ 21, HØ9QD 3, HC2GP 4, HKØBSJ 2, HR2PEV 3, H55ABD G-1, HUIP 3, HV3SJ 22, JW7DH 6, KC4USN 7, KG4AS, KH6HCX 6, KL7s BJW 10, FC 7, KP4s GRD 2, 7G 2, KS6DH 10, KZ5s AE 7, DA 6, DF 5, NR 4, LX1BW 22, OA8V 11, OD5BA 23, ØH3QA, ØKIADM, PYØAD, PZIDF 10-11, SP8AJK 21, TA3MQ 3, TR8PT 9-10, UC2DE 0, VO1s FG 22, Fx 5, VPs 1CP 3, 2LA 2, 28Y 11, 8KF 22, 9I 5, VU2BEO 23, XEs KS ØE 4, WS 7, YB2AJ 12, YVs 41A 5BPJ 3, ZB2BX 21, ZS1MH 23, 4S7PB, 4UHTU 21, 4X4s 1F 1-2, WN 23, 4Z4AO 23, 5Z4KT, 21, 6W8DY 23, 7Q7AA 22, 8P6CX 4, 9H1BE 21, 9J2DT 22, 9V1PP 22 and 9Y4MM, most just below 3800 kHz with a secondary pocket near 3700. Five-Band DX Century Club hunters will note well over 100 countries accounted for in this brief 80- and 75-meter synopsis. Go get 'em!

Lessee-next hand-check ought to feature 21 MHs with the aid of (15 cw) Ws 1RV 1PL, 4Z2YT 5BKZ 8KZO 8YGR 9LNO, Kz 3CUI 5MHG/6, WAs 1FHU 1HY 1KZJ 1JMR, FCT 2BHJ 2DFD 2FOS 2HDZ 2KEA 2YWR 3GVP 3GY 5SOG 5UAX 5VMW 5ZEJ 7CUM 9SQY 9TØZ ØPT, WAs 2DRS 2INA 4KZG 9AVY 9BCC 9CIS 9TNS 2DRS 2INA 2IQL 4OFO 6RGQ 7OLT 9CFC 9VF ØYMC, VEs 3GHO 7BAF,

IER: (15 phone) **Ws** 1PL 2KXK 3HNK 4YOK 5GB 5KKW 8YGR 9LNQ. **Ks** 4TWJ 8PYD. **WAs** 1FHU 1JKZ 2FOS 3JHB 6SOG 9SQY 9TZD. **WBs** 4KZG and 9AVY; later (10 cw) **WAs** 1PL 4YOK 8EFW 8KZO 8YGR, **K5MHG/6**, **WAs** 1FHU 2HZR 2KEA 5YMW 9SQY, **WB4KZG**, **VE7BAF**, **IER**; (10 phone) **WAs** 1PL 3HNK 4YOK 5GB 5KKW 8EFW 8YGR 9LNQ. **WAs** 1FHU 2FOS 4ZU 6SOG 5YMW 9SQY, **WB4KZG**; (20 cw) **WAs** 1PL 2KXK 6EAY, **Ks** 3RPF 5MHG/6, **WAs** 1JKZ 9TZD. **VE7BAF**; (20 phone) **WAs** 1PL 2DY 2KXK 3HNK 5BZK 8YGR. **WAs** 1JKZ 9TZD and **WB4KZG**. Later will be hearing from **Ws** 1BB 2BP, **WB9BUV** and other 160-meter boosters as well.

Where:

H E R E A B O A S—**AXs** 78M 0LD, CR8AG, CT2AT, HCXZCN, EAs 2DT 8BD 8GK, GC2LU, GW3IEM, HB9ACP, HC0TH, HSs 1ABU 3ACP 4ABS 5ABD, HU1P, I81A0V, JYL, KC6s BY CT RS, KG4DS, KH6LL, KP4s AUF CL, L8AG, LZ1KQ, MP4QBK, OHs 2AD/0 6NH 0AM, Q13NY, PA0s ABM NW WA, P39VR, S0W0V, TA28G, TR8MC, VR51T, VU2AE, W9IU/KS4, WA8RAT/HM2, YB9AAJ, Y44UA, ZMs 1AAT/K 2AFZ 3PO/c, ZP3s GS 0J, 5Z4LS and 9N1RA, for supersuit QSL transmissions, are "QSLers of the Month" designated in correspondence from **Ws** 18WX 81B, K4HPR, WAs 8QY TZD, **WBs** Z2HM 6WHM 9CJS and VE3GHL. This kudos committee also applauds prompt managerial performance by **Ws** 28UC 2YY 3HNK 6DQX 9VNE, **Ks** 4MQG 4RTA 8GAK, W4HUP, VE3s ABG BYN DLC GMT, VK6WT and ZL2AFZ. Any particularly punctual pasteborder pushers you'd like to commend here? *Help!* W2KXK needs nudging toward an XF4KS card; W48TLA seeks aid in confirming his EL2Y radioteletype contact of '68; HB9ANR can't seem to glom VQ9A's '69 wallpaper; K4HPR yearns for suggestions on tracing EP2BQ '69, F48RC '67, PY0s BLR OM '68, VK0MI '69; and VE3GHL wants word on GC3ULZ, TI9CF, XT2AA and ZK1AA. Any *alp*? W9AES, WB2s MUK and ZHM volunteer to act as QSL reps for DX ops in need. "As of this August I am no longer QSL manager for VP5TH," apprises WA5GFS. "Tom now does the job himself from K5AES. I continue to handle cards for VP5NB, TI9PE and my own YN1GLB activity." W8NKC's stint as OX5AP QSL tender dates from July 2, 1970. In line with Antigua's licensing policy only nationals henceforth will bear two-letter-suffixed calls. VP2AP (W1TBS) thus becomes VP2AAP. "I've assumed VP7NT QSL duties for QSOs on and after June 9, 1970," instructs VE3GHL. "I also handle 9Z2RQ's QSLing for Canadian and West Indies QSOs only." Some DXers report mediocre results from the International Reply Coupon (IRC) gambit but W6EAY says they work fine if sent in pairs. ZF1WP (W4YKH) agrees with ZF1ME (W8QW) that requests for Grand Cayman QSLs are surprisingly scant. He suggests that a high percentage of stations worked may not be aware of ZF1's separate DXCC status. K4HNA heartily applauds QSL managers collectively but like WA9SQY and others, he's disturbed by the increasing number of hotbed QSLs being issued all around. "Let's take care that the cards we send are made out correctly," urges Edwin. West Coast DX *Bulletin* has it that the real HH2G hasn't been active for a decade. PY7PO, according to LIDXA's *Bulletin*, understands that PY7AWD/Q, now PY7AD, dispenses his own QSLs from Fernando de Noronha.

O C E A N I A—**AX9KY**, due for Cocos QRT the 18th last, will continue QSLable via VK28G. The latter writes, "To date all cards received have been attended to. Admittedly there has been some delay with QSLs received via bureau, and cards with only single IRCs were answered via bureau." KM6CE (KOMTM) explains, "QSLs for KM6 stations operating either from Midway or the Kure islands may be sent care of KM6CE, Box 23, FPO, San Francisco, Calif., 96814. Current actives from KM6-land include KM6s BI CE DT DU and DV." "CR8AJ vows 100-percent QSLing for his Timor activity after October return to Portugal," relays W9TKV seconded by W8HN. "Horacio eventually will be reassigned to duty possibly as a CR3, CR4 or CT2." Could be a CR8 encore, too.

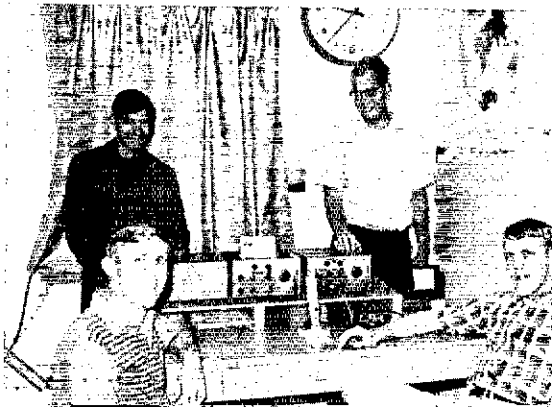
E U R O P E—W4YOK received a card from Franz Josef Land, all right—an s.w.l. job from UA3-127-200/UAI. "Appears to have been printed on the back of an old computer blank," he writes. "W4SHUP has been CTILN's QSL manager for about a year and will continue as such," clarifies K9CUY. LaMar will QNP to her any CTILN logs and QSLs that happen to show at this QTH through misunderstanding. Via WAIKQM of ARRL we hear that WB2ETI and Brother Ed request that QSLs for HV3SU not be sent direct. No Vatican time to answer them. There has been no GC5OU since 1960 according to the previous holder of the call. W4SYQV established this while attempting to QSL the phony he worked in May. Meanwhile newcomer GC3ZIF promises 100-percent QSL response, according to Geoff Watts's *DX News-Sheet*. Participants in this month's Scandinavian Activity Contest (see "Whence") are urged by OZ4FF to keep the QSL tradition strong by confirming all SAC contacts.

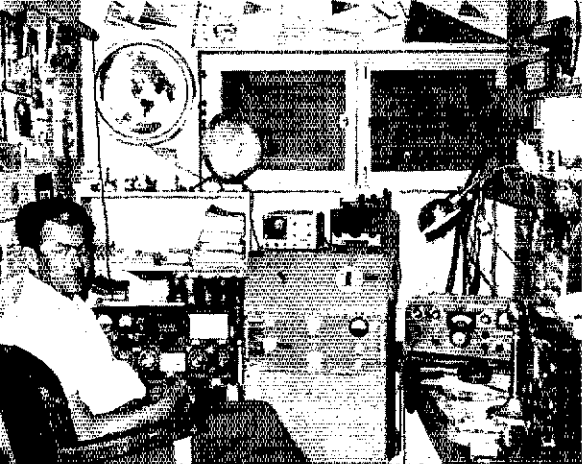
A F R I C A—"I have 9Q5RD logs dating from mid-March, 1970," discloses W9AES, "and will try to confirm Dave's earlier QSOs as well." Self-addressed stamped envelopes (s.a.s.e.) please, or s.a.s.e. plus IRCs when appropriate. W48VBY's tour as F18HM QSL tender commences with QSOs of June 15, 1970. "I hold partial ZS4BZ logs back through December of '69," informs K9CUY. "Applicants not appearing in these records will have to be checked with Dick before I can respond." The dearth of Libya action has the gang digging back into their ledgers for unconfirmed 5A contacts. W3HNK has October 1964-July '65 logs for 5A3TX, and December '64-June '65 records for 5A5TR. Long Island DX Association's *Bulletin* understands that W2MVZ takes over PE8CE QSLing for QSOs after this April, also that direct mail to T78AF has a better chance of delivery if no radio jargon appears on cover. *DX News Sheet* records that most of those 3B8s are ex-VQ8s with unchanged suffixes and addresses.

A S I A—"Still have XW38Q logs," W6KGG/4 tells ARRL's WU0ED. "Anyone still needing any QSL should use my Alabama address." Society of Thai Amateur Radio's H8SARD labels H8IKM/mm, K4WCC/HS, W4AJRM/HS and W4IBK/9B as unauthorized and unsupportable operations. "I'm once again QSL manager for 4X4DK," announces VE3MR, willing to attempt confirmation of Ami's QSOs for years back. "EP2DX sends me logs every two weeks to keep things moving," assures W3HNK. West Coast *DX Bulletin* has it that 9N1MM's ARRL Test code QSOs may be confirmed via W2PPI, also that G3KDB's VS9MB QSLing is hampered by tardy log shipments. Do you unflinchingly supply s.a.s.e. to Stateside QSL agents? Well, you should. And s.a.s.e. plus IRCs to others. To our directory, now, keeping in mind that each suggestion is necessarily neither "official", complete nor accurate.

- AX9DM**, R. Martin, c/o Post Office, Kerema, P.T.
- AX9LL**, P.O. Box 530, Rabaul, New Guinea
- ex-C21JW**, R. Wirth, 22 Berry st., Cornulla, NSW, Australia
- CE9s AT AW AZ** (via CE3RR)
- CF0ZK**, P.O. Box 3016, Valparaiso, Chile.
- CO2DC**, J. Vidal, P.O. Box 6881, Havana, Cuba
- ex-CR8AJ**, H. Torres, Rua Luis Camoes, Vila Sobral 10, Laranjeira, Portugal
- DJ7MG/OH0** (to DJ7MG)
- FG7AC**, B.P. 411, Pointe-a-Pitre, Guadeloupe, F.W.I.
- FL5HM** (via W48VBY; see text)
- FY7YL**, P.O. Box 19, Cayenne, Fr. Guiana
- GC3ZIF**, M. Frater, Les Varennes Cottage, Catel, Guernsey, U.K.

ET3USA, with a steady staff turnover, is Ethiopia's chief DXCC export on 3.5 through 28 MHz. Seated, left to right, are **Ws** 5QHD 4SYX; standing, **K8RWO** and **W3DNA**. (Photo via WAIKQM)





CP5AD gets around nimbly on 10, 15 and 20 meters with this well-appointed Cochabamba outfit. Juan prides himself in a speedy and thorough QSL policy. (Photo via K8VBS)

HL9KM, S. Morgan, Hq. USFK J6, attn. Dir. Amateur Opns., APO, San Francisco, Calif., 96301 (or to WA8QNR)
K5QHS/KS4, S. Hutson, Box 588, Stuttgart, Ark., 72180
K6s ICQ/VE ICs/VE (to K6s ICQ ICS)
KH6GPP, 13149 Chrissy way, Lakeside, Calif., 92040
KL7DTH/KG6, C. Wareham, c/o RCA Global Comm. Inc., Box EH, Agana, Guam, 96910
MP4s BHH QBK (via K1MQQ)
OX3WQ, P. Vestergaard, Box 48, 3920 Julianebaab, Greenland
OX5AP (via W2ENK; see text)
PY0AD, C. de Araujo, P.O. Box 2, Fernando de Noronha, Brazil
PZ2ITU, P.O. Box 566, Paramaribo, Surinam
PZ3s RK RR, P.O. Box 1838, Paramaribo, Surinam
VK5PB/VR2 (to VK5PB)
VP2AAP, F. Perkins (WITBS), Antigua Ad, Box 4187, Patrick AFB, Fla., 32925 (see text)
VP5TH (to K5AEN; see text)
VP7NT (via VE3GHL; see text)
VP8LR, T. Arden, Port Stanley, Falkland Islands
W4VPD/KS4 (to W4VPD)
WA2ZEZ/KP4/KV4/FM7/mm, Cpl. T. Dietrich, P.O. Box 4035, MCAS(H) New River, Jacksonville, N.C., 28540 (or to WA2ZEZ)
WB6NWW/4X (to WB6NWW)
WB8YQ/YV5, R. Bruns, Box 267, Caracas, Venezuela
ex-W8BQ, J. Klinepeter, Drawer C, Elberta, Ala., 36530
YA1MLX, c/o U.S. Embassy, Kabul, Afghanistan
YV4SN, Box 244, Maracay, Venezuela
ZD5X (W/K/VE/VOs via WA5IEV)
3B8s CC CZ (see text)
7Q7BB, P.O. Box 1201, Blantyre, Malawi

AC6A/mm (via W2MZV)
AC6A/gf (via W2MZV)
BT1PK (via BY1PK)
CTILN (see text)
DX0PAR (to DU1PAR)
EA8AJ (via DL1CF)
EI1IC (via EI2CA)
EL2BD (via K4AGC)
F0VQ/FC (via DL8NU)
F0VQ/FC (via DJ8UT)
F0WJ/FC (to W5QNY)
FH8CF (see text)
FH8CY (to F5CY)
FM7WN (via K2KGB)
FW8BO (to FK8BO)
GB3RC (to G4RS)
HB0AJH (to HB9AJH)
HP8C (via HPIAA)
HS4ADF (to WB4HJ)
KA2AA (via WN4QDR)
KC6SK (via W7YOZ)
KH6BSA (to KH6GRG)
MP4BJJ (via M4BBW)
OA3H (to WIKE)
OI3MF (to OH3MF)

OX3W (to OZ8SW)
PA0HVM (via W8HMK)
PY1NEW (via K9LSB)
PZ0ITU (via PZ1DF)
SV0WY (to W1KYG)
VK6RZ (via WB6R1U)
VP5NB (via WA5GFS)
VQ9A/f (via W2MZV)
VQ9E (via W4SFA)
XE0DIA (to K6DIA)
XE0DQA (to K6DQA)
XE0GPU (to WA6GQU)
XE0IC (to K6ICQ)
XE0ICS (to K6ICB)
XE0LE (to K6LE)
XE0MSD (to W8MSU)
XE0OPE (to K6QPE)
XE0SH (to WA6SHI)
XE0SMT (to K6SMT)
XE0WHJ (to WB8WHJ)
4X4DR (via VE8MR)
5H3ML (via VE8ODX)
5R8AU (via JA8DYU)
9N1MM (see text)
9Q5RD (via W9AES)

(Generous Ws 1PL, ISWX 1UED 2KXK 4YOK 5NW 6EAY 8HN 8TKV, Ks 3CUI 3RPF 6IGS 8NG, WaS 1KQM 3E8Q 4ZU 5GFS 6AUD 8VBY 9T2D, WB9CJS, WN7OLT, KH6BZF, VETBAF, Columbus Amateur Radio Association CARAAOP (W8ZCQ), Didi-dumdum-didi (WA6KZL), DX News-Sheet (G. Watts, 62 Bellmore rd., Norwich, Nor. 72 T, England).

Far East Auxiliary Radio League (M) News (KA2LL), Florida DX Club DX Report (W4FRO), Greater Lansing DX Group DX Bulletin (WA8VBY), International Short Wave League Monitor (A. Miller, 62 Warward Ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club Bulletin (JA3UI), Long Island DX Association DX Bulletin (W2GKZ), Newark News Radio Club Bulletin (J. Heien, 3822 Marshall ct., Bellwood, Ill., 80104), North Eastern DX Association DX Bulletin (K1IMP), Northern California DX Club DXer (Box 608, Menlo Park, Calif., 94025), Southern California DX Club Bulletin (WA6GLD), UBA's On the Air (ONs 4AH 5VA), VERON's DXpress (PAQs FX LDU TOVDY WWP) and West Coast DX Bulletin (WA6AUD) provide the postal pointers preceding.

Whence:

F world-wide participation in the 1970 Scandinavian Activity Contest scheduled for (cw) 1500 GMT on the 19th of this month to 1800 the 20th, and (phone) on the 28th-27th, same times, on 3.5 through 28 MHz. Non-Scandinavians will capture as many JW JX LA QH OH0 OX OY OZ and SM-SK-SL stations as possible, snapping the usual RS- or RST001, RST002, etc. serials. For score multiply completed QSOs by the number of Scandinavian band-privates collected (45 possible). Your log transcript listing date, GMT, station worked, serials sent-received, band, and notation of each new multiplier claimed, should be submitted with a summary sheet to EDR, Contest Committee, P.O. Box 335, Aalborg, Denmark, postmarked no later than October 15, 1970, to be eligible for possible award acknowledgment. Great opportunity to beef up your chances for such certifications as OHA, OZCCA, WALA, W8SM, etc. CU on the northern paths, OM Don't forget the phone section of DARC's WAE DX Contest due on the 12th-13th of this month. You're also invited to work the DJ-DK-DL gang on their September 6th phone field day. Next month we'll fill you in on the 10th WADM DX Contest, an East German cw-only export, set for October 17th-18th On the awards front we hear from DIG, the 280-member *Diplom Interessens Gruppe*, who offer a variety of targets of possible interest to wallpapermen hither and yon. Check with DLs 2FB 9KP 9XN or DJ8OT for details. IRTS (Irlanda) presents WAEIC and WAIEP credentials to those who garner sufficient EI counties and provinces. Consult EI2CC for specs. BIA (Bornholm Island Award) is a trophy issued through OZAFM for confirmed QSOs with a minimum of two Bornholm OZs. WIPL reveals that HA5KFN sends out Nos. 1, 12 and 35, HA8KOB Nos. 18, 27 and 28 of the quaint Hungarian Castle Series. G3DME now publishes QUAX, the ten-meter sportsheet originated by SM4DXL some years ago. If you're a 28-MHz trueblue Alan has news for you. The Corsica 60WY eaper by Belgian Air Force hams is due to conclude about now. W3OCW mentions ONs 4NG 4TJ and 5DT participating. YOTNA's 5B-DXCC ambitions received a setback when flood waters soaked his station. W4s HTF and VNN, OM and XLT, report high hospitality during their visit to YU2OZ and the YU2BHI club group. WIPL finds Q3s JKY and YPZ, with seven watts and one watt respectively, doing well on cw. DL1VD also lashes out with a 7-watter on 15.

A SIA-4P2LQ, now residing in Quebec, talks to A AP2SG and other friends back home via VE2AK. D' the wonders of amateur radio-AJmal intends by this means to marry his Karachi fiance by proxy. "It's a pleasure to inform you that after four months of waiting I finally received authorization to operate in South Korea as HL9KM," writes a happy WA8QNR. "We're permitted a maximum-power increase from 100 to 500 watts which should enable us to work the States more easily. Look for me on 20 almost daily around 0800 and 1500 GMT." "I'm building a cube quad for 15 to go with my 20-meter inverted vee," reports H8ACE, due back home at WA3EXP in November. Neighbor H86TOE (WA0DYU) will run his KWM-1 and Q3s on phone and cw until February, according to

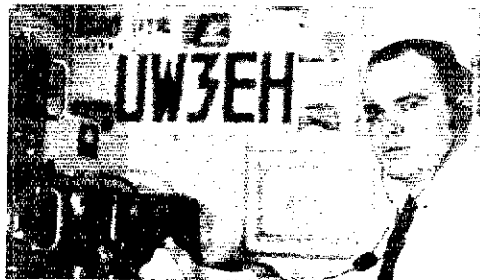
KØBHM "Watch for me on 15 cw," invites **9VIQA (WØBPO)** who commutes to Vietnam between Singapore week ends "No 80- and 40-meter DXing appears possible on Marcus island due to local QRM from a 13-megawatt Loran rig," laments **KA9RC (WA4FLR)** of KA1B fame Was **3JGY** and **9TZD** find **4Z4NBS** getting out like mad on 21 MHz with 10 cw watts to a ground-plane **WA7MUY** wants to team up with philanthropic hams to corral a decent receiver for **VU2JEZ**, India's youngest ham "KA2AA likes to listen for Novices on 15 cw," notes **WN4QDR**. "Bob also works code and voice on 10 and 20." "OD5BZ's systematic and efficient operation on 10, 15 and 20 regularly produces from thirty to sixty DX QSOs per hour," lands **HR8ANR**.

AFRICA **5N2ABG** lists fellow **5N2s** **AAA**, **AAE**, **AAF**, **AAJ**, **AAK**, **AAU**, **AAV**, **ABH**, **NAS** and **KPT** as the total Nigerian ham complement as of mid-May. Eric writes, "5N2KPT is a school station at Kaduna operated by **G2FKS**. David expects to be active from September onward with a **KW2000A**, **5N2s** **AAA** and **AAU** are university stations, and **5N2NAS** is Nigerian Army signals." Nigerian Amateur Radio Society, **5N2ABG** president, issues **NARS News**, an articulate voice for promulgating ham radio in that region. Eric, by the way, is keenly interested in knowing the whereabouts of old **ZD4AX**. Any clues? **9J2XZ** tells **QSL** side **WAØZZT** that DX conditions in Zambia are erratic of late but the two Dons manager 20-meter skeds okay around 1400 GMT **W5IB** learns that **7Q7AA (W4FOA)** formerly signed **EL2AD** Check with **CR6MG** staffers for word on *Concurso Centenario de Malanje*, a sheepskin available to cw DXers who contact any one of **CR6s** by CD EP GQ GW HQ JY KB KZ LC LK LN MG and NS between August 3 and December 31, 1970. Phone applicants must work **CR6MG** plus another **6W8DG** specifies 14,220-14,300 kHz at 0700-1200 GMT for possible DXpeditionary visits to rare countries near Senegal **WB6WHM** wants to see an all-Africa DX contest on the order of **JARL's** annual Asian shindig. How about it over there? "9Q5RD can be found mostly on 14 and 21 MHz," remarks **W9AES**. "Dave is replacing his long-wire with a beam."

OCEANIA—"After three years and 12,000 contacts **KX6FJ** is QRT," announces the OM himself. "Thanks to all for a fine operating experience. See you from **W1BRJ**, and perhaps from another exotic spot before long." From **WN7OLT**: "W86DI likes 21-175 kHz at 0600-0900 GMT on week ends but also uses 21,136 near the end of his operating periods." **WA4GWN's** arrival revived **KG6NAA** activity for Stateside traffic and DX work. Harry writes, "We're also helping Naval Air Station personnel with code and theory studies." The more **KG6s** the better. OM Need Papua? **VK9BS** schedules **W3HNK** each Tuesday on 14,280 kHz at 1000 GMT. Neighbor **AX9DM**, according to **W4YOK**, has his power knocked off every midnight in Kerema **KM6CE** indicates that more Kure activity by itinerant **KM6s** is in the cards because Kure **USCG** gents really dig those QSOs with home and family **AX9KY** closed on **Cocos-Keeling** last month after dispensing several kiloQSOs to friends in more than 125 countries. **QSL** side **VK28G** writes, "Ken was off the air six weeks due to a blown transmitter power transformer but he gave the boys a good spin from the islands. There may be further ham operation from the **Cocos** by Ken's relief."

SOUTH AMERICA—**O3AH**, assigned to and operated by **ARRL** Assistant General Manager **WIKE** for two long weeks in June, accompanied an American Alpine Club group of mountaineers and doctors in providing disaster relief for the earthquake-ravaged area near **Huaraz** and **Huari**. Dick states, "High hills made DX work to the States rough but a **KWM-2**, **Hustler** vertical and portable generator supplied excellent local communications on 7 MHz." "Ex-**CP6GN** is taking a **Cygnus** with him on a tour of missionary duty in French Guiana," learns **WA5SG**, and **K7DYK** says ex-**GPIHW** is shoving off for Indonesia **W8EFW** hears from **CE3IU** that a Yank from Pittsburgh will be signing **CE3ALU** in his neighborhood for a couple of years **ARRL** Director **W4DQS** finds **CE3GF** and friends thinking in San Felix terms for October. Incidentally, currently active **CEØZK** is said to be a ship-board item, not Juan Fernandez **WIPL** expects **OA4KF** to start signing **PAØXE** again next month **PY2PE**, according to **W2KXK**, can put the finger on **CE8AT** South Shetlands QSOs near 14,225 kHz around zero GMT "Tourists Sought by Easter Island" goes a New York *Times* clipping forwarded by **WA2LDX**. The item further points out that such tours are not only costly but extremely rugged.

HEREABOUTS—**W9UCW**, in behalf of **Chiburban** Radio Mobileers, invites 1.8-MHz-oriented cats to attend the third annual 100-Meter Reunion on the 20th



UW3EH is a Moscow sideband favorite who frequents 14,220 kHz at 0330-0430 GMT, 21,312 at 1400 or so. Anatoly seeks a Wyoming contact to clinch his **WAS**. (Photo via **W1RLV**)

of this month in Joliet, Ill. Grab Larry for the lowdown quick "Gave six guys on 160 their first Nicaraguan," recounts **WB9BUIV** of recent **HT4CI** note **W2BP**, with a new **T4XB/R4B** combo, thinks 160-meter transcontinental tests are in order. Meanwhile, other top-band contest ideas are welcomed by **ARRL's** Contest Advisory Committee West Coast *DX Bulletin* lists **WA5REU** pres., **W3DJZ** vep, **K3RLY** sec-treas, and **PY2PE** liaison officer of newly formed International DX Association **K7DYK** says **VPIEG** reaches a Swan for renewed DX action, and **WIPL** was **VP1VR's** first 7-MHz QSO. **VPIWUM** will be **WSWUMU's** call down there for contest work next month on 10 through 80 **W2DY** gives up his antenna farm for minibeam retirement **WB8ABN** reports **FG7TD** honeymooning in France with a replacement **KWM-2** power transformer on order *Reminder*: The annual **W9-DXCC** blowout erupts on the 12th of this month in Chicago. You still may have time to buttonhole **W9ZRX** about it **ARRL's** **W1ETU** discovers that new **VE2AK (W4DX)** is old **ZD8AK** and **DL4FM**. Karl's call may have changed to **VP2AAK** by now **VE4AE** can supply data on a fresh **Winnipeg DX Club** award based on 31 specified global contacts plus QSOs with five **WDXC** **VEs** **W1ETU** will operate portable in the Washington counties of **Wankiakum**, **Pacific**, **Mason** and **Jefferson** on the 8th-13th of this month. Watch 60 kHz up from the low band edges **WA4ZZU** pushes **Vanderbilt's** **W4VSV** toward **DXCC** with 96 countries confirmed This may be the kilowatt age but **K2QBW** finds it still possible to reach 200/175 worked/confirmed with 180 watts and a vertical in a little over two years. Along the same modest line **W5IB**, ex-**SVØWZ**, cracked **DXCC** in eighteen months with an **NCX-5** and **14AVQ**. CW in the Extra bands does the trick **W18WQ** spent the summer burying more radials for his 4-element 3.5-MHz vertical Two short months with a **2NT** and **14AVQ** amassed 56 countries for **WN7OLT** on 21 MHz **Wanderlust** department: **W3HNK** aims for **F8Y PJ7** and **VP2VY** QSOs over the 20th-28th of next month, **W4YKH** hopes to reactivate **ZF1WP** around the same time, **W9AES** plans possible early Baja Nuevo and/or **Windwards/Leewards** sport, and **WB8ABN** seeks a game young partner for extensive European **DXpeditionary** delights.

IMPORTANT NOTICE

Changes of Address

Important postal changes in handling second-class mail matter are now in effect. Please advise us *direct* of any change of address. Four weeks notice is required to effect change of address. When notifying, please give old as well as new address. Your promptness will help you, the postal service and us. Thanks.

Operating News

GEORGE HART, WINJM
Communications Manager

ELLEN WHITE, WIYYM,
Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, WIZJE

DXCC: ROBERT L. WHITE, WICW

Training Aids: GERALD PINARD

Contests: ALBERT M. NOONE, WAIKQM

Public Service: WILLIAM O. REICHERT, WA9HHH

"IS THE FREQUENCY IN USE?" Now and then you hear this on the phone bands. Not often enough, but occasionally an amateur about to make a transmission is considerate enough to inquire before he spews forth with his rf onto what might appear to be a vacant frequency. If you think that just listening will tell him whether or not the frequency is occupied, you are marking yourself as a 75-meter man who seldom uses any other band. And, with the coming sunspot null, even 75 is showing signs of "skip." The frequency may seem clear to you, but actually a station skipping over may be transmitting on it. He can't hear you and you can't hear him, but the station at the other end can hear you both. If you come on the frequency with a CQ, you may very well be breaking up a QSO, quite innocently and unintentionally.

So ask first, "Is the frequency in use?" Any station copying someone on the frequency will tell you quickly enough: "Yes, please stand by."

One of our correspondents - in fact, the one who prompted this whole discussion - says that on the cw bands there is even less consideration in this regard than on the phone bands. Perhaps this is because the cw bands are less crowded, since cw takes so little room compared to phone, and there is less likelihood of QR'ing somebody; anyway, we doubt that cw operators are inherently less considerate, as a breed, than their phone brethren. Our correspondent suggests some kind of a Q signal to inquire if the frequency is occupied.

The nearest to it on the present international list is QRL?, which, as everybody knows, means simply "Are you busy?" This wouldn't quite seem to do it, although it is possible we could have it understood that a "QRL?" transmitted spontaneously would be asking if the frequency is busy. (On phone we have heard "QRZed the frequency?" Yeccch!)

Sometimes a procedure used in the past can be resurrected to good advantage. Back in the spark

OPERATING EVENTS

(Dates in GMT)

September

- 3 W6OWP Qualifying Run
- 11 W1AW Qualifying Run
- 12 Open FMT, p. 68 August
- 12-13 VHF QSO Party, p. 67 August
Delta QSO Party, Sta. Act.
WAE phone, p. 108 August
Wash. State QSO Party, Sta. Act.
W. Va. QSO Party, Sta. Act.
- 18 W1AW Morning Qualifying Run
- 19-20 VE/W Contest, p. 69 August
SAC cw, How's DX
Pa. QSO Party, Sta. Act.
- 21 9HI Contest, p. 61 August
- 23-25 YL Howdy Days, p. 100 August
- 26-27 SAC phone, How's DX

October

- 3-4 California QSO Party, Sta. Act.
Missouri QSO Party, Sta. Act.
Mass. QSO Party, Sta. Act.
VK/ZL/Oceania DX Test phone
IARU News
- 7 W6OWP Qualifying Run
CD Party, phone
VK/ZL/Oceania DX Test cw
IARU News
- 13 W1AW Qualifying Run
- 17-18 CD Party, cw
RTTY SS
WADM
Zero District QSO Party
- 21-22 YL/AP, cw

November

- 4-5 YL/AP, phone
- 7 FMT
- 7-8 Delaware QSO Party
N. C. QSO Party
- 14-15 SS, phone
- 21-22 SS, cw

December

- 2 W6OWP Qualifying Run
- 10 W1AW Qualifying Run
- 12-13 160 Meter Contest
- 17 W1AW Morning Qualifying Run
- 31 Hand-Key Nite

WIZJE

Here's our gal for all seasons, Lillian Salter WIZJE. On this happy occasion (May 12, 1970), Lil celebrated her 40th anniversary with ARRL. On a not-so-happy day (for us!) the end of next month, WIZJE retires. Join us with a hearty congratulations and 73 for "LMS."

QST for



W1AW SCHEDULE, SEPTEMBER-OCTOBER

The ARRL Maxima 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.

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000	← C.W.-OBS ¹ →						
0020-0030 ⁴			3.700 ⁶	14.020	14.020	7.150 ⁶	14.020
0030			3.700 ⁶	14.100	14.100	7.150 ⁶	14.100
0100	← Phone-OBS ² →						
0105-0130 ⁴			3.820	50.120	145.600	1.820	21.270
0130	← CODE PRACTICE DAILY ¹ (35-15 wpm TThSat), (5-25 wpm MWFSn) →						
0230-0300 ⁴			3.555		1.805		3.555
0300	← RTTY-OBS ³ →						
0310-0330 ⁴			3.625	14.095	7.095	14.095	3.625
0330	← Phone-OBS ² →						
0335-0400 ⁴			7.220	3.820	7.220	3.820	7.220
0400	← C.W.-OBS ¹ →						
0420-0430			3.700 ⁶	7.020	3.945	7.150 ⁶	3.520
0430-0500			3.700 ⁶	7.080	3.945	7.150 ⁶	3.555
1300	← CODE PRACTICE ¹ (5-25 wpm MWF), (35-15 wpm TTh) →						
1700-1800		21/28 ⁸	21/28 ⁸	21/28 ⁸	21/28 ⁸	21/28 ⁸	
1900-2000		14.280	7.255	14.280	7.255	14.280	
2000-2100		14.100	14.280	14.095	21/28 ⁸	7.080	
2200-2300		21/28 ⁸	21.100 ⁶	21/28 ⁸	7.255	14.280	
2300-2330	← RTTY OBS ^{3,7} →						
2330	← CODE PRACTICE DAILY ¹ 10-13-15 w.p.m. →						

- ¹ C.W. OBS (bulletins, 18 wpm) and the code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02, and 145.6 MHz.
² Phone OBS (bulletins) 1.83, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 145.6 MHz.
³ RTTY OBS (bulletins) 3.625, 7.095, 14.095, 21.095 and 28.095 MHz.
⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.
⁵ Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.
⁶ W1AW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.
⁷ Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.
 Maintenance Staff; Wis QIS WPR. * Times-days in GMT. Operating frequencies are approximate.

This tentative didit-dit signal is used in some cw nets, to indicate a station wishing to report in. No reason why it cannot also be used to ask, on cw, "Is the frequency occupied?" Shall we popularize it? No need to comment, this time. If you like the idea, use it. Should someone ask what it means, refer him to *QST*. - WINJIM.

ARRL QUALIFYING RUNS

Any person can apply for an ARRL code proficiency award. Neither League membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualified at one of the six speeds transmitted (10-35 wpm) you will receive a certificate. If your initial qualification is for a speed below 35 wpm, you may try later for endorsement stickers. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW and W6OWP (W6ZRJ, alternate) for the coming 3-month period. W1AW will simultaneously transmit a qualifying run on 1.805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.6 MHz at 0130 GMT Sept. 11. In converting, 0130 GMT Sept. 11 becomes 2130 EDST Sept. 10. W1AW will transmit a qualifying run on the frequencies shown above at 1300 GMT Sept. 18. In converting, 1300 GMT Sept. 18 becomes 0900 EDST/0600 PDST Sept. 18. W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7129 kHz. at 0400 GMT Sept. 3. In converting, 0400 GMT Sept. 3 becomes 2100 PDST Sept. 2.

W1AW CODE PRACTICE

W1AW transmits daily code practice according to the following schedule: showing speeds, local

Note: W1AW will be closed Sept. 7 for Labor Day. W1AW Fall-Winter sked will appear in Oct. *QST*.

times/days and GMT times/days. For practice purposes, the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries a checking reference.

10-13-15 7:30 P.M. EDST daily	2330 daily
4:30 P.M. PDST	
5-7½-10 9:30 P.M. EDST SnTThS	0130 MWFSn
13-20-25 6:30 P.M. PDST	
5-7½-10 9:00 A.M. EDST MWF	1300 MWF
13-20-25 6:00 A.M. PDST	
35-30-25 9:30 P.M. EDST MWF	0130 TThS
20-15 6:30 P.M. PDST	
35-30-25 9:00 A.M. EDST TTh	1300 TTh
20-15 6:00 A.M. PDST	

The 0130 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving 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 July *QST* practice text to be sent in the 0130 GMT practice on the following dates.

- Sept. 14: It Seems to Us, p. 9
- Sept. 17: The Solid-State Receiver, p. 35
- Sept. 23: Amateur Radio Public Service, p. 58
- Oct. 2: Happenings of the Month, p. 66

The subject of practice text for the following sessions is *Understanding Amateur Radio*, First Edition.

- Oct. 5: Not-So-Small Points, p. 137
- Oct. 9: Building Your Own, p. 137



• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE - SCM, John L. Penrod, K3NYG - S4C/PAM: W3DKX. RM: W3EEB.

Delaware Sectional Nets

Saturday:	1800 EDST	3.905	DEPN
Sunday:	1300 EDST	3.905	KEPN
Monday:	1930 EDST	145.260	DTMN

The Delaware Six-meter Net is without a net control and several members are waiting for this net to start again. If you are able to take the NCS job, please write WA3DYG, WA3CDV and WA3DYG won the Delaware ARC Homebrew Contest. WA3DUM is experimenting with 2 meters. W3DEO is host to company from Colorado. W3HKS is giving the rig a rest and taking up a little golf-playing. W3MMB won the Maverick Novice Contest. Many thanks to the hard-working group that put on a very good 1970 Hamfest. Traffic: WA3DUM 12, K3NYG/Ø 3.

EASTERN PENNSYLVANIA - SCM, George S. Van Dyke, Jr., W3HK SEC: W3IC. RM: W3EML, K3MVO, W3MPX. PAM: WA3GLI, K3PSO. VHF PAM: W3FGQ. OO reports were received from K3DRT, K3EMA, WA3IUV, K3WEU, W3KEK, WA3EEC: OBS reports from WA3AFL, WA3JKO, WA3EEC, WA3NVO: OVS reports from WA3FEF, WA3JWL, WA3KQX, WA3NVO, WA3MCK, WA3JIT, WA3KFT, K3VAX, K3WEU. PSHR: W3EML, WA3CKA, W3MPX, WA3ISU, WA3ETX/3, K3OIO, BPL: W3CUL, K3NSN, W3VR, W3MPX, WA3ETX/3.

Net	Freq.	Operates	QNI	QTC	RM/PAM
EPA	3610	Dy 6:45 P.M.	234	267	W3MPX
PTTN	3610	Dy 6 P.M.	136	118	W3MPX
PFN	3960	M-F 5:30 P.M.	257	317	K3PSO
L.PaEP&TN	3917	Dy 6 P.M.	286	142	WA3GLI

Field Day messages were received from WA3IGS/3, W3QV/3, K3SSOC/3, W3OK/3, W3CI/3, W3MTK/3, K3OWW/3, K3HNO/M, WA3JKO/3, WA3JZB/3, W3NLI/3 and WA3JKO/M. W3CUL reports it's good to be home and near her own doctor. K3NSN is active on the Missionary Net. W3VR reports skip acted weird in June. Well it happened after 115 months - W3EML didn't make the BPL. W3MPX is using the FD antenna tower for experiments at home. WA3AFL has been elected by the ORS appointees in EPA as RM of the PTTN. Thanks a lot to W3MPX for carrying the load of both EPA and PTTN for so long. Congratulations to WA3AFL. WA3ATQ reports the W3 YLs were well represented at the MidWest YL Convention. W3HNT worked the Phone CD week end from the Caribbean area. WA3HT operated a second station, WA3OSS, from the FJwv Institute, Phda Co. ARC: Net is shifting from 8:30 to 9:00 P.M. WA3IUV got his WAZ award. W3ADE has retired this month and expects to be more active. W3EU is playing with 160 meters. K3VAX, K3WFW, K3NYA and WA2WLN graduated from Drexel U. W3JD is still battling up hill to get IRC ARC on the air. Three new Novices reported by K3WEU are W3OSJ, W3OSK and W3OSM. New officers of the Mt. Airy VHF ARC are K3JIZ, pres.; W3CIU, vice-pres.; WA3BIV, rec. secy.; W3SAO, corr. secy.; K3GAN, treas.; K3UJC, K3BPP and WA3LNH, directors. W3GOA sure is a patient guy; after 13 years he finally made the achievement award from SJRA by working 35 members, all on 6 meters. I hope all the antenna repairs were completed this summer and that everyone had a fine vacation. Traffic: W3CUL 3785, W3VR 1148, W3EML 429, W3MPX 418, WA3ETX/3 239, WA3LMO 153, K3OIO 121, W3HK 108, WA3JWL 104, WA3JZB 88, K3PIE 67, WA3AFL 65, WA3ATQ 62, WA3GLI 58, WA3CKA 47, K3BHU 46, K3MVO 41, WA3LVC 39, K3PSQ 34, W3VAP 29, WA3HT 24, WA3IHV 43, WA3NVO 12, WA3IYC 10, WA3OSS 10, W3FPC 9, W3BNR 8,

WA3JKO 8, K3HKW 6, WA3JWF 5, WA3EFC 3, WA3IUV 3, WA3ISV 3, W3VA 3, W3ADE 1, WA3BJQ 1, K3PMA 1, W3EU 1, K3FOB 1, WA3IAZ 1, W3ID 1, W3KEK 1, WA3KFT 1, WA3KQX 1, K3VAX 1, W3YPI 1.

13TH ANNUAL PENNSYLVANIA QSO PARTY

This contest, sponsored by the Nittany Amateur Radio Club, will take place from 2300 GMT Sat. Sept. 19 to 0200 GMT Mon. Sept. 21. It is open to all amateurs. Stations may be worked on different bands and modes. The exchange will be: Pa. stations send QSO number, RS(1), county; non-Pa. stations send QSO number, RS(1) and ARRL section or country. Logging information: Show date/time in GMT, QSO number, station worked, HS(T), county worked (for non-Pa. stations) and ARRL section for Pa. stations, band and mode used. Suggested frequencies: Activity will be found around 75 kHz up from the edge of each cw band and 3880-7280-14280-21325 on phone. Check phone bands on even GMT hours. Scoring system: Pa. stations count 3 points per out-of-state QSO, 1 point per Pa. QSO, multiplied by the number of ARRL sections and other countries. Out-of-state stations count one point per QSO multiplied by the number of Pa. counties worked. Awards: (Single operator station awards only. Multiop, in a separate category.) Certificates go to each first-place station in each ARRL section and country. Second and third-place certificates issued where justification warrant. Any station qualifying for the Pa. Counties Award will be issued the award free of charge (minimum qualification is 30 counties). Nittany club members ineligible for awards/certificates. The mailing deadline is Oct. 19. Send your log to NARC, Box 60, State College, Pa. 16801.

MARYLAND-DISTRICT OF COLUMBIA - SCM, John Munnholland, K3LFD - SEC: W3LOQ. PSHR (June): W3E.Z. BPL: WA3IYS, W3TN. New appointments: K3AIB as EC Harford County and WA3KOO as ORS. Endorsements: WA3IYS as ORS, WA3AJR as EC, W3GN as OO, K9ZPP/3 as EC, K3LNF as OPS. W3JPT took time out from chasing DX to help K4CD/4 make 700 Field Day contacts. Your SCM received Field Day messages from the following: Howard County ARC (WA3NIZ), ARINC/COMSAT Clubs (W3KS), Goddard ARC (W3HKF), Chesapeake ARC (WA3GAU), WA1UNZ-W3YUG group, W3IN group and Bowie ARC (W3NHNG). WA3IYV will be QRT most of the summer. W3MJI was "in the field" at Thomas Point near Annapolis for Field Day. W3FOS is recovering from surgery. W3CDO is spending the summer in I-L and I-Lands with a 6-meter rig beside her. W3BWT has been "on the go" in and around the southeastern states by car and by plane. CW Iron Man W3TN has been making the rounds of the field nets: MDD, HBN, MDDS, 3RN, VN and VSN. WA3GVP is back on his OBS schedules after some time out for college exams. Club and individual memberships are being offered by AMSAT to anyone interested in upcoming Oscar 6 operations for DXing, contesting and traffic. For details, contact AMSAT Box 27, Washington, D.C. 20044. Congratulations to K3EQF on graduating from Capital Institute of Technology. W3FA got a Certificate of Merit from NSS for copying the Armed Forces Day CW message. K3NCM joined the Frederick ARC gang at its Field Day site and had fun. W3ECP says W3LL underwent surgery and K3LRJ completed another overseas assignment. W3EQV is participating in the Youth Opportunity Program throughout the summer. Traffic: WA3XJ 12873, WA3IYS 520, W3TN 254, W3E.ZT 121, W3FCS 46, W3EUV 32, W3FA 29, K3LFD 25, WA3IYV 22, W3ZNW 21, WA3GXN 19, W3ECP 17, K3GZK 17, WA3HHW 15, WA3LKI 11, W3LOQ 10, WA3LWT 9, K3ODC 8, WA3GVP 5, W3FU 4, W3BWT 2, W3GEB 1.

SOUTHERN NEW JERSEY - SCM, Charles E. Travers, W2YPZ - SEC: W2LVW. RM: WA2BLV. PAM: WB2UVB. FD reports are beginning to roll in with excellent results shown. All individuals, clubs and other groups are to be commended for their accomplishments, great and small. The West Jersey Radio Club held forth in the Kennedy City Park of Burlington, N.J. K2OPN, club pres., is very pleased with the activity of the club. Other officers are WA2HIF, vice-pres. in charge of activities and WB2LXA, secy.-treas. WA2MGV received the A-1 Operators Award. WB2LKR was graduated from Burlington High School in June. WB2YZC completed his freshman year at Rutgers U. WB2DRG continues on the Public Service Honor Roll with a total of 43 points for June. OO W2FBF informs this office that there were no "citations" issued in

June, W2PLV, now vacationing in New Hampshire as portable one, submitted the following report for the N.J. P and T Net for June: QNI 510, traffic 220. The net was not in session during FD operations. W2BLM operated mobile during Field Day and made an excellent record. The mobile rig will serve him well in his coming Canadian trip with his Boy Scout Troop. W2H retired from the N.J. Bell Telephone Co. A recent appointment is WA2FGS of Pennsville, N.J., a very dedicated RACES member of the state organization and also OPS. WA2GAA is a recent QBS appointee. Traffic: WB2UVB 146, WB2DRG 108, WB2VEJ 85, W2PU 53, W2BLM 44, W2YTPZ 29, WB2FJF 10, WB2WIR 4, WB2SFX 3, WB2APX 2, W2J1 2.

WESTERN NEW YORK - SCM, Richard M. Pitzeruse, K2KTK - Asst. SCM: Rudy M. Ehrhardt, W2PVI. SEC: W2RUF. Other leadership appointees and section nets appear in last month's Station Activities column. K2BKU spent a couple of weeks on a DXpedition to VF3. The Buffalo repeater is now K2LDT, with W2LUP the trustee. WB2NNA has been active this summer from Moose Mount Lodge in Warren County. WB2YQH and W2FXA operated from the Niagara Frontier DX Association's FD site as W2MU/2. W2RUT injured his knee but is back on the active list now. W2EMW has worked enough AX stations to apply for the Aussies Cook Award. RAGS plans big things again this year for the New York State Fair. Look for W2AE/2 operating from there. K2KIR has launched a new 60-ft. tower with such things as a 40-meter beam on top, K2JQT received the NCARC's Ham of the Year Award. W2LDM is looking for a skyhook to put his 2-meter beam on as the trees are crowding it now. W2AFB complained bitterly about the poor conditions, but then found the bad antenna relay. WAZANE has been granted Life Membership in the Ulster Amateur Radio Club. W2EMX has a new Hornet mobile. W2LMO got his picture in the *Buffalo Evening News*. WA2JIL is S-10 from Checktowaga. WB2ONO presented the new ARRL film on Channel 4. Buffalo, K2CEC has a new homegrown final. W2CFP is the new editor of *ECARS Monitor*. Dave also supplied some interesting comments on W0PAN's CD proposals. By the way, take the time to read about those proposals in the July CD Bulletin and make comment to WINJM. WA2BPE tells that a 6CW4 type navistor can be cooled neatly with a finned heatsink designed for transistor T1-5 cases. Keep a watch out for the Syracuse VHF Clubs annual VHF Roundup to be held in mid-Oct. NYS handled 245 messages in June with 696 check-ins. WB2VVZ hopes to have the fm 6-meter rig operational soon. WA2AWK announces that K2RXG is a new Asst. EC in Onondaga County. W2ICE tells of upcoming AWA shows at the National Convention in Boston. NCARC held a transmitter hunt in which a recording of a generator-like noise was played through the hidden transmitter simulating background noise. (VARC held its Annual Hamfest. BPL: W2OE. PSRR: W2FR. WA2CAL. K2KIK. W2QC. WA2ICU. W2RUF. W2MTA. K2KIR and WA2BEX. Traffic: WA2CAL 272, W2FR 266, W2OE 264, K2KTK 171, W2QC 135, WA2ICU 131, W2RUF 123, W2MTA 111, W2HYM 89, W2EFB 63, W2RQF 52, WA4PDM/2 34, W2AFB 30, WB2VND 30, K2KIR 28, K2OFV 28, WA2BEX 25, WB2JLL 25, W2MSM 22, K2IMI 19, W2DBU 18, WB2ZDK 16, WB2LQP 13, WA2AWK 12, WB2FHS 11, W2WAM 7, WA2ILLE 6, WN2LCC 5, W2PVI 4, WB2NNA 3, WA2PZD 3, WA2ANE 2, W2CFP 2, WA2KAT 2, WN2NLZ 2, W2RUT 2, W2EMW 1. Total 2027; last year 2229.

WESTERN PENNSYLVANIA - SCM, Robert E. Gawryla, W3NEM - SEC: W3KPI. PAMS: W3WER, K3ZNP. RMs: WA3AKH, W3KUN, W3LOS, WPA CW Traffic Net meets on 3585 kHz at 2300Z daily; WPP (Western Pennsylvania Phone Net) daily at 0200Z on 3955 kHz ssb. Since a change of SCM hands has taken place, it would be greatly appreciated if all the WPA clubs would send their newsletter to the above-mentioned SCM. I wish to take bits of information from the newsletter to use in my monthly column in QST. Thank you. The Footballs Radio Club, via W3LWW newsletter reports that its recent hamfest was a real big success with WA3IPU and his committee running things this year. The club also reports that WA3MST is now a General Class and WN3QSG finally made the grade. The Indiana County ARC has big news with W3IY's ORPIng. It seems that Cliff worked a Russian (whom he lost in the QRM) then turned around and worked a chap in Panama. Who says we need big power! I hear that W3FVU worked some long-haul mobile activity by working an auto three cars in front of him. WA3NCH now operates with a new Heathkit SB-102. Congrats go to WN3OTE, his XYL WN3OTO and their 13-year-old son WN3OTK, who became Novices simultaneously. WN3ONU and son WN3ONT, plus WN3OTD, are new Novices in the Baden area. The Nitfany Amateur Radio Club reports that its Annual Pennsylvania QSO Party will be held the 3rd week end of Sept. 19 and 20 and requests all Penna. amateurs to participate, especially from any rare counties.

I hear that K3HZL and W3VEQ have newly-arrived harmonics. Our congrats. Hope they become good cw operators. WPA Phone Net reports 24 sessions, 77 QNIs and 33 messages. Traffic: K3ZNP 131, W3NEM 115, K3HKK 112, K3OWJ 55, W3LOS 38, K3ZOB 21, WA3NAZ 14, W3YA 10, W3UHN 9, WA3HLL 6, W3SN 6, W3ZUH 4, WA3YA 2, K3STN 2. Total 525.

CENTRAL DIVISION

ILLINOIS - SCM, Edmond A. Metzger, W9PRN - SEC: W9RYU. RM: WA9ZUE, PAMS: WA9CCP and WA9PDI (vhf). Cook County EC: W9HFG. Net reports:

Net	Freq.	Time(Z)/Days	P/c.
1EN	3940	1400 Su	9
1LN	3760	2400 Dy	167
NCPN	3915	1300 M-Sa 1800 M-F	91
III PON	3915	2248 M-F 1430 M-F	613
III PON	145.5	0200 MWF	16
III PON	50.28	0200 M	4
Gt. Lakes	3937	0230 Dy	

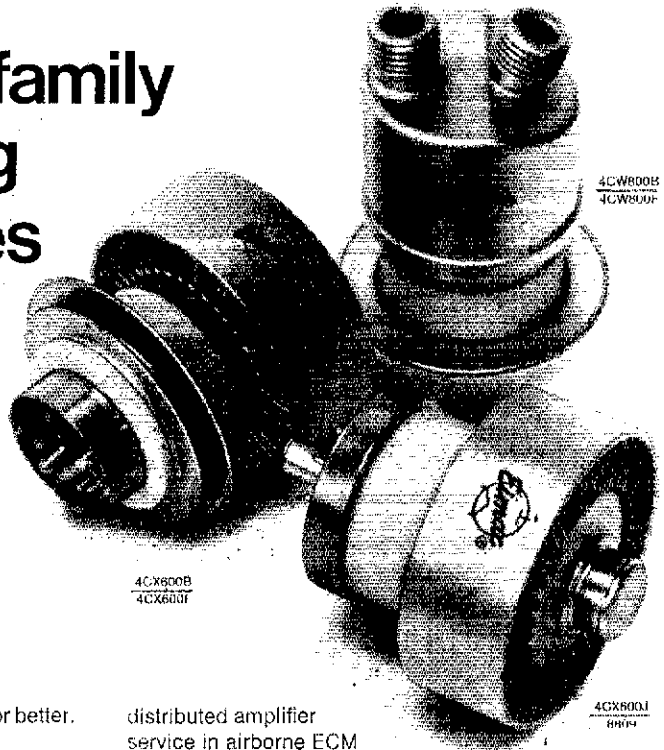
W9HRY reports that the North Region Net traffic for the month was 490. New Novice in the Springfield area is WN9FHV. WA9ZPL is on 2 with a Heath Twoer and an eight-element yagi. K9WYX moved to Rogers City, Mich., and is now W8IWH. WA9VMP received his General Class ticket. K9HLC is recuperating from surgery. WB9DPU has accepted the asst. mgr. position of CAN. WA9ZXU has a new mini beam. W9LDU reports that the Lee County RACES call is K9CLW and that the equipment includes three Galaxy 2-meter transceivers. WN9CZS passed the General Class exam. K9ASM will be operating as VE3 until Sept. Western Illinois University Amateur Radio Club has reactivated its club station, W9YOL, in the Physics Bldg. on the campus. WA9UCL is the pres. of the club. The Breakfast Club Annual Hamfest held in Palmyra had a FB turnout as usual. WA9TXW and WA9QCH were featured on an interview show on WIVS, where WA9QCH is employed. The show was Field Day publicity for the Kishwaukee Radio Club. W9LNO made top cw honors in the YL/OM Contest. W9CLN is a new General. The Mini-Hamfest, sponsored by the Big Thunder Amateur Radio Club, will be held in Belvidere Aug. 23. WA9BWK has a new 6-meter antenna. W9FBB is displaying his newly-acquired Amateur Extra Class license. The Six Meter Club of Chicago held its 13th Annual Hamfest at Frankfort, Ill., and Hamfesters picnicked at Santa Fe Park with many eyeball QSOs. The Chiburban Radio Mobilers announces the 13rd Annual 160-Meter Reunion, Sun., Sept. 20, 1970, at the Joliet Beach Club, Joliet, Ill. Just as before, there will be no admission charge, and no formal activities are planned. The reunion is a chance to get together with 160 other enthusiasts to discuss equipment, operations, noise problems, DX, use of frequencies, etc. Last year's mobile efficiency contest evoked so much discussion that it may be repeated with revised rules. Slides and snapshots of various 160 layouts will be shown. The Joliet Beach Club is located on Rowell Ave. immediately adjacent to Interstate Route 50. For those who wish to stay over, there is a Joliet Holiday Inn, and a Howard Johnson Motel nearby. Talk-in on 1810 kHz. For additional information, please contact Barry Mulvaney, WA9YDO, 13128 W. Playfield Dr., Crestwood 60445. WA9WNH/9 is the only BPL recipient for the month. Traffic: WA9WNH/9 569, W9EVI 168, W9LFL 100, W9NXC 86, W9HOT 76, WB9DPU 67, WA9ZUE 65, WB9BSX/9 61, WA9REB 58, WA9ZPL 54, W9UDQ 44, W9LNO 42, WA9NZF 42, WA9LDC 31, W9PRN 20, W9FHJ 15, W9HJM 10, W9LDU 7, K9BSK 5, WA9ZXU 4, WB9AJB 2.

INDIANA - SCM, William C. Johnson, W9BUO - SEC: W9FC. RMs: W9FC, W9HRY, WA9WMT. PAMS: K9CRS, WA9OHX, (VHF) W9PMT.

Nets	Freq.	Time(Z)/Days	P/c.	Mgr.
1FN	3910	1330 Dy 2300 M-F 142		WA9OHX
1SN	3910	0000 Dy 2100 M-S 342 2300 S-S		K9CRS
QIN	3656	0000 Dy	197	WA9WMT
ITN	3740	0000 Dy	73	WA97KX
PN	3910	1245 Su	24	WA9UMH
PONVHF	50.7	0200 M-Su	30	WA9FIS
Hoosier VHF			73	W9PMT

With deep regret I report the passing of W9INX of Fort Wayne, Ind. ITN net report for May was 65. Columbus ARC's new officers are WA9OLM, pres.; W9PIN, vice-pres.; W9FHL, secy.; WA9SBK, treas. The ITN Net has been changed to Ind. Training Net. Anyone who wants to learn how to handle traffic on cw should check in. All are welcome. At the June 13 Indiana Amateur TV & UHF Club meeting K8REG spoke on low noise pre-amp for 432. Gary Davis of

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					Plate Volts	Plate Amperes		
4CX600B 4CX600F	6.0 26.5	890	5 PIN SPEC.	Air	3000	0.6	750W	WIDEBAND AMPLIFIER SERVICE
4CW800B 4CW800F	6.0 26.5	890	5 PIN SPEC.	Liquid	3000	0.6	750W	WIDEBAND AMPLIFIER SERVICE
4CX600J 4809	6.0	150	OCTAL SPEC.	Air	3000	0.6	750W	CLASS AB-1 LINEAR SERVICE

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So we moved ahead of them.

Columbus spoke on cameras and W9JY talked about 1296 gear he contacts Chicago with that was built from the ARRL *Field Manual*. WA9BT received his 35-wpm certificate. Grant County ARC's new officers are WA9YD, pres.; WA9YOH, vice-pres.; W9CUC, treas.; W9ZIS, sec'y.; W9MXV, trustee. W9JH has retired and now will have more time for ham radio. Field Day activity was great and contacts were made on 7 amateur bands from 80 to 144. QIN Honor Roll: K9VYI 25, W9BDP 23, W9HS 22, W9QLW 21, WA9WMT 21, WA9ZKN 19, WA9KAG 17, K9WVJ 15, WB4OBD/9 15. Amateur radio exists because of the service it renders. BPL certificate went to W9JYO. Traffic: (June) W9JBO 261, WA9ZSK 230, W9CGW 162, W9HRY 160, W9JWH 141, WA9UJZ 141, WA9VZM 136, W9JYO 126, WA9WMI 113, WA9KAG 84, W9QLW 80, K9CRS 71, K9RWO 65, W9BUQ 64, W9UCU 39, WB4OZ/9 38, K9ILK 30, K9VHY 30, K9YHM 25, K9RLZ 24, WA9GJZ 21, K9KTB 19, WA9BBG 16, WA9CHY 15, W9YYX 15, K9CBY 13, W9EJL 13, W9PPI 13, WA9AXF 10, W9DZC 7, W9JHW 7, W9HDP 5, W9FC 4, W9DOK 2, K9QJY 2, WA9VRC 2, W9AQW 1. (May) WA9ZKN 197, WA9VZM 74, WA9MXG 10. (Apr.) WA9MXG 20.

WISCONSIN - SCM, S M Pokorny, W9NRP - SEC: W9NGT. PAMs: WA9EJT, WA9ZK, WA9OAY, WA9OKP, WA9QNI. RMs: W9HQT, K9KSA.

Nets	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
BWN	3985 kHz	*1245 M-Sa	394	215	WA9OAY
BFN	3985 kHz	*1800 Dy			WA9OKP
Wi-Pon	3925 kHz	*1801 M-F	390	99	W9VCM
WSRN	3985 kHz	*2300 Dy	1172	184	WA9QNI
WSSN	3662 kHz	*0030 T1Sa	48	4	K9KSA
WIN	3663 kHz	*0115 Dy			W9HQT
WRN	3620 kHz	*0130 Su (RTTY)			K9GSC
SW2RN	145.35 MHz	*0230 Dy	128	8	WA9ZK
WS6RN	50.4 MHz	*0300 M-Sa	101	2	WA9FZT

*All nets one hour earlier during Daylight Saving Time. Notice: WSSN changed from 3780 kHz to 3662 kHz July 1; same frequency as WIN. A few net managers didn't get reports in this month. Deadline is the 5th of the month, if I get them by the 6th, that gives me a couple of hours to get them out so that they are in the mail by the 7th. New ORS certificate went to WA9OMO; WSRN certificate to WB9BJR. Renewed FC appointments: W9CFS, WA9ZK, W9JQC, W9ONI. Renewed ORS appointments: WA9APB, W9RTP. Renewed OPS appointment: WA9ZK. Your SCM received 12 Field Day messages. Some of the stations reporting Field Day activity: WB9AMF, W9CQO, K9GSC, W9HBM, W9JCL, W9JZ, WA9OMO, W9OUT, WA9RPO, K9VWC, WA9WELZ, W9YTY. Traffic: K9CPM 211, WB9BJR 158, WA9QNI 76, WA9OKP 60, W9EJL 45, K9TBY 43, K9FTH 41, W9KRO 41, W9NRP 38, WA9OAY 38, W9QMT 38, K9FPS 37, K9KSA 34, WA9ZJY 29, W9DZC 27, W9RTP 20, W9JHW 17, WA9PKM 15, W9YT 15, K9LGU 14, WA9LRW 11, WA9EDZ 7, WA4CF/9 7, W9ONI 4, WA9SAB 3.

DAKOTA DIVISION

MINNESOTA - Acting SCM, Bob Schoening, W0BE. SEC: WA0MZW. RMs: WA0URW, WA0LAW, WA0AAU. PAMs: K0GYO, WA0DWM, WA0IRM, WA0MMV, WA0QJ. Net schedules are listed in last month's *QST*. Please submit announcement of your group's activities at least two months in advance for publication. Check renewal dates on your appointment certificates. With all the talent available, the SCM election should be interesting. Be sure to participate. Field Day activity reached a new high for the section this summer with an estimated 25 to 30 club and non-club groups participating. With vacations over, traffic activity should increase, although we have maintained a high level of traffic reports during the summer months. Special recognition and another BPL for WA0VAS and his tremendous June total. The emergency net was activated at least 4 times during June, but we escaped serious weather emergencies this year. We are sorry to announce the loss of a promising new Lake Crystal ham, W0VYLN, who passed away in early July. Traffic: (June) WA0VAS 1164, K9CSE 277, WA0TOT 192, WA0WEZ 147, WA0OJL 108, WA0VY/0 94, WA0URW 55, W0ZHN 50, WA0WDX 39, K0ZRD 39, WA0VHX 37, WA0VTZ 36, W0PAN 32, WA0FPX 31, WA0WIB 27, WA0YMU 26, W0BUO 25, WA0TIC 25, WA0LAW 23, WA0IRM 22, WA0MNE 22, W0BE 16, WA0MMV 15, WA0NQH 15, W0PFI 15, WA0YJB 14, WA0RKY 12, WA0JPR 11, WA0TLY 11, WA0ZTU 11, W0LQO 10, K0GYO 9, K0ICU 9, W0YYP 9, W0KNR 7, W0UMX 7, K0ORK 5, W0YAH 4, K0ELE 3. (May) WA0WIB 117, W0ZHN 86, W0AAU 20, K0GYO 12, WA0JPR 10, W0KNR 4.

NORTH DAKOTA - SCM, Harold L. Sheets, W0DM - SEC: WA0AYL. RMs: K0SPIH. PAM: W0CAQ. RMs: WA0RSR. OO:

W0BE. Only two clubs in the state reported FD activity. The Three Rivers Club operated under the call WA0LAC/0 at Abercrombie and the Fox Radio Club was at Renwick Dam in the northeastern section of the state operating 20 meters. The Kindred hams held their Annual Hamfest June 28. Despite FD there was a good attendance and plenty of prizes, to say nothing of the good food and coffee. WA0KLL and XYL WA0KIM were chairmen. W0FVG, W0ECK, WA0ZC and W0DIX and the XYLs as well as several non-hams and wives deserve a lot of credit in helping to make it a success. WA7IRT/0 is now back in Seattle. We will miss Don and his ham activities in Gr. WA0SJB is the new manager of ND PON. WA0MND returned to St. Luke's in Fargo for surgery. New Novice calls in the Gratton area are W0BPC and W0BPD. The following, who were in Prof's Jr. High class in Grand Forks are also new Novices W0BPP, W0BUD, N0BUP, W0BUBG and W0BUH. W0GLE continues to knock off some choice DX with the mobile rig. WA0VMA is in the southwest teaching. W0DM has his family back from Oregon after three weeks of batching.

Net	kHz	CDT/Days	Sexs.	QNI	Yr.
NDN CW	3640	2100 ME	16	12	4
NDN S	3996.5	0900 S	12	172	70
		1730 Sat-S			
NDRACES	3996.5	1830 M-F	18	371	38

Traffic: WA0RSR 54, K0SPIH 34, W0DM 15, WA0SJB 14, WA0SU 11, WA7IRT/0, WA0JPT 4, W0BHT 2.

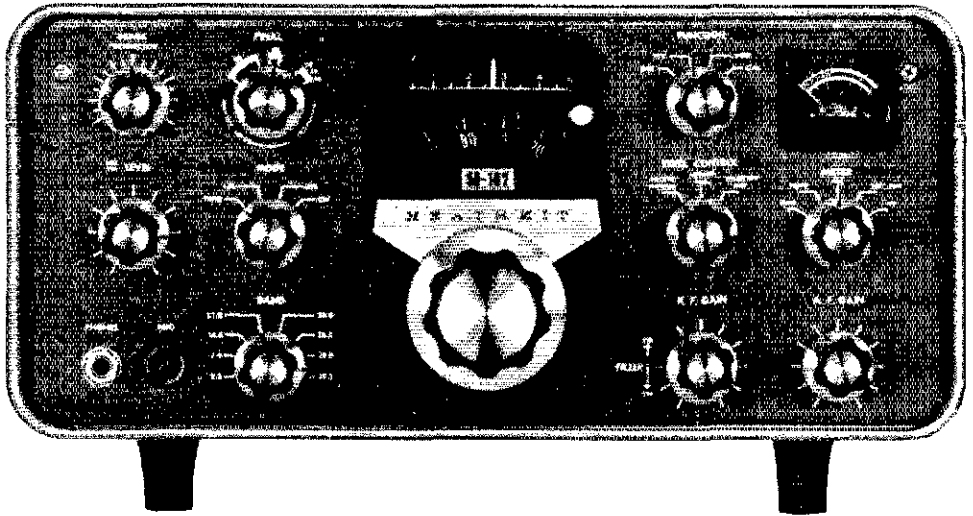
SOUTH DAKOTA - SCM, Ed Gray, WA0CPX - Field Day activity was very good in the South Dakota section with portable operation being conducted by Sioux Falls, Canton, Vermillion-Yankton, Mitchell, Madison and Rapid City amateurs, to name some. K0OTZ has moved to Brookings. Net reports for the nets, which all meet on 3955 kHz are as follows: Morning Net at 1300Z reports 333 QNI, 45 formal; NJQ Net at 1715Z reports 359 QNI, 20 formal; Early Evening Net, which meets at 2230Z, is active; Late Evening Net at 2330Z reports 1024 QNI, 34 formal. Traffic: W0HOJ 93, WA0UEN 43, W0IG 31, K0AIE 23, W0CAS 22, WA0SHA 6, W0JZ 4.

DELTA DIVISION

FIRST ANNUAL DELTA QSO PARTY

This contest, sponsored by the Delta Division of ARRL, will take place from 2000 GMT Sept. 12 to 0200 GMT Sept. 14. There are no time or power restrictions. It is open to all amateurs. Stations in the Delta Division (Arkansas, Louisiana, Mississippi, Tennessee) will attempt to contact as many amateurs as possible both inside AND outside the division. The exchange will be QSO number, report and QTH (ARRL section for non-Delta Division), county and state for Delta Division. Logging information: date/time, station worked, exchanges, band, emission and multiplier. Stations may be worked on each band/mode. Mobiles may be reworked if they change counties. Suggested frequencies: 3560 7060 14060 21060 28060, 3990 7290 14290 21390 28590, Novices 3725 7175. Scoring system: Delta Division amateurs multiply total number of QSOs times the number of ARRL sections (maximum 75). Outside Delta Division multiply the number of Delta Division QSOs times the number of Delta Division counties worked (maximum 316). DX stations may be worked but do not count as multipliers. Awards: Delta Division Achievement Award will be issued all amateurs contacting 5 amateurs in each of the 4 states comprising the Delta Division. Certificates will be awarded the 3 highest scoring stations in each of the 4 states (minimum criterion 50 QSOs), fourth and fifth place awards where warranted. Outside the division, certificates will be awarded the high-scoring station in each ARRL section and country, minimum 10 QSOs. Second and third place awards where warranted. A plaque will be awarded the high scoring station both inside and outside of the Delta Division, and to the high scoring portable or mobile station. A portable or mobile is defined as a station operating outside of his home county for the QSO Party (minimum criterion 200 QSOs). The mailing deadline is Oct. 11. Send your log to Malcolm P. Keown, W5RUB, 213 Moonmist, Vicksburg, Miss. 39180. Mobiles/portables must file a log for each county from which they operate, each to be separate for award purposes. Stations disrupting a working division net or exhibiting obvious irregularities will be disqualified.

ARKANSAS - SCM, Jimmie N. Lowrey, WA5VWH - SEC: W5PBZ. RM: W5NND. PAM: WA5KJT. WA5HS has a new linear running four 811As. Ex-W5NTW received his General Class license and is now W5RTY. W5WMD and W5WRN passed the General Class exam and are awaiting their tickets. WA5WMC has a new 48-ft. tower for his quad and 2-meter beam. Congratulations to WA5GPO on making BPL. W5B5TY has a new SB-102. Net reports for June:



Want to start a pile-up?

The New Heathkit® SB-102

Direct descendent of the most popular sideband rigs ever produced — the famous "100" & "101" Series. With an ancestry of top performance, high reliability and unbeatable value, you expect the new "102" to be a better rig . . . and it is.

The frequency stability and linearity of the "101" were second to none. The "102" is even better. An all solid-state Linear Master Oscillator cuts stabilization time in half; offers far greater tracking accuracy.

Hot new receiver circuitry delivers improved sensitivity . . . now less than 0.35 μ V for 10 dB signal plus noise to noise. This increase gives you solid copy longer when the band is on the way out.

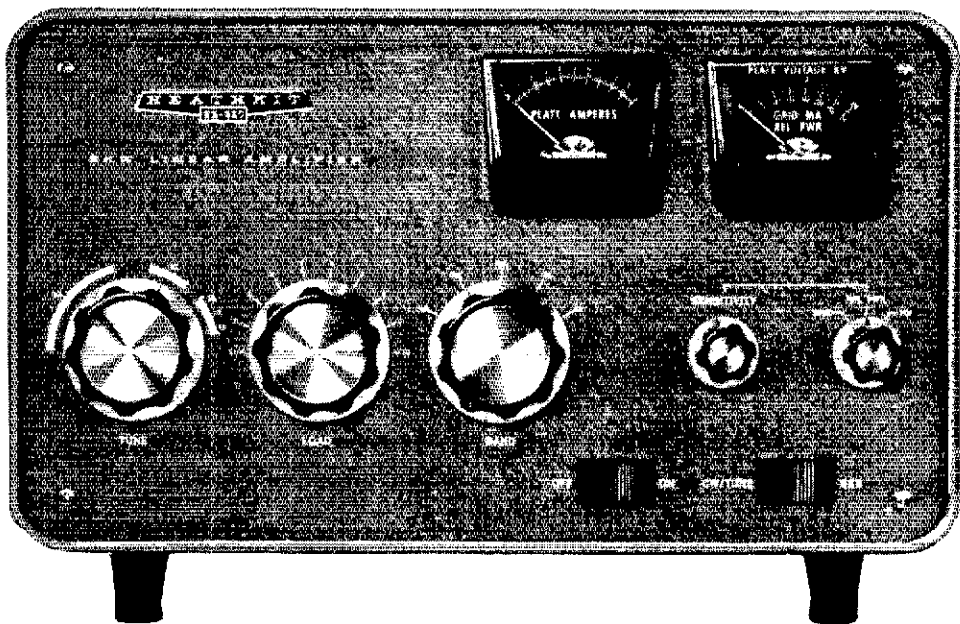
The new "102" brings you all the flexibility and performance that made the "101" the standard of comparison on the air, plus important new features. Start your Maxi-Rig now . . . with the SB-102 — from the Hams at Heath, of course.

SB-102 SPECIFICATIONS — RECEIVER SECTION: Sensitivity: Better than 0.35 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. **SSB selectivity:** 2:1 kHz minimum at 6 dB down, 5 kHz maximum at 60 dB down — 2:1 nominal shape factor — 6-60 dB. **CW Selectivity:** (With optional CW filter SBA-301-2 installed) 400 Hz minimum at 6 dB down, 2.0 kHz maximum at 60 dB down. **Input impedance:** Low impedance for unbalanced coaxial input. **Output impedance:** Unbalanced 8 and 600 ohm speaker, and high impedance headphone. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 dB. Internal spurious signals below equivalent antenna input of 1 microvolt. **TRANSMITTER SECTION:** **DC power input:** 55B: 180 watts P.E.P. continuous voice. 55B: 170 watts — 50% duty cycle. **RF power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 ohm non-reactive load). **Output impedance:** 50 ohms to 75 ohms with less than 2:1 SWR. **Oscillator feedthrough or mixer products:** 85 dB below rated output. **Harmonic radiation:** 45 dB below rated output. **Transmit-receive operation:** 55B: Push-to-talk or VOX. **CW:** Provided by operating VOX from a keyed tone, using grid-block keying. **CW side-tone:** Internally switched to speaker in CW mode. Approx. 1000 Hz tone. **Microphone input impedance:** High impedance. **Carrier suppression:** 50 dB down from single-tone output. **Unwanted sideband suppression:** 55 dB down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 dB down from two-tone output. **Noise level:** At least 40 dB below single-tone carrier. **RF compression**

• New all solid-state Linear Master Oscillator features 1 kHz dial calibration • Bands spread equal to 10 feet per Megahertz • Less than 100 Hz per hour drift after 10 minute warm up • Dial resettable to 200 Hz • New receiver circuitry provides sensitivity of better than 0.35 μ V for 10 dB S+N/N • 180 watts PEP SSB input — 170 watts CW input • 80 through 10 meter coverage • Switch-selection of USB, LSB or CW • Built-in CW sidetone • Built-in 100 kHz crystal calibrator • Triple Action Level Control™ reduces clipping and distortion • Front panel switch selection of built-in 2.1 kHz SSB or optional 400 Hz CW crystal filters • Operate with built-in VOX or PTT • Fast, easy circuit board-wiring harness construction • Run fixed or mobile with appropriate low cost power supplies

SB-102, 23 lbs. \$380.00*
 SB-600, Communications Speaker, 6 lbs. \$19.95*
 HP-23A, AC Power Supply, 19 lbs. \$51.95*
 HP-13A, DC Power Supply, 7 lbs. \$69.95*
 SBA-301-2, 400 Hz CW Crystal Filter, 1 lb. \$21.95*
 SBA-100-1, Mobile Mounting Kit, 6 lbs. \$14.95*

(TALC): 10 dB or greater at 1 ma final grid current. **GENERAL:** Frequency coverage: 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). Frequency stability: Less than 100 Hz per hour after 10 minutes warm-up from normal ambient conditions. Less than 100 Hz for $\pm 10\%$ line voltage variations. Modes of operation: Selectable upper or lower sideband (suppressed carrier) and CW. Visual Dial Accuracy — "resetability": Within 200 Hz on all bands. Electrical dial accuracy: Within 400 Hz after calibration at nearest 100 kHz point. Dial mechanism backlash: Less than 50 Hz. Calibration: 100 kHz crystal. Audio frequency response: 350 to 2450 Hz ± 3 dB. Phone patch impedance: 8 ohm receiver output to phone patch; high impedance phone patch input to transmitter. Front panel controls: Main (LMO) tuning dial; Driver tuning and Preselector; Final tuning; Final loading; Mic and CW Level Control; Mode switch; Band switch; Function switch; Freq. Control switch; Meter switch; RF gain control; SSB-CW filter switch. Audio Gain control. Internal controls: VOX Sensitivity; VOX Delay; Anti-Trip; Carrier Null (control and capacitor); Meter Zero control; CW Side-Tone Gain control; Relative Power Meter Adjust control; P.A. — Bias; Phone Vol (headphone volume); Neutralizing. Rear Apron Connections: CW Key jack; 8 ohm output; Spare A; Spare B; Phone patch input; ALC input; Power and accessory plug; RF output; Antenna switch; Receiver Antenna. Power requirements: 700 to 800 volts at 250 ma; 300 volts at 150 ma; —115 volts at 10 ma; 12 volts at 4.76 amps. Cabinet dimensions: 14 $\frac{3}{8}$ " W x 6 $\frac{5}{8}$ " H x 13 $\frac{3}{8}$ " D.



Turn on your Benton Harbor maxi-rig!

The New Heathkit® SB-220

Business end of the Maxi-Rig! Gives your signal the authority it takes to punch through those pile-ups (or start one yourself). And keeps you operating under conditions that drive the other guys QRT.

A pair of conservatively rated Eimac 3-500Z's provide up to 2000 watts PEP SSB input . . . 1000 watts on CW and RTTY. Requires only 100 watts PEP drive. Pretuned broad band pi-input coils deliver maximum efficiency and low distortion on the 80-10 meter bands.

The built-in solid-state power supply can be wired for either 120 or 240 VAC and switched back again in minutes if your power requirements change. Circuit breakers provide added protection and eliminate costly fuse changing. And for cooler operation and extended tube life, idling plate current is reduced by Zener diode regulated bias.

The layout of the new "220" is designed for fast, high volume air flow with a husky, quiet fan in the PA compartment doing the job. Result: the "220" actually runs cooler than most exciters.

Other features include two front panel meters for continuous monitoring of Ip plus switch-selected monitoring of Rel. Pwr., Ep & Ig . . . ALC output to reduce overdriving and distortion . . . safety interlocked cover . . . easy 15-hour assembly and handsome Heathkit SB-Series styling.

Tired of stumbling barefoot through the QRM? Order the shoes for your Maxi-Rig now . . . the new "220" . . . another hot one from the Hams at Heath.

- Full 2 kW PEP input on SSB . . . 1 kW on CW and RTTY
- Boardband pi-input on 80 through 10 meters
- Two Eimac 3-500Z tubes • 120 or 240 VAC wiring options
- Zener diode regulated operating bias for reduced idling plate current, longer tube life, cooler operation
- Double shielded to reduce stray radiation
- Solid-state power supply
- Two front panel meters for continuous monitoring of plate current, plus switch selected monitoring of Rel. Pwr., plate high voltage and grid current
- Quiet, high volume fan for cool running
- ALC output
- Easy 15 hour assembly.

Kit SB-220, 55 lbs. \$349.95*

SB-220 SPECIFICATIONS — Band coverage: 80, 40, 20, 15 and 10 meter amateur bands. Driving power required: 100 watts. Maximum power input: SSB: 2000 watts P.E.P. CW: 1000 watts. RTTY: 1000 watts. Duty cycle: SSB: Continuous voice modulation. CW: Continuous (maximum key-down 10 minutes). RTTY: 50% (maximum transmit time 10 minutes). Third order distortion: —30 dB or better. Input impedance: 52 ohm unbalanced. Output impedance: 50 ohm to 75 ohm unbalanced; SWR 2:1 or less. Front panel controls: Tune, Load, Band, Sensitivity, Meter switch, Power CW/Tune — SSB, Plate meter, Multi-meter (Grid mA, Relative Power, and High Voltage). Rear Panel: Line cord, Circuit breakers (two 10 A), Antenna Relay (phono), ALC (phono), RF Input (SO-239), Ground post, RF output (SO-239). Tubes: Two Eimac 3-500Z. Power required: 120 VAC, 50/60 cycles, at 20 amperes maximum, 240 VAC, 50/60 cycles at 10 amperes. Cabinet size: 14 $\frac{1}{2}$ " W x 8 $\frac{1}{4}$ " H x 14 $\frac{1}{2}$ " D. Net weight: 48 lbs.



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AM-238R

Net	Time(Z)/Day	Freq.	T/c	QNI	Mins.	Mgr.
OZK	0000 Dy	3790	27	115	479	W5NND
RN	2340 Dy	3945	32	611	469	W4SKJT
PN	2130 M-F	3925	78	254		W5MIO
APN	1100 M-F	3437	10	434	1320	W5VFW
DX INFO	2345 M	3860				W4SLFL

Traffic: W4SGPO 703, W5NND 116.

LOUISIANA - SCM, J. Allen Swanson, Jr., W5PMP - SEC: W5OB, RM: K5ANS, VHF PAMs: W4SDXA, W5UOR. Be active in our first Delta Division QSO Party, which starts at 2000 GMT Sept. 12 and ends 0200 Sept. 14, usual frequencies for contest, "CO Delta" ssb and "CO Del" on cw. This is a League-sponsored affair. Yours truly will not be able to participate as I will be in Europe visiting England, Switzerland and Italy. LAN is in need of a Net Mgr. W5MBC is leaving the State. Those of you interested, contact RM K5ANS. WASUBG is going mobile. A group of the fellows recently boosted the morale of the 159th Fighter Group La. Air National Guard who were in Mass. for training. W4SLY and W4SLMH, with the cooperation of the Jeff ARC, ran phone patches for the boys to New Orleans. Also participating were W5HRM, W4SRIO, W5WZE, K3GGW and W5KXZ. Field Day in the state was a big success. Those known to be active were the Lake Charles group, the Westside ARC, the Jeff ARC, the GNOARC, the Cenla ARC and many independent groups. The GNOARC now holds code and theory classes introduced by W4SWPV. K5ANS will have an RTTY article in the Oct. or Nov. RTTY Journal. According to W5LMO the Red Cross Net for La. and the Gulf Coast will operate on 3830 night and 7210 day. W4SVQE has just earned his 2nd-class telegraph license with radar endorsement. LAN is in need of additional outlets from various points in the state, especially the southern part. W5NSYJ and W5NZCF are now Generals! W5CEZ attended MARKS meetings, spent a week in Florida and made two trips to Toledo Bend. W5OB has rig trouble but seems to be able to chase the elusive DX. W5BV and W5CEW still meet with the Knights of the Round Table each morning on 3905, together with W5GMO, W5BMM, W4SCAU and W4SSIK. Will club groups that have annual hamfests include our Director in your early mailings so he may act as a clearing house against conflicts. This also holds true for our Annual La. QSO Party. Traffic: W5ML 137, W4SOVL 42, W5CEZ 25, W4SQVN 18, W5PMP 15, W5EA 10, K5ANS 9, W4SOVX 3.

MISSISSIPPI - SCM, Clifton C. Comfort, W4SKY - SEC: W4S3WD, RM: W5SBM. From reports the Field Day exercise was a fine outing. MTTN CW Net is picking up with W5SBM, W5WZ, W5EDT, W4SEIN, W4STCM, W4SYJA and W4SBUQ acting as "the backbone". - Everyone is invited to get back in it. As a training net you are welcome at whatever cw speed you want to start back at and it helps on the Public Service Honor Roll! All wish K5EMV a speedy recovery from the broken hip. The "Jammer" on 3990 kHz is reported to be independent Sideband RTTY using 85-cycle shift and running three or four channels. Anybody know from where it comes? RTTY and 2-meter activity still are on the upswing. W4SWJP is finishing up his power supply. W4SWAJ is still having trouble on 2-meter sideband. Welcome home from Vietnam to W4SCAC and K5DGL. W4J8W/S's new call is W5BUE. New Novices are W5BLV and W5BKM, the latter is the father of W4SUH! Delta Division QSO Party is planned for Sept. Check into as many nets as possible and get to know more hams!!

Net	CDT	kHz	Mgr.
MTTN Slo Speed	171845	3665	W5SBM
GCSHN	1830	3925	W5JHS
MSBN	1915	3990	W5UBQ
CSCHN	2000	3935	W4SGOH

Traffic: W5SBM 211, W4SEIN 151, W5WZ 43, W5BTV 37, W5PDT 27, W4STMC 22, W4SYJA 11, W5BUE 8, W4SSUE 8, W4SUW 8, W5NCB 6, W4SGE 2.

TENNESSEE - SCM, Harry A. Phillips, K4RCI -

Net	Freq.	Time(Z)/Days	Sex.	QNI	QTC	Mgr.
TSSB	3980	2330 Tu-Su	26	1249	21	K4MIO
TPN	3980	1145 M-Sa	30	1295	30	W4PFP
		1300 Su				
ETPN	3980	1040 M-F	22	584	22	W44EWW
TPDN	3980	2330 M-F	4	123	12	K4RTA
TFN	7270	2100 Dy	13	36	0	W4H1FH
TN	3635	0000 Dy	25	109	36	K4AMC
ETVHF	145.2		9	43	1	W44IOB
ETVHF	50.4		13	170	1	W44IOB
ToMSN	80.1	0015 Wed	4	80	2	K4LOQ
ELIMN	26.8	0130 W&F	7	58	8	K4LIA
MTTMN		0200 M&Th	9	90		W44GNS

OBS W4SGI reports the Oak Ridge RO made 6500 points in the VHF QSO Party. W4MPJ reports the Kingsport ARC and the Bay Mtn. RC participated in "Take Five" project jointly sponsored by

the two clubs and other local groups. The project is described as a break period for motorists in which they are given refreshments and road information and can send messages through the message center operated by the two clubs. W4PER reports the Nashville Am. Rad. Explorer Post 15 now has the call W4PYB. The Post has demonstrated Amateur radio for about 500 Scouts at the Scout Circus and Camporee and have operated from Camp Boxwell Scout Camp near Lebanon for 5 weeks. The Delta QSO Party will be held from 2000 GMT Sept. 12 to 0200 to 0200 Sept. 14 and all amateurs are invited. Details will be given on the nets. K4DPO is now W4ZJY. Traffic: W44JIT 313, W44UZ 147, W4OGG 143, W4ZJY 102, W4SOE 97, W4MXF 54, W44JTS 39, W44HE 33, W44YFG 31, K4AMC 29, W4PFP 19, W44ZBC 16, W44DYI 14, W4SGI 13, W44CGK 12, K4LOQ 12, W44YBM 12, W4WBK 8, W44ANK 7, W44BZC 6, W44GTW 5, K4SXD 5, W44PIM 2.

GREAT LAKES DIVISION

KENTUCKY - SCM, George S. Wilson, III, W4OYI - SEC: K4YZU. Appointed: K4MAN as PAM-KTN, W44MKH as OPS. Endorsed: W44VUE as FC, W4NBZ as OPS. BPL: W44MKH.

Net	QNI	QTC	Net	QNI	QTC
KRN	329	26	KYN (May)	312	213
MRPN	415	62	KYN (June)	388	216
KIN	809	130			

W44AGH led KTN for over four years into a well-developed, disciplined, traffic-handling machine. He has earned his retirement. K4MAN, his worthy successor, deserves the support of all net members. The new Kentucky Novice Training Net (KNTN) is gathering at 8 P.M. Central Time on 3725 under the auspices of W44NOZ. Cw speed is limited to 7 wpm tops. Total traffic across the state continues to slip from a year ago, but reporting remains at a high level. The many Kentucky hams holding official appointments can be proud of this evidence of their continuing justification of their public trust. Yet I'm sure there are many deserving ops who aren't appointed, so nominations or applications are eagerly encouraged. ARC totals are the highest ever. Praise continues to be heaped on the Owensboro/Henderson gang for their Hydroplane Regatta efforts. Thirty hams put in 500 man hours operating at the five-day event. W44KER is DXing with a four-element, three-band quad. Traffic: (June) W44MKH 308, W44LL 177, W44KPE 137, W44BAZ 95, K4HY 68, K4MAN 63, W4TOY 56, W4OYI 47, W44VZZ 46, W44AGH 40, K4TRT 37, W44EOR 36, K4UDZ 34, W44MOR 28, W44AUN 27, W44DYI 27, W44MXD 27, W4UK 21, K4LUMN 20, W44EYU 14, W44KER 14, W4COT 14, W44LLE 12, K4VDO 10, W44FA 7, W44LJZ 7, K4PFW 5, K4UNW 5, W4RTA 4, W44MEX 4, W44GCV 1. (May) W44KPE 234, W44MEX 113, W44FAE 34. Total traffic 1738 reports 38.

OHIO - SCM, Richard A. Egbert, W8FJU - SEC: W8OUL, RM: W8IMI, PAM: K8UBK, VHF PAM: W8ADU, June section net reports:

Net	QNI	QTC	Sex.	Freq.	Time(Z)	Mgr.
OSSBN	1836	909	60	3972.5	1430/2245	K8DHB
BN	586	293	59	3480	2300/0200	W8IMI
6MtrN	303	60	60	50.61	2300	W8ADU
				50.16	0100	
OSN				1580	2225	W8VNU

Many thanks to K8FHU who wrote last month's column, handled the correspondence and generally watched the store while I made another trip to Thailand. Sincere apologies to the Massillon ARC for the erroneous statement that the Canton ARC provided communications for the Canal Fulton Canoe Races. It was the Massillon Club. BPL for June was earned by K8ONA, W8BPU, W8BPP and W8OUL. W8ROI is looking into the feasibility of a section-wide RTTY net. Those interested should contact him. Field Day messages were received from K8EAY, W8LF, W8LKY, W8NP, W8BAKO, W8HII, W8MBR, K8TH, W8FY, W8AYC, W8DB, K8UXW, W8GZE, W8TV, W8COK, K8KRN, W8ATGX, W8RTR, W8AL, W8YFW, W8EE, W8TFZ, W8YHN and W8RI. Congratulations to new Extra Class W8LPA and new Advanced W8FEZ. Summit Co. Asst. FC K8HIO reports on communications through the Barberton Cherry Blossom and Little League Parades. The "Ham Slack Gossip" (Toledo) tells us that W8FI would up his Sat. morning Extra Class license sessions. SEC W8OUL advises that our section ARC now boasts 1097 members. All Ohio amateurs are urged to join their local ARCC organization. Canton ARC provided a public demonstration of many aspects of ham radio in a salute to National Radio Month. Included in the display was message-handling, RTTY, class-invent TV and antique wireless equipment. Columbus ARA will have its 2nd Annual OX Roast Sept. 12.

AHA! YOU THOUGHT GOTHAM

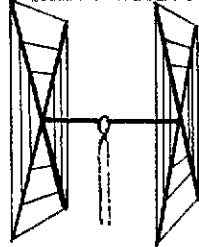
was a giant, automated, mechanized, computerized factory. No, no, no. Just two brothers, making thousands of the best antennas possible at low, low, low prices that reflect the tiny overhead. In QST since '53 without missing an issue!

QUADS

Totally satisfied with quad. Worked DK4VJP, SM7DLH, XE1AB, DM4SEE, FL8SR, F6AUM, HK7YB in few hours. Instructions a breeze. WB8DQ1

CUBICAL QUAD ANTENNAS

— these two element beams have a full wavelength driven element and a reflector (the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!



10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' x 1 1/4" OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 7/8" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these startling prices — note that they are much lower than even the bamboo-type:

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)

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect. DEALERS WRITE!

BEAMS

"Just a note to let you know that as a Novice, your 3-E1. 15 Beam got me RI Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). 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; 3/4" 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 E1 20. \$21	4 E1 10. \$20
3 E1 20. 27*	7 E1 10. 34*
4 E1 20. 34*	4 E1 6. 20
2 E1 15. 17	8 E1 6. 30*
3 E1 15. 21	12 E1 2. 27*
4 E1 15. 27*	*20-ft. boom
5 E1 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, K1MUV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8AT'S, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWI, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ51KN, KZ5OWN, HC1-LC, PY5ASN, FG7XT, XE21, KP4-AOL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters. \$14.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters. \$16.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters. . . \$18.95

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

W8CHT reports that members of the Butler Co. VHF Society, Northern Ky. ARC and the Queen City Emergency Net jointly provided communications for the Cystic Fibrosis Foundation collection campaign. We regret to report that K8QAY, K3VAP (ex-K8HUI) and W8AYC joined Silent Keys. Buckeye Belles and Chix-on-six are conducting fund-raising activities in preparation for a grand YL celebration at the Cleveland Convention in 1971. New officers of the Dayton ARA are W8KSE, pres.; K8DOT, vice-pres.; W8DPW, secy.; W8SUUX, treas. W8WKQ writes of his activities on 15 meters with EL stations which served to make arrangements for an eight-year-old to be sent from Liberia to Cleveland for help with a vision problem. Observers W8DPW and W8MCR participated in the May FMT. QVS W8YBK, K8TUT and W8STX all report good openings on 6 meters during June. Don't forget the Cincinnati Stag Hamfest Sept. 27. Announcements for coming activities and functions must reach me by the seventh of the second month before the event to make the column. W8L8X/W8L8X made second place in the CW Sweepstakes for the NNJ section. Central Ohio FC W8HRD announces that the emergency operating center in Columbus has been designated the Roger A. Barnett Memorial Communications Center and will use the call K8IDDG. Traffic: (June) W8LPH 448, W8LAG 406, K8ONA 303, W8B8PB 285, W8BRPU 257, W8ADWL 223, W8AETX 220, W8IMI 203, W8AUP1 188, W8QZK 181, W8QCTU 177, W8AQEK 160, W8AVS/8 146, W8BAKW 140, W8GVX 113, W8NALU 95, W8PMJ 91, W8WAK 79, W8MOK 77, K8URK 76, W8WGR 74, W8LUF 73, W8AZTV 71, W8JD 66, W8BYUB 66, W8AFTW/3 61, K8DHI 58, W8CHT 57, W8ARNO 54, W8AJWJ 51, W8ARUO 48, K8LGA 43, W8BDSV 40, W8FGD 39, W8OE 37, W8UX 36, W8ABDU 32, W8BAJC 32, W8BYB 32, W8BDHY 31, W8BAYC 28, W8VKU 28, W8GOE 27, W8GNL 26, W8RSX 26, W8BYWH 26, K8EHE 25, W8BCLF 22, K8QYR 20, K8BYR 19, K8ONV 19, W8GOD 18, W8BCWD 16, W8NAL 16, W8ETW 15, W8ARW 14, W8AKPN 14, W8WSD 14, W8YHN 14, W8RZX 12, W8MCR 12, W8WQO 12, W8JFH 11, W8ATRE 10, W8AHP8, K8BHH 7, W8CKG 7, W8MGC 6, W8AKTM 6, W8AZNC 6, K8CKY 5, W8LZE 5, W8OLW 5, W8BCCQ 4, W8A8X 4, K8PBE 4, W8TV 4, W8YBK 4, W8ZUK 4, W8BCEH 3, W8AL 2, W8DYF 1, W8FRD 1. (May) W8WGR 91.

HUDSON DIVISION

EASTERN NEW YORK - SCM, Graham G. Berry, K2S2N - SEC: W2KGC. RM: W2VYS. PAM: W2VJB. VHF PAM: W2YQU. Section nets scheduled as in previous columns. Appointments: Note many cancellations because of failure to report activities. Send reports and requests for appointment or renewal to the RM, PAM or VHF PAM, as indicated. On the club circuit: Only a couple ED messages were received - score not important this year? June was Field Day Plans month for most clubs, but Schenectady ARA had Ladies Night with speaker Cmdr. J.R. Pilon on Operation Deepfreeze, where he has just completed his fourth Antarctica assignment. New SARA officers are K2HYD, pres.; W2WPS, vice-pres.; W2RTZ, secy.; W2HNV, treas.; K2EJL, W8JWK/2, W2VJB and W2NWL, directors. Westchester ARA heard R.L. Stow, of CBS Labs, on "Image Transmission Systems" and balloted for 1970-71 officers and directors. The new slate takes office in the fall. The Overlook Radio Society presented an ARRL Handbook to the Kingston Public Library, and plans a Novice Class in Sept. Details from W2LZJ. Congrats to ORS, by the way, for getting the "Amateur Radio Week" proclamation from Governor Rockefeller. The Communications Club of New Rochelle had Mayor Church name ED dates as Radio Days - complete with official visit to the site by His Honor. Attention VHFers: The Annual Windblowers Contest will be held on 2 meters from 1300 EDT to 2000 EDT Sept. 26. Individual Station Activities: Net certificates went to W2IVT and W2DFI in the area from ESS. W2MGT reports W2TIF and W2II BR are good ED cooks. EC W2URP reports Schenectady Cy ARJC will be on regular drill basis again in Sept., with nets on 2.6, 7.5, 14.6, 9.4, 30.64 and 3.95. W2SIR worked W4LHY/Fla. on 2-meter meteor scatter in June and Arizona and Colorado for a 40 state total on 6 meters. All stations: Plan to make Hudson Council Convention next month in Larrytown. Hope each and every member of the section had a very FB summer vacation. Traffic: (June) W2EA: 96, W2VYT 91, W2VLS 51, W2CRW 48, W2VYS 46, W2DFI 42, K2S2N 32, W2JLR 23, W2AIFV 11, W2BXL 11, W2LXW 11, W2LUV 9, W2EAH 5. (May) W2IHO 148, W2DIH 65, W2VLS 25.

NEW YORK CITY AND LONG ISLAND - SCM, Fred J. Brunjes, K2DQ. SEC: K2OVN. MR: K2UAT. HF PAM: W2UWA. VHF PAM: W2RAE. The following nets are major ARJC nets. Join one!

Bronx	28.64 MHz	50.35 MHz	146.17 MHz
Brooklyn	28.64 MHz	50.40 MHz	145.26 MHz
Nassau	28.72 MHz		145.32 MHz
Queens	29.50 MHz	50.20 MHz	145.62 MHz
Richmond			147.12 MHz
Suffolk	29.56 MHz	51.51 MHz	146.82 FM
Huntington	28.73 MHz		145.50 MHz
Brookhaven	28.73 MHz	50.46 MHz	145.50 MHz
New York	28.50 MHz	50.48 MHz	

Note: Net times usually open 8:00 P.M. Mon. With most vacations over for another year, it's time to fix the mobile, and that old antenna that you've been saving for the summer months but somehow never got around to fixing (that's me). K2H01 gave up altogether and moved to 4X4-Land for a few years and will be operating as portable 4X4. K2UBG has a mobile power supply to fix. He said it had a short intermittent, or was that an intermittent short? Seems he burned off the reflector, but it's still perking with two elements. W2KSB has just put a "labor of love" HW-100 on the air, and used Field Day to give it a shake-down test. (Hope it passed the smoke test). I'm glad to hear somebody else blew it on Field Day! W2DZZ had only 400 QSOs; he wished he had a beam. I was in the mobile and couldn't make it driving to the site for a QSO! It is with regret that I report the passing on of W2IVL. Al passed away while enjoying the hobby he loved. An enthusiastic Fmer and DX operator, he will be missed by all. For those who worked W7ASW/2 this past year or so, well, he is now K2ANX! A fine job is being done by the VHF Emergency and Traffic Net. Recipients of net certificates are W2RVC, W2WIH, W2CCKS, K2MOP, W2EW and W2AML. For those interested in the net, it provides tie-in with long-haul NTS, MARS, AREC and RACES Nets, along with local outlets within local townships. W2RQF oversees the operation at present, with W2CCKS and K2MOW as NCS. This net functions as a training net also as part of its other duties; so if you have been shying away from traffic and emergency nets because you think you are not experienced, here's your chance to get your feet wet and meet a great bunch of people for the same cause! What happened to W2DXM, you ask? Well it seems he's jumped from the frying pan into the fire! Yep! He took on a log-keeper Aug. 22, and will be living up Albany way while completing school, keep a close ear out, though for a little cw sidetone coming from WPTR, for once a traffic man always a traffic man! Best of luck to both of you, Bob. Seems a group from the Iatthush RC took an excursion to ARRL Headquarters and apparently enjoyed themselves. Recn there yourself yet? Traffic: W2JMO 298, K2UBG 115, W2CGK 98, W2DZZ 93, W2LGA 64, W2W01 59, W2DBO 26, W2LCK 22, W2EC 16, W2PF 12, K2AAS 7, W2BR1 2, W2KSB 2, W2RQF 1, W2WFI 1.

NORTH NEW JERSEY - SCM, Louis J. Amoroso, W2ZZ - SEC: K2KDO. RM: W2TAE. PAMS: W2PEV, K2RQO and W2ATBS

Net	kHz	Time(P.M.)	Days	Sess.	QNT	Tfc.	Mgr.
NJN	3625	7:00	Dy	30	407	145	W2BBLV
NJN	3695	10:00	Dy	29	252	74	W2BBLV
NJSN	3740	8:00	Dy	14	73	24	W21EH
NJJPON	3930	6:00	Su	4	72	9	W2ATBS
NJEPFN	3950	6:00	M-Sa	28	500	220	W2PEV
NJAN	50,428	8:00	M-F	22	120	38	K2SGX
PV1TN	145,710	7:30	Dy	30	217	123	K2KDO
ECTN	145,800	8:30	M-Sa	30	133	60	W2ATBS
	146,700	6:30	Su				

New appointment: W2LUX as ORS. Endorsements: K2DQT as QVS and W2YPO as OBS. W2KQO is home from the hospital and is on the mend. K2UBG is also home and expects to be active again. W2NZRZ and W2NOSC are new hams in Bergenfield. W2NLP passed the General Class exam. W2JHT and W2JYY received Tech Class licenses and dropped the W2. W2ZJQ passed the 1st-class commercial. Congratulations to all. W2DZF is the club call of the BARK Memorial Station. NJN will miss W2DRV when he moves to W4-Land, probably N.C. K2BN reports the Warren County fm repeater program is progressing well. W2EPI added 2 meters to his shack with the SR-42 and eight-element beam. W2DRH visited VP7-Land. W2UDT is back on 2 meters with 50 watts. W2FEH is now using the NCC-3. Congratulations to K2AGJ on being elected a VP in the YL Int. SSB System. W2FUI is building a 2-meter linear using a pair of 4CX250Bs. W2JHT has a new Clegg 22 Mark II. The group at W2YXQ operated in the June VHF Contest. W2OQM made the Dean's list at NCE. W2JYM reports his 250-milliwatt rig now has 32 states to its credit. W2MPT is busy tuning up mobile rigs for the "After Work" Net. W2KVR will be going to college in Arizona. W2LKY has made over 700 contacts in less than a year and needs a K1.7 for his WAS. W2KZF retired as mgr. of NJAN after three years. K2SGX will be the new mgr. and we wish him the best of luck. W2JIM worked at a Boy Scout camp

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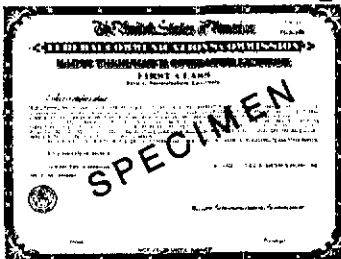
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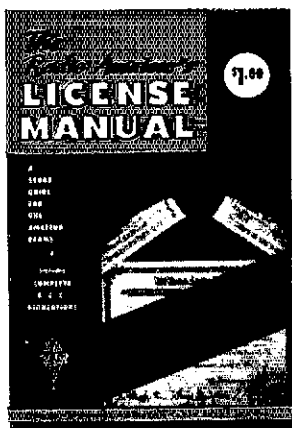
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for the summer. WB2JCI moved to Stockholm, N.J., and WB2YXJ is moving to Texas. The Windblowers VHF Society Annual Big Blow will be from 1300 to 2000 EDST Sept. 26. Contact W2ZDR/2, W2RRP/2, WA2ZAU/1 and W2ERZ/3 to qualify for their FB certificate. Field Day was a big success again this year with many groups sending traffic to the SCM. We had a great time, even with Murphy. Next year we ship him to the EARA group. Hope you had an FB time in the NJ QSO Party. Send your logs in early. Traffic: (June) K2DEL 311, K2KDO 247, WA2EPI 240, WA2BAN 229, WB2DDO 160, WB2VPR 135, WB2YPO 105, WB2FEH 90, WA2UMI 64, WA2DRH 47, W2PLV 40, WB2LTW 38, WA2TBS 33, WA2LDX 32, W2ZZ 26, WA2FUI 25, WA2GLI 25, WA2BCT 23, W2CU 21, WA2CCF 19, WB2BKK 16, WA2JXE 14, WN2KYB 13, W2CVW 11, K2DQT 10, WA2EUX 10, WB2BCS 7, WA2DNB 6, W2TFM 6, W2EWZ 5, WN2NLP 5, K2BN 4, W2DRV 4. (May) W2DRV 10, WB2BCS 2.

MIDWEST DIVISION

IOWA — SCM, Al Culbert, K0YVU — SEC: K0LVB. This is my first report after officially assuming the SCM position. I ask for your continued support through submission of station activity reports and other timely items of interest in your locale. I hope to bring the appointment files up to date soon, so I may be contacting many of you in the near future. WA0VKI is a new ORS appointee. Our congratulations to W0MHC upon being elected pres. of the Iowa Association for the Blind. WA0VBG has a new SB-102 and SB-610, but will be temporarily QRT while moving to a new QTH. W0MOQ is also QRT because of moving, but hopes to be on again soon. Congratulations to WA0OTQ on passing 1st phone examination. W0MOW reports the marriage of K0HGR and WN0BKG on June 27. Other hams attending the wedding were K0JFK, W0LKG, and W0MOW. My apology to K0JGI for deleting his call from the list of 75-meter net control stations in the July column. Enjoyed the 160 meter picnic, even though W0NFL, W0KUS and I didn't win the transmitter hunt. I wish to remind everyone of the Zero District QSO Party Oct. 17 and 18, which is being sponsored by the Roosevelt High School ARC of Des Moines. Details are published elsewhere in *QST*. Traffic reports for June 1970:

Net	GMT	kHz	QNI	QTC
Iowa Noon	1730	3970	1325	200
Iowa SSB	2300	3970	911	40
LLCN (cw)	2330	3560	148	113

Traffic: (June) W0LCX 716, WA0VKI 475, WA0VZH 51, K0AZJ 36, WA0OTO 31, W0PPI 26, WA0VBG 18, K0JGI 13, W0BW 10, WA0AIW 9, WA0OZL 7, W0MOQ 4, W0MOW 3, W0JAO 3. (May) W0BW 10.

KANSAS — SCM, Robert M. Summers, K0BKF — SEC: K0LPE. PAM: K0JMF, RM: K0MRI. VHF PAMs: WA0CCW, WA0TRO. K0LPE is changing the Kansas EC Net to 40 meter operation on a trial basis. Look for it on 7280 KHz Sun. at 1300 local time, central area that is. We now also have a 160-meter net in operation for the first time in a long while. Zone 10A, EC WA0LBB mgr., meets on 1.98 Tue. at 9 P.M. Zone 10A also meets on 3920 Sundays at 9:30 A.M. K0LPE received 3 FD reports and K0BKF 10, one of which was a duplicate. FD reports were received from WA0OPO, K0UKN, W0MCH, K0NL, K0ZHO, W0BBO, K0EOH, W0PCD, W0CWO, WA0TAS, K0GJA, W0VZJ and K0OKI. The Ham-Butchers Net Picnic was a big success in the KC area. SEC K0LPE was very active in the coordination of HBN activities and operators with the ARPSC program in Kansas. I would estimate over 50% of those attending were from Kansas. W0LYC and WB0BF have earned OES certificates and WN0WXY has earned his OCN certificate. W0PB provided communication between the Boy Scout Camp and Hiawatha June 5-6. W0SPE now has completed his slow-Scan TV monitor and has been checking into S5TV Net. Hams operating vhf recently have been filling up the log book with contacts especially on 6 meters, according to WA0IRO and WA0HOZ. Six stations reported PSHR totals this month. How about you? Net reports for June: KWN — QNI 50K, QTC 13; QKS — QNI 428, QTC 156; KSBN — QNI 689, QTC 34; KPN — 174 QTC 13; KPON — QNI 1465, QTC 250; OKN — QNI 111, QTC 28; HRN — QNI 634, QTC 60. Zones 1 and 15 report ARCC nets total QNI 147, QTC 13. Traffic: W0HI 254, WA0LBB 121, W0INH 104, W0BFI 91, K0MRI 90, WA0LLC 69, WA0FZK 56, K0JMI 54, K0BKF 47, W0MA 38, W0GCI 32, K0LPE 29, W0NFE 29, WA0JEC 20, W0VOX 18, WA0SKR 15, WN0AJU 14, WA0UTT 14, WN0YXK 11, W0LYC 10, W0CHJ 9, K0GZP 8, K0UVH 8, WA0OWH 6, WA0OZP 5, W0PB 5, WA0SEV 5, WA0SRO 4, WN0WYX 4.

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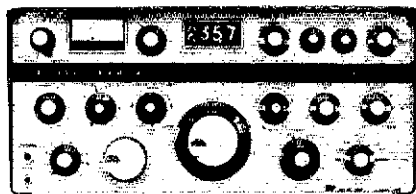
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MISSOURI - SCM, Robert J. Peavler, W0BV - SEC: W0LNW. PHD Net certificates went to W0BOK, W0BTHK, W0BTR and W0BTA.

Net	Freq.	Time(Z) Days	Sess.	QNI	QTC	Mgr.
MMN - 4pm	3.15	2300 MF	5	12	0	W0N0ZLP
MMN (dial)	3.15	2330	8	19	1	W0N0ZLP
W0BOK	6.05	2400 M-Sa	26	1026	18	W0RTO
W0BON	6.33	2200 M-Sa	26		53	W0BIAA
W0BN	5.55	0000 Dy	21	133	64	K0AEM
W0BQ	5.55	0245 Dy	24	110	27	W0QSKP
W0B	7.45	0000 Tu	5	126	0	W0B0KUH

News: please note you are invited to participate in MMN, Field Day without rain! Incredible, but it happened. W0BV received Field Day messages from W0AV/0 W0BRN/0 W0BHR/0 K0EM/0 W0LWC/0 W0BJBN/0 K0LIR/0 K0OYM/0 W0BUGU/0 a great increase over last year. Congratulations to K0VVH, who received WAC with 75-meter ssb endorsement. June was a good month for vhf. W0BTU, W0JKI and K0ITM report openings on all bands from 50 to 420 MHz. Many thanks to W0YCN and W0ZLU for their steady job at OIS. We are all glad to hear W0GQR on the air after a stay in the hospital. It was a great pleasure to meet so many section members at the PHD and Hamhutchers Picnics. Traffic: K0ONK 1901, K0AFM 84, W0BV 84, W0HTN 50, W0BIAA 40, W0BUD 13, W0RTO 13, W0B0KUH 10, W0YCN 4, W0BVR 3, W0JKI 1.

7TH MISSOURI QSO PARTY

This contest, sponsored by the Missouri SCM, will take place from 2100 GMT Sat, Oct. 3 to 2400 GMT Sun, Oct. 4. There are no time limits or power restrictions. It is open to all amateurs. Stations may be worked on each band and mode. Portables and mobiles changing county or State/Province may be worked at each location. County-line type operations count for only one county or state, and a change of county or state requires an actual location change. The exchange will be QSO number, RST(1) and QTH. (Stations outside Missouri send state, province or country. Missouri stations send county). Suggested frequencies: 3540 7040 14040 21040, 3910 7260 14285 21360. Try 1810 KHz at 0400 GMT. QSOs on other frequencies and bands are encouraged. Participants are urged to avoid interference with nets in session. Scoring system: Missouri stations multiply QSOs by total of states, provinces and countries. Out-of-state stations multiply QSOs with Missouri stations by the number of Missouri counties (115 possible). Awards: A certificate to the highest single-operator station in each state, province or country; to the top 5 single-operator stations in Missouri; to the top 3 multiple-operator stations worldwide. Additional certificates may be issued at the discretion of the sponsor for noteworthy accomplishment. The mailing deadline is Oct. 31, 1970. Send your log to Robert J. Peavler, W0BV, Route 4, Kirksville, Missouri 63501. Send an addressed stamped envelope for results.

NEBRASKA - SCM, V.A. Cashion, K00AL - Asst. SCM: Velma Saver, W0GHZ. SEC: K00DF. We all wish a speedy recovery for W0LSI, who is hospitalized in Crawford. W0LRO is now operating 20 and 75 meters mobile. FCC has approved the call K0NEB to be used by the Lincoln ARC at Nebr. State Fair. Congratulations to W0KGD on achieving Advanced Class. K0WPF, Box Butte County EC, reports 2-Meter AREC Net QNI 26 for June. There are 330 registered AREC members in the state to date. Activity is falling off because of the vacation season, additional chores around the household, etc. Don't forget to take a little time to check over the antenna system. New appointments: W0TOD as ORS. Renewed appointments: W0DOU as EC and W0LVO as OO. June net reports:

Net	Freq	GMT/Days	QNI	QTC	Mgr.
NSN I	3982	0030 Dy	827	46	W0QLY
NEB	3590	0400 Dy	171	26	W0HWR
NMN	3982	1230 Dy	997	43	W0JUF
WNN	3950	1300 M-Sa	556	11	W0NIK
AREC	3982	1330 Su	128	10	W0IRZ
CHN	3980	1730 Dy	950	42	W0GHZ
NSN II	3982	2330 Dy	679	64	W0QLY

Traffic: (June) W0L0D 172, K0UWK 136, K0JIN 35, W0HWR 24, K0IRU 20, W0BFV 18, K00DF 16, W0QOX 16, W0TOD 16, W0DMY 15, W00EX 14, W0B0I 12, W0BYG 12, W0B0GV/0 9, W0LEJ 9, W0NIK 9, W0GHZ 8, W0JH 8, K0SEA 7, K0HNT 6, W0JUF 5, W0GAT 4, W0PCC 4, W0PHI 4, W0ATU 3, W0ACK 2, W0HOP 2, W0L0Y 2, W0RAM 2, W0RJA 2, W0LEI 1, W0LRO 1, W0PPI 1, W0PSN 1. (May) W0SPE 5.

NEW ENGLAND DIVISION

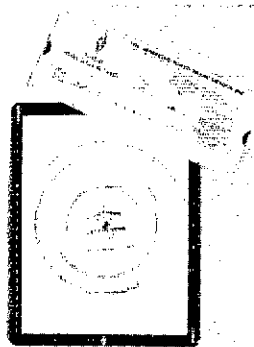
CONNECTICUT - SCM, John J. McNassor, W1GVT - SEC: W1HHR. RM: W1HNS. PAM: K1YGS. VHF PAM: K1SXF.

Net	Freq.	Time/Days	Sex.	QNT	QTC
CN	3640	1845 Dy	30	305	344
CPN	3965	1800 M-S			
		1000 Su	30	464	196
VHF 2	145.98	2200 M-S	22	104	24
VHF 6	50.6	2100 M-S	22	100	27

High QNT: C N - WAIGH, WEFJ and WAJJC. CPN - K1YGS, WIGVT 29, K1SXF 26, K1HC, WAJJC 23. SEC W1HHR needs monthly reports from all EC's and extends his thanks. Be sure your area is included each month. Please read the July CD Bulletin, your comments on Restructuring and Board Meeting Highlights should be expressed to the Communications Dept. and Director W1QV. Trumbull ARC's new officers are WA1CXB, pres.; W1PPT, treas.; WA1LWD, activities; W1FTD, secy. and editor; W1KOT, trustee. Their "Un-Named Newsletter" is a fine example for all clubs to follow. The Danbury "CARA Newsletter" earns Director's letter reprint that should rate large print in all radio publications - amateur radio is recognized by our Government and CW is singled out! Murphy's Marauders Instruction List for Field Day is required reading for all clubs and any others who take an active part in this big event. Thanks for the many Field Day reports and even better luck to all next year! ARRL film Hams Wide World ran for three days at the Submarine Base Theater in Groton! W1EJ handles 7-MHz. TCC sked. W1BDI enjoyed his vacation in Maine. W1ADW toured New England during vacation. Congratulations to WA1LJA General Class; WN1NCK, WN1MYX and WN1MAQ new Novice Class! Traffic: (June) W1EFW 277, W1EJ 236, WA1HOI 218, K1FIR 137, WA1G1H 123, WA1HSN 100, WA1JJC 100, W1GVT 86, WA1LB 72, K1HC 68, K1SXF 59, K1YGS 58, WA1JQC 50, W1CTT 42, W1AW 32, W1EUP 31, WA1JVV 22, W1QIA 20, W1MPW 17, W1QV 17, W1BNB 10, W1HHR 10, W1CKV 9, W1BDI 8, W1DQI 7, WA1JGA 7, W1YBH 7, W1CUH 6, W1WEE 2, (May) W1EFW 175, W1BNB 10.

EASTERN MASSACHUSETTS - SCM, Frank L. Baker, Jr., WA1ALP - WA1AGI, our SEC, received reports from W1s LE, UHF, K1s DZG, NFW, WA1DXI. K1FWA is new State MARS Director for the Air Force. Headline in paper, "Popcorn Truck Saves Station" out on Field Day for the Whitman ARC. WA1AXK, WA1GZZ is on 40 cw and 10. WA1HLK is mobile on 2, W1TOI and ex-W1CMI are Silent Keys. W1RNS has his old call back and is in Framingham. WN1NDU is ex-K2SMGN in Quincy, New Y1s: WA1s NBW, NCR, WN1s NBX, NCO, W1EJN is in Vt. for the summer. WA1NCV is

ex-K1RKN. The Barnyard Net had 589 QNTs, 5 traffic, cw 2, K1s GFR, KBB, W1s RUD, IR. ALP attended a meeting in Boston of the Mass. Emergency Communications Comm. WN1MDS is the son of W1ROZ, now on the Cape. W1BIB now is in Georgetown, WA1GDO is on 2. K1VNI on 6. K1EVP is pres. of Somerset ARC. WA1DGW, W1NI went to NYC. his annual trip. W1RCN says the Texas Tower Net still is on 59.8 kHz at 1730 GMT. Barnstable RC had a booth at its County Fair, reports K1ZZY. WA1KZE has a phone patch he built. WA1OC reports the New Eng. Emerg. Phone Net had 71 QNTs, 10 traffic. W4YACJ went to Tenn for 1 D at W4SKH/4. WA1ENM has a new vertical J4AVO. K1WVW has a Mark 2. New officers of Quannapowitt RA are K1NFW, pres.; K1ZUP, vice-pres; WA1ENM, secy., E1NKA, treas.; W1SFD, PL., DFB, ESN, IRGI, WA1s DNT, HPS, HOD, board of directors. The club's annual banquet was held at the Lord Wakefield Motor Hotel. E1LT visited W1PL. K1UHQ got married. W1EKI is the first and only licensed fully-operating slow-scan TV station in Mass. W1PM is ex-W1BNY, W41AI, ex-W1KKJ, and W41AR. ex-W1MIV, send 73 from St. Pete. WA1AZR has his Advanced Class ticket. WA1HF worked W4 and W8-Land on 6. WA1DGI worked W3s, 4s, 5s, 8s, 9s, WA1KZE is a new OPS/OBS. Appointments endorsed: K1LJO, W1BVV as EC; W1s PL., E1N, KBN as OBS; W1KBN as OBS, K1KTH as OO. WA1KOG and WA1EMN helped a small group get licenses, and now WA1s LCV, LGZ, LDA, JZP are Generals Class and WN1s MHZ, NBD are Novices. The Upwey RC met at W1EYU's and has applied for the call W1ZST for the club. W1YTB is too busy to get on the air. Massachusetts ARA is going to hold an auction in Oct. W1CUY got married. The Plymouth boys are helping each other with towers, beams, etc. WA1s ISH and ISL are back in this country in Needham. FMNN had 38 QNTs, 9 sessions, 26 traffic. FMN had 250 QNTs, 50 sessions, 211 traffic for June; 59 sessions, 295 QNTs, 272 traffic for May. FMNN had 34 QNTs, 9 sessions, 9 traffic for May. K1PNB held a portable operating schedule with the Salvation Army Scout Troop Radio Club, K1HDA, in P-town, works his son W1QOS, in Marshfield, on 2. WA1P worked K1HDA for his first QSO on 2 in that town. FMNN had 22 sessions, 129 QNTs, 101 traffic. The 6-Meter Crossband Net had 20 sessions, 72 QNTs, 4 traffic. WA1KZE made PSHR. W1BM made BPL. WA1KZE is very active in traffic nets and ACS for four. W1EYV is on many bands. W1LL says the Emergency Net meets every Mon. on 50.7 MHz at 7 P.M. W1BIB is too busy with house and garden traffic. (June) W1MX 866, W1OJM 392, WA1SYP 273, W1PEX 253, WA1HAD



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158 W1PI 12, W1KZI 15, W1ABC 95, W1HHE 40, K1LCO 39, K1PRB 58, W1BUL 34, W1CTR 22, W1UUX 21, W1A0G 16, W1H4G 14, W1M1EG 12, W1DOM 9, W4YAC71 8, W1JDP 7, W1I1NM 6, K1ISG 5, K1OKL 5, K1ULM 4, K1VWV 4, (May) W1MX 110, K1PRB 66, W1BB 6.

SIXTH ANNUAL MASSACHUSETTS QSO PARTY

This contest, sponsored by the MIT Radio Society W1MX will take place from 2300 GMT Sat. Oct. 3 to 0500 GMT Mon. Oct. 5, no time restrictions. It is open to all amateurs. Stations may be worked only once per band. Each cw and phone segment is considered a separate band. Crossband contacts are not allowed. On the VHF band, Mass. stations may contact other Mass. stations as well as stations outside Mass. Of course, below 50 MHz, Mass. stations may work ONLY stations outside Mass., as usual. The exchange will be report, QSO number, county (for Mass. stations), state or province. Logging information: date and time (GMT); station worked; reports; QSO numbers; county, state or province of station worked; frequency and type of emission. Suggested frequencies: 3550 1060 1400 2100 2800. 3950 7270 14290 21390 28560, Novice 3735 7175 21110. Scoring system: Count 1 point for each report received and one for each report sent and confirmed, maximum 2 points for such complete exchange. Multiply the number of QSO points by the number of multipliers (following) to determine total score. MULTIPLIERS: For all stations outside Mass. total number of different counties worked (max. 14). For Mass. stations operating VHF only, total number of Mass. counties plus the number of different states and Canadian provinces. For Mass. stations which either operate on VHF or which operate both above and below 50 MHz, use total number of different states and VE provinces. Note that Mass. stations operating above and below 50 MHz, DO NOT count Mass. counties as multipliers but DO include Mass. stations worked when calculating QSO points. Certificates will be awarded to state, province and counties at the discretion of the contest committee. The mailing deadline is Nov. 1. Send your logs to MIT Radio Society, Box 558, 3 Ames St., Cambridge, Mass. 02139. Include an addressed stamped envelope for contest results. Include a signed statement to the effect that the operator observed all regulations of his country. Decisions of the contest committee are final, logs property W1MX.

MAINE - SCM, Peter L. Sterling, K1EIV - SEC; K1CLE, PAM: W1JCM, RM; W1BG, W1JCN is a new General in the Livermore Falls area. The PAWA went out on Field Day this year and did quite well. The following operated at the site: K1RQF, W1GKJ, K1EIV, K1GAX, K1RSA, W1J11, K1OYB, W1K1O, W1K1VY. New hams in the State of Maine are W1MZF, W1MZG, W1MZA, W1MZZ, W1MZZ, W1NBO. Congratulations, fellows. I am still looking for news to put in the column. It seems there must be something going on in the state. K1SGU is in the process of getting 2-meter K1FFV. K1GAX is on the air with a new 2 watt QRP rig and doing quite well. K1ROF has a new 88-tube crank-up power. Sea Gull Net meets on 3940 Mon. through Sat. at 1700: Pine Tree Net meets at 1910 on 3596 Mon. through Sun. Still looking for NCS for the Pine Tree Net. Anyone interested in helping out, please contact W1BG. Traffic: W1JCM 242.

NEW HAMPSHIRE - SCM, Donald Morgan, K1QES - SEC; W1LUD, PAM: K1A0P, RMCs: K1BCS and K1POV. We welcome the following new hams: W1MZV, W1NAE, W1MZY, W1NBD, W1NBI. The GSPN report for the month shows 621 check-ins and 63 traffic. The V1NHD reports 232 check-ins and 221 traffic. W1GCE is now Extra Class. Congratulations, Jim. At this time I would like to say thanks to K1RSC, who has been SEC but because of increased business has stepped down. John Carr, W1LUD, of Littleton, now has assumed the duties of SEC. Congratulations, John. W1BYS is still very active on 2 meter tm. W1SWX is busy building a 4-1000A final. That signal should help on DX. Bob, Traffic-handling is quite hard at times on cw with the summer state and at times is nearly impossible on phone because of skip conditions. The PSHR reports are increasing steadily. Traffic: W1JTM 527, W1GCE 219, K1POV 103, K1BCS 100, W1K1X 76, W1UBG 58.

RHODE ISLAND - SCM, John L. Johnson, K1AAV - SEC; W1YNE, RM: W1RTV, PAM: W1TXL. VHF PAM: K1TPK. Activity this month centered around Field Day with several clubs in the field. W1SYE/I was located in Newport with 29 operators present. W1AU/I was located in Lincoln-Smithfield with 18 operators present. W1OP/I was located at the Boy Scout Reservation in Cranston with 10 members present. K1NOG/I was located at

Rottonwoods with 13 operators present. K1EPI/I was operating from Chopmist Hill with 15 members present. All clubs mentioned sent messages to the SCM for qualifying points. As the summer vacations start don't forget to send your traffic reports to the SCM for the monthly report. R1SPN report: 30 sessions 503 QNI, 65 traffic. W1HGH, who is on vacation in W4-Land, has joined the Dade Radio Club while he is there. The W1AQ Club reports that painting on the exterior of the building will begin soon. K1AAV hopes to have a list of members with paint and brushes at the next meeting. Traffic: W1TXL 88, K1QFD 17, W1HBB 3, K1VYC 3.

VERMONT - SCM, E. Reginald Murray, K1MPN -

Net	Freq.	Time(Z)/Days	QNT	QTC	N.Mgr.
Gr. Mt.	3931	2130 M-S	453	46	W1JLZ
Vt. Fone	3955	1301 Su	40		W1JED
MMV	3685	2230 M-F	232	721	K1BCS
VTPON	3909	2200 Su	53	16	K1BOB
VTSB	3909	2130 M-S	411	64	W1HSG
		1230 Su			

Vt. CD RACES Net will resume Sun., Sept. 6, at 1400Z on 3990.5 MHz. New net mgr. for Vt. Fone Net is W1KEM, W2GDU/I (Cornwall) is now W1FUQ. Congrats to new Tech, W1NBU (Bennington) and new Novices, W1NAB (Pownal) and W1NAM (Bennington). Hope you all had a good time at International Field Day in Charlotte. Vt. SB Anniversary Nite (July 6) was a huge success. Thanks, everyone. Traffic: K1BOB 83, K1MPN 20.

WESTERN MASSACHUSETTS - SCM, Percy C. Noble, W1BVR - SEC; W1ADNB, CW RM: W1DWW, W1ALPJ is the new EC for Hampden County. W1MFB is new ORS. OPS and OBS. A combined picnic and meeting of the WM CW Net members and ARFC members was held at W1ZPB's QTH June 21. Among those present were W1EWF (JRN Net Mgr.), W1ADNB (SEC), W1DWW (CW RM), W1BVR (SCM), W1DVE (Berkshire County EC), W1HFEY (Franklin County EC), W1ZPB, W1ALNE, W1JH, W1JH, W1MFB, W1HRC and W1CSF. From the SCM and CW RM W1ZPB received an award as "Operator of the Year" of the West. Mass. CW Net, a certificate well earned. W1MFB made HPL, W1EVB and XYL celebrated their Golden Wedding Anniversary July 1. RM W1DWW reports that WMN had 192 QNI's and handled 215 messages. Top five in attendance were W1BVR, W1DWW, W1ZPB, W1ALNE and K1SSH. W1ZPB and W1KK should now be back from Europe. From the CMARA bulletin: New members: K1LZH and W1YPK. W1LEA has his General. From the VARC "Oscillator": K1PNA was Field Day Chairman, W1LGLU is the new editor. While a Novice she won the WM Section award in the Novice Roundup. K1ZKH has a 2500-watt generator. Sun., 5:00 PM VARC 29,000-MHz net. Guests at the June banquet included Mr. & Mrs. John Huntoon (W1LQV ARRL Gen. Mgr.) and Mr. & Mrs. Robert Chapman (W1QV NE Div. Dir.). The SCM and his XYL had a most enjoyable time as guests of the H1RA on Field Day. SEC W1ADNB reports that the Sun. Morning ARFC Net at 8:30 A.M. on 3935 kc. is going real well. Traffic: W1ZPB 203, W1MFB 142, W1BVR 111, K1SSH 91, W1DWW 81, W1ALNE 60, W1JH 29, W1BXX 26, W1LGLU 19, W1ALPJ 10, W1EYF 3.

NORTHWESTERN DIVISION,

IDAHO - SCM, Donald A. Crisp, W7ZNN - SEC; W1E7EW, The FARM Net meets on 3935 kHz each day at 0200 GMT. The Idaho RACES Net meets week days on 3991 kHz at 1415 GMT. K7THX lost his beam and tower in a wind storm. W1YI is moving to a new location in Grandview. New Idaho amateurs: W17ORF, W17ORH, W17ORI, W17OTL, W17OZA, W17OOS, W17ORD, W17OOQ, W17OOR, W17OQI, W17OSV, W17OWB, W17ORY, W17OSV. Idaho Counties Award certificates will be made to any amateur who confirms contacts with amateurs in 15 or more Idaho counties. Contacts made after Jan. 1, 1970 are valid. Certificates will be awarded for contacts with 15, or 30, or all 44 counties. Send a copy of your log, that has been notarized or witnessed by 2 or more amateurs, to Mr. T. A. Daniels, W1E7GL, FARM Net report: 30 sessions, 839 check-ins, 65 traffic handled. Traffic: K7EBX 165, W7GHT 130, W17BDD 35, W7ZNN 12.

MONTANA - SCM, Joseph A. D'Arcy, W7TYN - SEC; W7RZY. Please check and see if your appointment has been endorsed within the last year. If not, send to your SCM and I will get it fixed up. W17OTC is a new call in the Helena area. W17JZW vacationed in Pennsylvania this year. W17PAJ is a new call in the Anaconda area. Congratulations to K7IMZ, of Missoula, and his staff for putting on a great hamfest at Glacier Park this year. Next year it will be in Canada at Waterton Lakes. Ex-W7GUG is now a Silent

he worked the world.



Mr. John H. Thompson, W1BIH/PJ9JT, recently packed his Ten-Tec Power-Mite PM 3A transceiver into a suitcase and headed for the Coral Cliff Hotel, Curacao (Netherlands Antilles). From there he worked the world.

"Final tally on the PM 3A results at PJ9JT are 281 QSOs on 14 MHz and 41 QSOs on 7 MHz for a total of 302. This includes 32 different countries in 5 continents. I operated only with the PM 3A on 7 and 14 Mc. CW. No contacts were set up first on high power, nor was any auxiliary receiver used. It was all done with the PM 3A. Of course I had a FB location and the PJ9 call didn't hurt. Among the DX worked were five VKs, a ZL, VU and 4X4. Only Africa was missed and I did get a PJ? response from an EL. The batteries, a pair of 6V lantern batteries in series, lasted the entire operation and showed no signs of failing. Some comments from stations worked:

W8KIT: 'Congrats on that signal with real QRP'

W00PK: 'Unbelievable'

W5IUW: 'Ur really busting my ears'

W3KR: 'Boy, ur 5 watts FB here on my attic antenna'

W4KC: 'Did you say 5 watts?'

W2GA: 'Boy, ur rig doing FB'

W4YWX: 'Unbelievable — if I didn't know you I'd swear you're pulling my leg because ur hitting 20 DB'

K3CUI: 'Are you really running only 5 watts? FB'

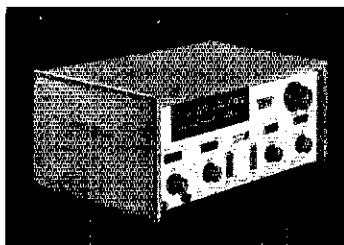
OK1AOR: 'Sigs 589 FB'

K6IC: 'Your 5 watts sure good here'

UK2KAF: (ex UP2KNP): 'Ur low power sure doing FB'

K4ZA: 'Ur sig has real punch'

I did other hamming, making some 400 contacts on the other bands, both CW and SSB using high power equipment. Could have made many more QSOs in the same time using the high power rig but it wouldn't have been half the fun."



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Key. The PON Picnic was held at Kings Hill with a nice time had by all those attending. WA7MKY will be getting on RTTY soon. Traffic: W7LKB 23, WA7LXM 14, WA7ZR 13, W7YN 8.

PACIFIC DIVISION

FIFTH ANNUAL CALIFORNIA QSO PARTY

OREGON - SCM, Dale T. Justice, K7WWR - SEC: W7HLP, PAM: K7RQZ, RM: K7GCG. Section nets: WA7HKV reports for the BSN, sessions 60, check-ins 1000, traffic 162, contacts 205. WA7KIU reports for the OSN, sessions 15, check-ins 67, traffic 17. K7YOM reports for the ARLC Net, sessions 30, check-ins 581, traffic 30, contacts 61, maximum number of counties 15. Amateur Radio Week was celebrated June 21-28, with the Convention in Bend a great success and Field Day a fitting conclusion. FD messages were received from W7PXL/7, WA7FQD/7, W7TMI/7, WA7IRN/7, and W7KYC/7 sent a message to HQ. New Novice is WN7QWC in Baker, and new station in Clatsop County is WA7OWA. WA7JRT has his Advanced Class license. The Oregon QSO Party was fun, with WA7DAC taking honors for Oregon and K7LPZ/V77 winning from out-of-state. WA7FTN was running one of his 597 patches to S.E. Asia recently when someone stole his phone wire! Suddenly the phone went QRT. The Saturday Afternoon Uplift and Drinking Society Net met at K7NCG's home with 15 members of the net present. Several received certificates. Traffic: (June) WA7ICX 286, WA7IIS 206, W7BDU 131, WA7LDZ 101, WA7HKV 57, WA7KIU 47, K7OPG 47, K7OH 35, K7WWR 24, WA7RRH 23, K7YOM 18, W7HLF 14, WA7JAW 13, K7KPT 13, W7MLJ 8, WA7AQ 2, WA7JRT 2. (May WA7JRT 2.

This contest, sponsored by the North Hills Radio Club, K6IS, will take place from 2000 GMT Sat. Oct. 3 to 0200 GMT Mon. Oct. 5. Use all bands, cw and phone. It is open to all amateurs. Stations may be worked only once per band per mode. The exchange will be QSO number, report and county for California stations. Non-California stations send QSO number, report and ARRL section or DX country, working only California stations. California stations may work each other for QSO credit only. Logging information: All logs must show date, time, band, mode, stations worked, exchanges. All logs become the property of the North Hills Radio Club and cannot be returned. Suggested frequencies: 3560 3980 7060 7280 14,060 14,280 21,050 21,380 28,060 28,580. Look for Novices at 3735 7175 21,110. Scoring system: California stations multiply total QSOs by total ARRL sections and DX countries worked, do not count California sections. All others multiply total QSOs by total California counties worked. Awards: First place certificates will be awarded to the winners in each of the 74 ARRL sections and each DX country. Additional awards may be issued depending on the amount of logs received. The mailing deadline is Nov. 6, 1970. Send your log to John Minke, W6KYA, 6230 Rio Bonito Drive, Carmichael, California 95608. Please include summary page and large addressed stamped envelope for results. DX stations need not submit s.a.s.e. Stations planning rare county activity please notify W6KYA.

WASHINGTON - SCM, Harry W. Lewis, W7JWJ - Walla Walla Hamfest Sept. 26 and 27. This event rounds out a summertime of Washington ham picnic and convention activity. The big State Hamfest was held at Tacoma with the Radio Club of Tacoma as sponsor. Next came Concomully, followed by the CBN and WARTS-NTN-WSN Picnic. This is the first time that the three NTS section nets of Washington have had a combined get-together. Governor Evans signed a proclamation declaring Sept. 6 through 12 as Washington State Amateur Radio Week. This coincided with the Washington State QSO Party sponsored by the BEARS club of Boeing. The Northwest Tech Net reconvenes Sept. 13. W7IEU, in Everett, has now over 500 countries worked/confirmed on cw. Bob runs ORP cw and is now showing up on 2-meter fm. In the event that Director Bob Thurston, W7PGY has not been seen around Seattle this summer it might be because he attended the Oregon State Convention at Bend, the Montana get-together in July, the SCM meeting in August, was reportedly seen in Boise Idaho, Spokane, Tacoma, Portland, was in Newington (Connecticut that is) in May and on his way back in Sept. He has been carrying the tennis shoe wherever he goes. He recently received a one-month's free subscription to 73 Magazine from the combined donations of the ARRL members of Montana, Idaho, Oregon and Washington. Also, the editor of 73, reportedly, donated an additional month's free subscription. Traffic: W7BA 1379, W7PI 313, W7BQ 42, W7BUN 38, W7JEY 34, WA7MEO 26, W7GYF 25, W7APS 21, W7JWJ 18, W7ZHZ 15, K7LRD 12, WA7AB 4, W7HU 3.

EAST BAY - SCM, Paul J. Parker, W6BDH - The whole northern part of the state really felt the hand of mother nature on Field Day with hail and even lightning to raise the noise to a very unacceptable level for short periods of time. W6BNMT/6 has been very busy trying to get his 220-MHz antenna back in the sky. WA6DIL reports that the slow-speed session of the NCN (meeting daily on 3630 kHz at 0330 GMT) had a really big month with over 400 QNI and over 130 QTC. K6LRN reports frequent attendance into the NCN lately. W6CBF has been chasing rare ones on 20 meters. W6TTS recently tried his hand in the DX barrel and came out with 57 countries in just 2 weeks! W6UZX reports that the DX conditions into Europe have been very good lately. K6OSO reports having participated in this year's Armed Forces Day at the receiver's site near Vallejo. W6AR reports that he has been having a hard time obtaining those much-needed QSL cards for his DXCC. W6GUMT is a new member in the section after spending a year as KR6K1. W6RGG, one of the few OOs we have in the section, has been keeping an eye on the bands lately. W6VEW had a real thrill the other day when he passed a real Field Day message. W6IPW reports that the TIC is running smoothly. Congratulations to WA9FDU/6, who recently passed the Extra Class exam. A notice of interest to all in the state is the Annual California QSO Party, details in this issue. There is a "particular need" in this section for a person to handle the office of SEC. All those interested in the position should get in contact with me as soon as they can. This is a responsible post in the section and should be filled by someone who can devote the time necessary to get the job done. Traffic: (June) WA6DIL 521, WA9FDU/6 314, W6IPW 260, W6VEW 36, W6IHX 6, W6GUMT 5, W6AR 3, K6LRN 1. (May) WA9FDU/6 297, WA6DIL 295. (Apr.) WA6DIL 357.

HAWAII - SCM, Lee R. Wical, KH6BZF - SEC: KH6GQW. RM: KH6AD. PAM: KH6JN. OSI. Mgr.: KH6DQ. ECs: KH6s GPO, LP, BAS, GRV/KR6, KIHN0/KH6, KC6FJ and W7UZH/KG6. RACES Nets coordinate with Henry Gamache, Radio Officer.

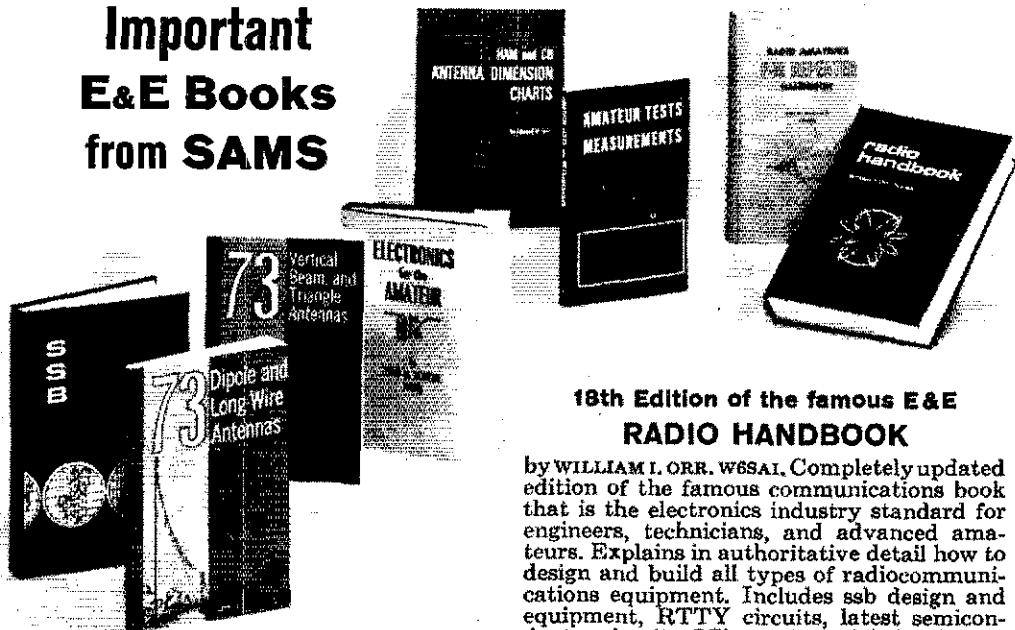
FIFTH WASHINGTON STATE QSO PARTY

This contest, sponsored by the Boeing Employees' Amateur Radio Society K7NWS, will take place the final weekend of Washington State Amateur Radio Week from 2000 GMT Sept. 12 to 0200 GMT Sept. 14. It is open to all amateurs. Stations may be worked once each band and mode for contact points. Stations may be worked more than once each band and mode if they are additional multipliers. The exchange will be QSO number, report and county for Washington amateurs. All others send number, report, and state province or country. Logging information: dates, times in GMT, stations worked, exchanges, bands, modes and claimed score. Each entry must include a signed statement that the decision of the Contest Committee will be accepted as final. No logs can be returned. Suggested frequencies: 3560 7060 14060 21060 28100, 3960 7280 14290 21390 28600, Novices 3735 7175 21204. Scoring system: Wash. stations score 1 point for each contact (including contacts with other Wash. stations). All others score 2 points for each contact with a Wash. station. Wash. stations multiply total QSO points by the total of different states, VE provinces and other foreign countries worked. All others multiply total QSO points by the total of different Wash. counties worked. Awards: Certificates to the highest scoring station in each state, province or country and each Washington county. Worked Five (5) BEARS certificates are also available to anyone working 5 club members before, during, or after the QSO Party. Working the club station K7NWS will provide a gold seal endorsement sticker for either certificate. The mailing deadline is Oct. 10. Send your log to BEARS, c/o Contest Committee, Willis Propst, K7RSB, 18415 38th Avenue South, Seattle, Washington 98188.

Net	(MHZ)	TIME(Z)DA YS
Friendly	7.290	2030 M-F
World Wide Boy Scout	21.360	1800 Sat.
Confusion (Patches)	21.400	0130 All
Pacific Interland	14.335	0830 M-W-F
Microwave	14.335	0800 Tu-Th-Sa-Sun
S.E. Asia	14.320	1200 All
Pacific Typhoon *	14.265	

*During typhoon Alerts, I regret to report the passing of KH6BVS's father. In addition to monthly reports from amateurs in the section, as your SCM I depend upon radio club bulletins to be informed on what clubs are doing. Does your club provide its elected ARRL official with copies as part of the communications link in the League's structure? Why not do your part to help your ARRL officials serve you better? KH6GKI will transfer to Boston, Mass., to a new position. K2HBA/KH6 and W0DAD/KH6 are new UOs. KH6BVS's XYL is signing KH6HQ. K0DAS/KH6 is here with the USAF. Ex-W4UAI/KH6 has retired after 29 years with U.S. Navy. KH6NS worked WB6KAP on 50.9 and ZK1AA and 5W1AR continue to be heard on 50.1 MHz. KA6FJ has returned home to be W1BRJ again. Thanks, Stan, for all your efforts. KH6OR is off to

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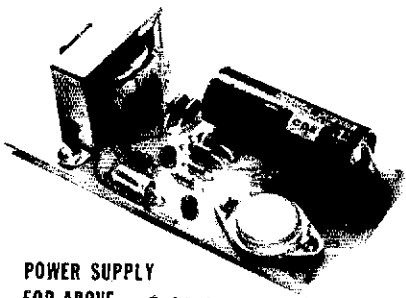
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VE7- and KL7-lands for some hunting, fishing and traveling. KH6HDM is now at his other QTH signing WA7NEW with his new Advanced Class ticket. W6H6CH, recently passed the General Class exam. Both KH6HGJ and KH6EQH passed their Advanced Class exam. KH6DJE recently left the bachelor ranks. KS5TH/KH6HDB, from KH6SP/KH6NR recently visited his folks in Lubbock. Les' father signs WA5BEM. KJ6BCF and KJ6BZ had a 4th of July 24-hour QSO Party. WB6GHG/KJ6, WB6LOC, W6PVQ, KH6HET, WA4VHH and WA0TIE were the operators. All QSLs and SASEs should be sent to WA6ENF. KH6GRG has left for the Coast Guard. KH6HCM reports he's awaiting 9 cards for 5BWAS. KH6LP is back from a lengthy trip. KH6BAS has a 4-L quad up 350 ft. above MSL. KH6HDH will go to Okinawa soon. KH6GQW is baching it with his XYL visiting her folks. Honolulu DX Club has been busy with AC0A/GR, 3B6CP, FH0VP et al. KH6BZF has his antenna 1A-18 upgraded to a 1A-36 after a six-month wait on insurance and parts. Keep those Form 1s coming in on the first of the month! This is your column. Traffic: KH6GJN 106, KH6HGJ 58, KH6GRG 48, KH6GQW 28, KH6BZF 27, KH6HCM 24, KH6LP 10, K1HNO/KH6 8, W7UZH/KG6 8, KH6BAS 7, KH6HDH 4, K2HBA/KH6 1.

NEVADA - SCM, Leonard M. Norman, W7PRV - SFC: Lewis L. "Mike" Blain, WA7BEU/W6EBS, 560 Cherry Street, Boulder City, NV 89005. Molding in Nevada: WCARS-7255, Reno and Las Vegas FM repeaters 146.34/146/94. W7VYC is coordinator for Powder Puff Derby Communications. K7ZOK is vacationing in Colorado. W7DYX is visiting in Southern Nevada. W7YRY reports good copy on RTTY. W7TVF will schedule anyone needing a Nevada contact, cw or ssb, DX or stateside. WA7FPZ is working on a new HB linear. W7HWL is vacationing in Northern Nevada. K7ZAU, new NARA Club pres.; advises the Sierra Hamfest is planned for Aug. 22 at Genoa, Nevada is all set for a big turnout. K7VYT advises the SNARS third code and theory class has 25 new graduates, 2 Novices, 8 Tech. class and 15 Conditional class, so watch for more QRM from the Reno area. Congratulations. W7YNI/7 operated Field Day at Pevine Mtn.

SACRAMENTO VALLEY - SCM, John F. Minke, III, W6KYA - Portable stations out on Field Day included W6KJL of Dunsmuir near Mt. Shasta, K6ASU of Nevada County ARC on Washington Ridge, K6LS of the North Hills RC at Grouse Ridge, both in Nevada County, and W6AK of the Sacramento ARC operating above El Dorado Hills. The RAMS, as usual, were out competing mobile style. The Sacramento and North Hills Clubs have increased in membership recently. Ex-WN6IZH, who is my lovely XYL, delivered a 9-pound 8-ounce girl on Father's Day. To top it off, I went and bought a new transceiver. W6VLZ has been busy moving since being harrassed by the Jan. floods. W6LNZ is back on NCN after such a "horrible, but profitable" spring. WA6OWH and WA6JZJ have been teaching theory and code up in Yuba City and all 16 students passed the 5-wpm code test. K6GVG has returned from sabbatical leave and has rejoined the Yolo County CD Net. Don't forget the California QSO Party coming up in Oct. Traffic: (June) W6LNZ 24, W6KYA 6, (May) K6YBV 95, WA6TQJ 14, WA6OWH 5.

SAN FRANCISCO - SCM, Kenneth S. McTaggart, K6SRM - W6GGC struck it rich on Father's Day, which is also his birthday, when he was feted by W6GHI, W6BIP, W6BYS, K6HZ and their XYLs. W6CTH showed his slides of Turkey and Greece at the June meeting of SFRC. SFRC and HAMS of San Francisco held their Field Day activities together at McClaren Park. W6EAJ is patiently waiting for his 100-watt power transistor for 160 goings-on. Watch for the 5th Annual California QSO Party, Oct. 3-5. Sacramento Valley SCM W6KYA has full information for an SASE. Watch QST for details, this issue. The HAMS Radio Club meets at 1625 Van Ness Ave., San Francisco, the 4th Fri. of the month at 8 P.M. San Francisco Radio Club meets at the Lake Merced boathouse the 3rd Fri. of the month at 8 P.M. Valley of the Moon Amateur Radio Club meets the 1st Fri. of the month at 276 E. Napa St., Sonoma. Club bulletin editors should put the SCM on their mailing list so club activities can be given coverage in this column. WB6UJO says he is not QSL Manager for KX6BU, but only does QSL chores for YU3TXT at present. WB6UJO also keeps busy chasing DX with a new CX-7. K6ZWB advises that he, K6JC and WA6STS are active on 432-MHz ssb from South Sonoma County. WB6JQP manages to keep active on NCN between trips to sea as a merchant seaman. Field Day messages to the SCM were received from WB6HZZ, W6ISS/6, WA6IC'B and WB6NVY/6. ECs are reminded to report monthly to our SEC. W6WLV. Thanks to all those who have been sending in their Form 1s early in the month. Traffic: WA6BYZ 343, W6WLV 291, WB6FZN 35, W6BWV 29, WB6JQP 7, W6EAJ 2.

SAN JOAQUIN VALLEY - SCM, Ralph Saroyan, W6JPU - The Tulare County Amateur Radio Club held its Field Day at Pierpoint Springs, had 12 AREC members and W6ASV was in charge. The Fresno Amateur Radio Club held FD near Shaver Lake.

W6ARE is the trustee for the c.d. station in Visalia. W6TTP is on 2-meter fm and during his vacation was able to work through the various repeaters across the western states. K6CZO has a Symet transceiver. New officers of the TCARC, WA6BAI, are WA6AGS, pres.; WA6DEA, vice-pres.; W6MUD, secy.; K6LLR, activities chairman. W6JUK and W6DPD were elected to the board of directors of the FARC. W6JUK demonstrated his 2-meter 1-kw final to the members of the TCARC. WA6OPG is the call of the 2-meter repeater of TCARC, the output is 146.88. W6SYP moved to Lodi & is attempting to get the Lodi Radio Club going again. WA6CPP made 605 contacts during his vacation. W6YKS worked a KL7 on 6 meters. W6YKS has 125 countries confirmed. W6JUK, W6YEP, W6DPD and WA6ZOH worked KL7ABR on 6 meters. W6POW has a Swan Mark 6B. WB6QWE is mobile on 6 meters. W6MHD built up a 6-meter inverter. WB6VSV has an SR42A. W6DPD is on 6-meter mobile. Traffic: WA6SCE 134, WA6CPP 21, WA6JDB 21.

SANTA CLARA VALLEY - SCM, Albert F. Gaetano, W6VZT - SEC: W6NVO (acting), RM: WA6LFA. W6AUC continues to experiment with antennas at his new QTH. So far using a doublet is his best antenna; not much experimenting there, hi. W6BPT reports that MARS overseas traffic has been very slow. W6DEF and KYL spent a week in the British Isles. W6PBC worked KL7ABR on 50-MHz ssb. This was the first time he has worked Alaska since it became a state. W6RFF just renewed his ORS appointment, which has had a continuous renewal since 1939. W6ASH was in the hospital for a minor operation but has recovered nicely. WB6KUK just made WAC. WB6HWO, WA6ARV and WB6FZZ have dropped the "N" from their calls. Congratulations, fellows. As usual the traffic on NTS gets very slow in the summer months. Keep checking in, fellows, because it will be picking up soon and your presence is always needed. Incidentally, you guys working into the Midwest have patience with those guys during the summer months because of their very high noise level. If you have never been there to hear it, you can't really appreciate the fine conditions we have out here. The Redwood City Civil Defense and Disaster Communication Service handled communications for the Fourth of July Parade for that town. Traffic: W6YBV 283, WA6GTE 188, W6BVB 160, WA6LFA 143, W6NWN 100, W6DEF 74, W6VZT 63, W6BPT 57, W6ZRJ 50, W6AUC 36, W6RFF 12, W6OII 10, K4BVD/6 1.

ROANOKE DIVISION

NORTH CAROLINA - SCM, Calvin M. Dempsey, WA4UQC - SEC: W4EVN. PAM: W4AJT. VHF PAM: W4HJZ. RM: W4WXZ. The following radio clubs participated in Field Day: Cape Fear Radio Amateur Society, Forsyth County Radio Club, Carteret-Craven Amateur Radio Club, Seymour Johnson AFB MARS Group, Yackin Valley Amateur Radio Club, Buncombe County Radio Club, Macklinburg Amateur Radio Association, Lumber River Radio League, Raleigh Amateur Radio Society. WB4ILO and K4CAX operated Field Day Class D. K9ZCH/4 passed the Advanced and 2nd-class commercial exams.

Net	Freq.	Time(Z)/Days	QTC	Mgr.
N.C. SSB	3938	2330 Dy.	7	WB4ADE
CN(E)	3573	2245 Dy.	56	WB4MLI
CN(E)MAY	3573	2245 Dy. 58		WB4MLI
CN(L)	3573	0200 Dy.	24	WB4GHK
T.H.E. N.	3923	2330 Dy.	75	WA4UQC

Traffic: W4EVN 211, W4WXZ 102, K5TGA/4 58, WB4BGL 45, WA4UQC 27, K4MC 25, WA4VNV 20, WB4HGT 15, WB4JMG 9, K4FTN 7, WB4HGS 4, WB4ILO 4.

SOUTH CAROLINA - SCM, Mrs. Elizabeth Y. Miller, WA4EFP - SEC: WA4ECJ. Asst. SEC: W4WQM. PAM: WA4GAW. RM: Vacant. A mobilization exercise, conducted June 16 as a surprise SET with only 40 minutes notice, netted 64 stations representing 16 counties and several distant states in an hour. The Forum, a coordinating medium for ECs and AREC members, going strong since Feb., finds its twice-weekly schedule quite convenient. North Augusta-Belvedere Radio Club with 15 operators and 5 AREC members operated from Panic Pond Park, and Spartanburg Radio Club with 9 operators and 4 AREC members operated near Whitestone, S.C., during Field Day. Anderson Radio Club, active as usual, held 2 hidden transmitter hunts and a picnic and operated during Field Day. W4VFO, past manager SSBN, and one of its most active members, has been transferred to Ohio, and rejoins the net from 8-Land. WB4OVQ jumped from Novice to Advanced Class in Mar. Congratulations! "Hams Wide World" was shown on all S.C. ETV stations June 29.

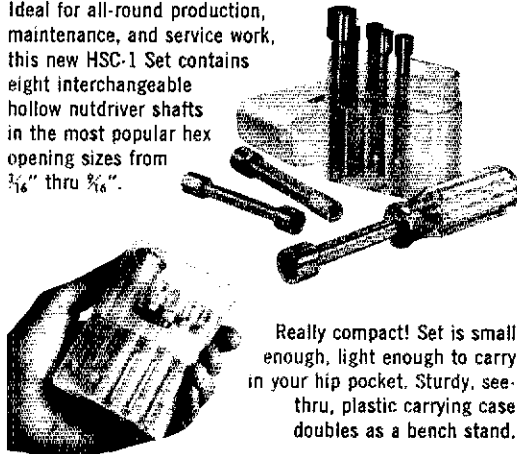
SCPN: 3930 kHz Dy Noon; Su 0830 and 1530 EDT
 CN: 3573 kHz Dy 2245Z and 0200Z.
 SC SSBN 3915 kHz Dy 1900 EDT
 AREC Forum 3915 kHz Tu-W 2000 EDT
 Traffic: W4NTO 23, WA4LDM 11, WB4OVQ 4.



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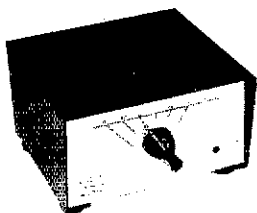
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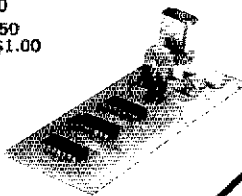
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VIRGINIA - SCM, Robert J. Slagle, K4GR - Asst. SCM: A.E. Martin, W4THV. SEC: WA4PBG, Asst. SEC: WB4CVY, PAMs: W4OKN, WA4YXK. RMs: WA4EUL, K4MLC, W4SHJ, We regret to announce W4TBO, founder of the Alexandria Radio Club, as a Silent Key. The XYL of W4QDY is seriously ill in Bethesda Naval Hospital, WB4DRB had a ruptured appendix. W4OGW is in the hospital. WB4ODN is up from a leg operation, Your SCM made the rounds of local FD sites with SFC WA4PBG. FD reports were received from W4ZA/4, WB4MZT/4, WB4GTG/4, WA41XA/4, WB4LJA/4, K4HEX/4, K4CG/4, W4MT/4, W4BUW/4, WA4TFZ/4, K4KDJ/4, W4YZC and Director W4KFC operated multi-op mobile on route hamfest at Jackson Mills, W. Va., on 40 and 2; visited K4KNP on the way back. W4RHA deserted us for Fla. W4JUJ is back from three weeks in G-, GM- and GW-Lands and visited R5GB Hq. while in London. He ran second in the county race to WA4WQG, 1617 to 1869. Went to VFN Picnic with WA4JJF, WB4DRB, WB4FDT and WB4DRC; DRC is sweating his WAS certificate. K4LDR is a new resident in Woodbridge. SEVWA elected WB4JTT, pres.; WB4GMC, comm. mgr.; QLF editor; WB4IQS, secy.-treas.; WN4OXP, PR mgr. W4SOQ fixed my typewriter. WB4NNO is trying to OSK and has problems. WB2FHH/4 was with us until the end of July. WB4KKB is mobile in a truck camper and has gotten sons (7 and 10) interested. WB4PYA is working hard on WAS and DXCC before college. K4TSJ's new beam at 65 feet is working DX. W4ZM hosted G3-KB and family. W4JHK enjoyed operating W4ZA/4 FD. W4THV reports a good turnout at RARC FD. W4KAO continues working on the rig. W4DM took a vacation. W4ZYT, W4DSW and K4JYM were heard from. Traffic: (June) W4SOQ 316, W4NLC 134, W4TE 107, K4KNP 96, WB4CVY 90, WB4NNO 89, WB4GTS 77, K4PFL 68, WA4EUL 60, WA4JJF 54, K4GR 46, W4OKN 34, WB2FHH/4 32, WB4FDT 24, WA4PBG 22, K4JM 21, WB4KBJ 18, K4ASU 17, W4SHJ 17, WB4ODN 15, WA4WQG 14, WB4PYA 10, WB4IRA 9, WA4NJG 8, K4TSJ 6, WA41XA 5, W4ZM 5, W4JHK 4, W4THV 4, W4KAO 2, W4KEC 2, W4MK 2, W4DM 1, W4KX 1. (May) WB4NNO 156, WB4GTS 66, K4FSS 58, W4ZM 16, W4OP 4, W4JHK 3, W4THV 3.

WEST VIRGINIA - SCM, Donald B. Morris, W8JM - SEC: WA8NDY. RM: WB8BBG. PAMs: W8DUW, W8LYD, K8CHW. Phone Net Mgr.: WA8LEW. Congratulations to Kay Anderson, W8DUW, West Virginia's Amateur of the Year for 1970. Award was presented at ARRL State Convention, Jackson's Mill, Kanawha ARC won Field Day award, with 2nd place going to the Monongalia ARC of Morgantown. "Outstanding Convention" reported Bob Denniston, W0DX, pres. of ARRL, who attended along with Michael Owens, VK3KL, pres. of Wireless Institute of Australia. Representing Headquarters was John Huntoon, W1LVQ; also attending, Bill Grenfell, W4GE, Division Director Clark, W4KEC, and Vice-Director Wicker, W4ACY, along with 500 Tri-State amateurs. WB8BBG continues as WVN CW Net Manager and WA8LEW was elected Phone Net Manager. Missing from the Mill were regulars, K8BHV and W8FQS, both passing away the week before the convention. WA8NDY and WA8WCK, along with BARC members, manned the convention station, W8WVA. Remember: Roanoke Division Convention, Raleigh, Oct. 31-Nov. 1. Traffic: WA8POS 73, WA8NDY 49, W8HZA 36, W8BCYB 35, WA8LFW 9, W8JM 8, WA8WCK 6, W8AEC 1, W8BAQE 1, W8QEC 1, W8SOQ 1.

WEST VIRGINIA QSO PARTY

This contest, sponsored by the Kanawha Radio Club of Charleston, will take place from 0001 GMT Sept. 12 to 2400 GMT Sept. 13, using all bands and modes. It is open to all amateurs. Stations may be worked twice on each band, once by phone and once by cw. W. Va. stations are not permitted to work stations in their own state for point credit. The exchange will be QSO number, reports and West Virginia county (or ARRL section/country for non-West Virginians). Logging information: usual info, in GMT. Suggested frequencies: 3570 3903 3995 7050 7705 14050 14300 21050 21410 28050 28800 and 50250 kHz. Scoring system: Each completed exchange counts 1 point. Non-West Virginia stations multiply total points by the number of W.Va. counties worked. W. Va. stations multiply total points by the number of ARRL sections/countries worked. Awards: Certificates to the highest scoring phone and cw station in W. Va. and in each ARRL section/country. Multioperator stations are not eligible. The mailing deadline is Nov. 1. Send your log to Frank Wilkin, WA8LFZ, 581 Forest Circle, South Charleston, West Virginia 25303.

ROCKY MOUNTAIN DIVISION

COLORADO - SCM, Charles M. Cotterell, W0SIN - Asst. SCM: Neal Morris, K0TIV. SEC: WA0HLQ. PAMs: W0CKW, K0IGA, W0LRW. VHF PAM: W0AWG. RM: W0LRN. The fm repeater enthusiasts are doing a lot of excellent public service. W0UAT, our

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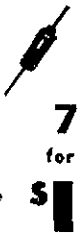
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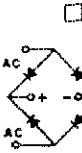
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PRV	Sale	PRV	Sale	PRV	Sale
<input type="checkbox"/> 50	.45	<input type="checkbox"/> 150	.80	<input type="checkbox"/> 300	1.75
<input type="checkbox"/> 100	.70	<input type="checkbox"/> 200	1.15	<input type="checkbox"/> 400	2.25
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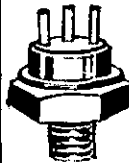
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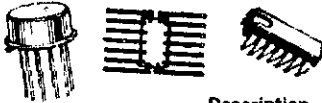
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<input type="checkbox"/> 913TU	Shift Register	RTL
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net mgr. for CCN, has resigned (press of other duties) so we have KØECR in that post. Had a good meeting at the convention and some recommendations will be implemented. Like to keep up on section news? Try the DRC Round Table, New EC for Dist. 10 is WAØQOY. WØLLA is awaiting new equipment. CCN will have a picnic Aug. 30. Ask a member and if possible attend. WAØMNL and friends handled communications for the Colorado Springs stop-over of the Powder Puff Derby. Colorado has 345 AREC members from June report. Copies of the new Colorado Ham Directory are being delivered now. Columbine Net total: QNI 918, QTC 75 with 193 patches, time 1459. Hi-Noon Net: QNI 913, QTC 116, time 1074. CCN: For May: QNI 106, QTC 96, time 474; for June QNI 85, QTC 62, time 400 mins. WBØAWG reports sporadic E openings on 6 during June. Traffic: (June) WØWYX 334, KØJSP 78, WAØMNL 64, KØECR 50, KØMNO 49, WAØLVM 29, WØMQH 22, WØUAT 11, KØIGA 10, WØKFH 7, WØLCE 6, WØOWP 6. (May) WØUAT 45.

NEW MEXICO - SCM, James R. Prine, WSNUI - June activities were highlighted by a number of individual and club Field Day exercises. Field Day messages from W5AHH/5, K5FHU/5 and W5VCB/5 were received by the SCM. If other messages were originated service message follow-up is indicated to identify the failure in the traffic system, I am sure that every one has properly serviced the Field Day equipment? It could be needed prior to the next Field Day. W5QNY is in Corsica working as 1ØWJ/FC. W5GB. New Mexico State University Club station, has reworked the antenna system and is doing a nice job. Are there any other active college club stations in the state? K5MAT, WØHQH, WSLT and W5RQK represented New Mexico at the ARRL Rocky Mountain Division Convention at Estes Park, Colo. W5WBU has a Marauder on the air soon to be mated to a linear. W5AHH has joined the experimentation with amateur TV. Traffic: W5NNG 55, W5SMYI 53, K5MAT 50, W5PDY 33, W5MYM 31, W5DMG 27, WSNUI 24, W5SOHI 18, W5JNC 17, W5PNY 12, W5BWV 9, W5BLL 6.

UTAH - SCM, Thomas H. Miller, W7QWH - SEC: W7WKF, RM: W7OCX. Utah had a fair representation at the recent Rocky Mountain Division Convention in Estes Park, Colo. K6DLY has moved back to Utah to accept a teaching position in Vernal after doing graduate work in Salt Lake in 1968-69. Tom has been recommended by his SCM in the Orange section for OBS. K7ZJS has received his Life Membership plaque from ARRL Hq. W7WKF has been running phone patches regularly with stations in the Antarctic. WN7OXZ is the 11-year-old daughter of WA7MEI and recently received her ticket. Her sixth QSO was with W1AW and was quite a thrill. W7EM has been awarded the PICON award for the Utah section for 1969. W7VTJ works her father, WN7OQE, weekly. W7HKC has been working on a solid-state receiver for 2 meters. BUN reports QNI 565, QTC 8, sessions 30, average time 11.17 minutes. WA7GTU is now in Tempe, Ariz. Don has done a fine job as NCS for BUN. New NCSs are needed. Traffic: W7EM 72, W7WKF 60, W7OCX 19, K7CLO 2.

WYOMING - SCM, Wayne M. Moore, W7COL - SEC: K7NOX, W7GMT now has his master's in electrical engineering and is also running 500 watts on his home-brew linear. W7COK has a couple of new rigs, an fm 2-meter rig and a new 500-watt transceiver. K7PIDQ was home on leave and doing very well with the mobile rig. W7BKR his his tower and antennas up in Casper and is keeping the DX stations happy. WA7GOV is working on a 2-meter repeater for the Casper area. K7ITH is the recipient of the 1969 Wyoming PICON award. WA7EGK received a certificate of commendation. WA7PEB is a new ham in Rawlins. W5UY, visiting in Casper for the summer, is keeping regular schedules on 20 meters. WA7EGK is compiling a list of Wyoming hams, so if you know of any new ones in your area, let him know and maybe this will work into a state ham directory as some other states have. Traffic: K7NOX 370, K7KSA 86, W7GMT 62, W7SDA 61, W7TZK 58, K7TAQ 40, K7VWA 18, K7TXZ 10, K7SLM 9.

SOUTHEASTERN DIVISION

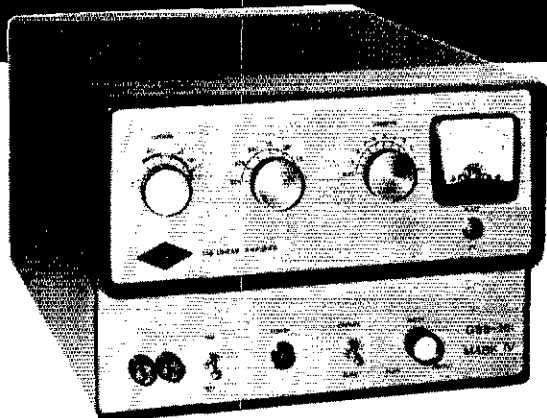
ALABAMA - SCM, Donald W. Bonner, W4WLG - RM: W4HFU, WB4LHH is the new manager of the AENM net. WA4HGN and W4HHK have just completed a two-way contact over a distance of about 250 miles on 2300 MHz. The signals were exchanged on July 11 and were 10 db above the noise level. After some trouble and waiting for the right conditions, the signals maintained strong the entire day until WA4HGN had to start knocking down to return home. The mode was narrow-band cw. FD sounded good this year. All the club calls were heard. The HARC group (K8BF) found a 75-ft boom with a sign truck attached to it on the mountain this year. Boy, what a 75-meter FD dipole. The Mobile ARC (W4QEL)



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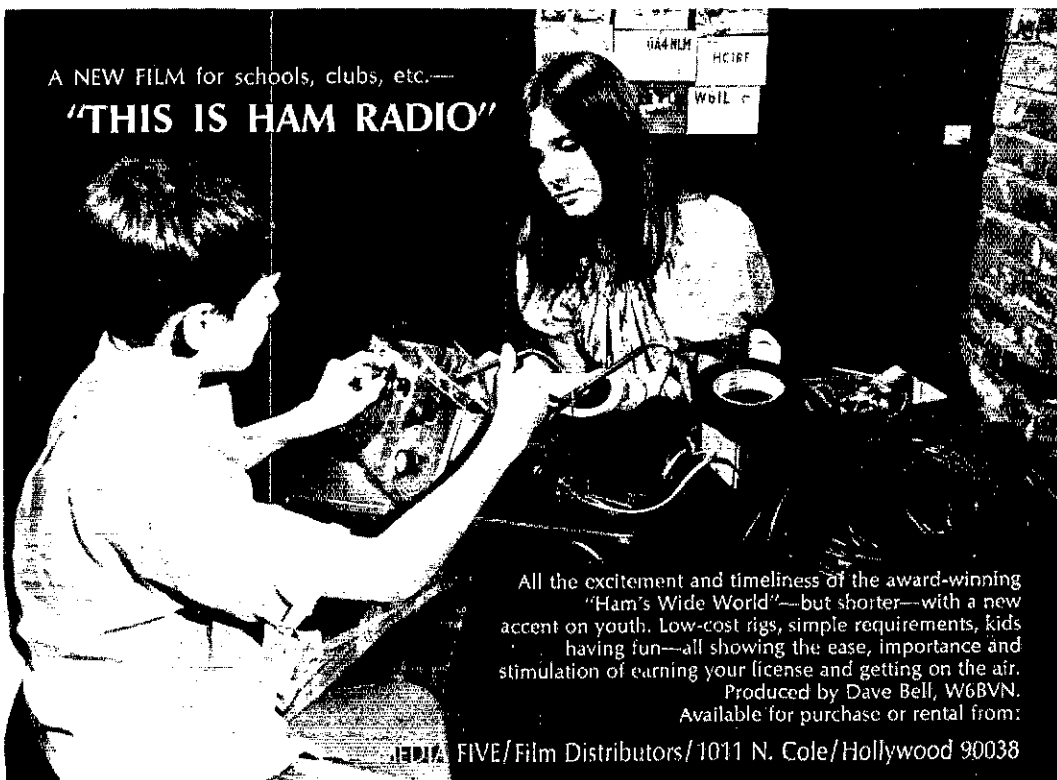
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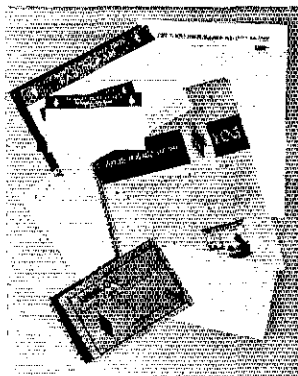
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put on a good hamfest this year. New appointments for the section are WB4LNM as ORS, WB4DOY as OPS. The Robert E. Lee High School Amateur Radio Club is now ARRL affiliated and this group answers to the call of W4WBF. Sorry I goofed last month, but W4CUE is really the Birmingham ARC, not HARC. June was a down month for traffic. The cw net needs some more who can go to RNS. Traffic: WB4EKJ 125, WB4JMH 117, WN4PQC 58, K4A0Z 50, W4AGGD 35, WB4LAL 32, WN4OJD 21, K4UMD 21, WB4LNM 20, W4WLG 19, WB4KSL 17, WN4OVR 17, WB4LAO 11, K4WHW 9, W4AVEK 7.

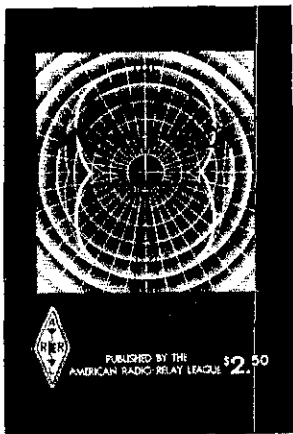
EASTERN FLORIDA - SCM, John E. Porter, W4KGJ - Asst. SCM: Albert Hamel, K4SJH. SEC: W4IYT. Asst. SPC: W4SMK. RMs: W4ILE, K4EHY. PAM 75: W4OGX. PAM 40: W4SDR. K4FMA, our top OO in the section, scored a .4 ppm in the May FMT. W4WVB now has his Advanced Class ticket hanging up on the wall. New Novice in the section is WN4RDA. WB4ONC acted as Net Control for the Novice Hurricane Net during June. Anyone else like to step in and help out? W4BNE, EC for Hillsborough County, worked with the Red Cross in providing contact to the Peru earthquake disaster area. This amateur service was featured on WFLA TV in Tampa. Good work, Ray. W4ASCK, one of our best traffic men, has decided to pull out of the game. If, we are certainly sorry to see you go. Received Field Day messages from the following clubs: Ft. Myers, North Florida, Indian River, Bade, Dade County ARPSC, Key West Navy, W. Palm Beach and Jacksonville. Andy, our SEC, received a batch also. Glad we had such a good turnout in Florida. Let's all plan for a bigger and better one for the next year. The following ECs have been appointed: W4NTE St. Lucie, WB4OMG Bradford and K4QBO Collier. Other appointments are: WB4HNL as OPS, WB4HKP as OBS. W4ASCK made BPL for June. We are now in our summer slump and the traffic has dropped off as well as stations reporting in. What about some of you club secretaries dropping me a line on what your clubs are doing. Also your meeting times so I can plan for visit in the near future. There will be a section meeting at the 5th Annual Hamfest at Melbourne this year. Our Director, W4DQS, has promised to be there. Let's have a good turnout. The hurricane season is here so let's all be prepared. Check your antennas for high winds. Traffic: (June) W4ASCK 729, W4FPC 175, WB4HTJ 169, 8R1Y/W4 143, W4ILE 136, W8BZY/4 116, WB4MIQ 113, W4SDR 106, WB4GHD 84, WB4HNL 83, K4DAX 65, WB4OMG 64, W4EHW 63, W4LJK 61, WB4ONC 61, WB4FLW 56, W4YXP 54, K4HS 48, W4NGR 48, WB4PWD 45, W4IA 39, W4ABY 34, K4BLM 34, WA4UJH 31, W4FP 30, W4BFO 29, W4TJM 26, W4KGJ 25, WB4ADL 24, W44HDD 24, WB4JSK 22, W4SMK 21, K4LPS 20, WB4KPK 18, W4IYT 17, W4GUI 16, WB4OAI 15, W4GDK 14, W4IAD 14, WB4FTY 12, W4LK 12, WB4HTJ 11, W4OGX 11, K4SIH 10, W44EYU 7, K4EBE 6, WB4JRV 6, W4U0Q 3. (May) W4EHW5E.

GEORGIA - SCM, A.J. Garrison, WA4WQU - Asst. SCM: John T. Laney, III, K4BAI. SEC: W4YDN. RM: K4BAI. PAMs: K4HQI, W4LRR. Section net reports and schedules:

Net	Freq.	Time(Z)/Days	QNI	QTC/Net Mgr.
GSN	3595	2300/0200 Dy	595	259 K4BAI
GTN	3718	2200 Dy	49	6WB4JO
GSSB	3975	0000 Dy	978	50WB4DITY

June 14-21 was proclaimed AR Week in Georgia by Georgia's Governor, Lester Maddox. EB Field Day activities by most of the clubs within the section have been reported. W4ISS reports a 6-meter opening on the morning of June 28. He worked the Miami area, Ark., Okla. and Ohio during the opening. Congrats to the GSN group for 100% representation on 4RN again for the month of June. W4DQD reports that the Georgia Southern College club station call has been changed from WB4NXH to WA4DTE. W4TYE has QSY'ed to North Carolina. W4YDN is planning an aeronautical mobile installation in his new Cessna-206 in the near future. Flying co-pilot with Hoppy should be a lot of fun. New appointments: K4BAI as Asst. SCM. WB4IXO, K4OSL and W4RNL as ORSs. Traffic: WA4RAY 139, W4NSO 133, K4BAI 130, WA4WQU 78, W4DOC 62, W4CZN 57, WB4KVE 44, W4PIM 43, WA4VWV 36, W4AMB 16, W4DDY 15, W4UVP 9, W4FDN 4, K4HQI 2, W4ISS 1.

WEST INDIES - SCM, Jose Medina-Hernandez, KP4CO - KP4ID, the official station for Club de Radio de Puerto Rico actively participated during the Field Day exercises. The operators participating in Field Day were KP4DFH, KP4CQM, KP4BBN, KP4AEF, KP4DDO, KP4CSZ, WP4DIW, WP4DHD, KP4CQC, KP4BBI, KP4DDB, KP4DAC, KP4DGE, KP4AWX, KP4BSH and KP4TI, pres. of Radio Club de Puerto Rico. Thanks to K1JMV for relay of KP4BFF/KP4 participation on Field Day with 10 operators participating. KP4WT is active on sbh 7 and 3.5 MHz. KP4CPT has a new TA33. KP4ES checked his DXCC list to renew DX Contest activities. KP4FK has a new TR6. KP4QM is active with a new SB220. KP4BHM is ready for slow scan on 40 and 20 meters.



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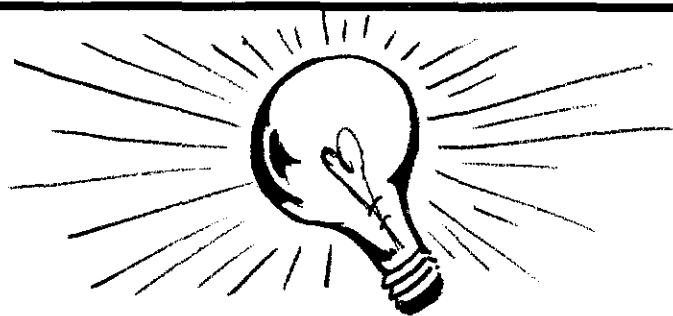
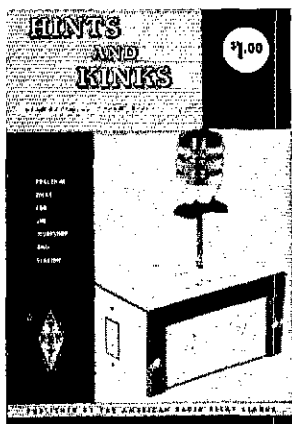
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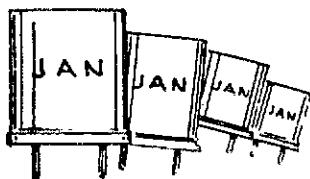
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OA4ACT received his reciprocity license in June. He will operate from the College of Agriculture and Mechanic Arts student dormitories and will QRM KP4CRF/4, who also operates from the dorm. KP4AST won the WWCQ Contest award for Central America and Caribbean. Congratulations to KP4CL, winner of the V1. Phon Contest. New operators: KP4DJR and KP4DNJ. Active on 6 meters KP4DHC, KP4ANG, KP4QCM and W1HOY/4. KP4MC is active on 75 meters; also KP4ES, KP4AST, H18RRP/KP4, KP4RD, KP4JM KP4SV. Traffic: KP4WT 173.

WESTERN FLORIDA - SCM, Frank M. Butler, Jr., W4RKH - SEC: W4IKB, PAM: W4MQO, RM: K4Vfy, RM-RTTY: W4WEB
Net Frequency Time (Z)/Days
WFPN 3957 2230 Daily
QFN 7095/3651 0000/0300 Daily

Pensacola: WA5GTJ/4 is debugging his 572B linear. K4LAN sent out 20 OO notices in June. 8R1Y/W4 is the only W. Fla. station on Gator Net. It meets daily at 0730 CDT on 7115 kHz. New calls in town are WN4RCZ, WN4RDC and WN4RDF. W4UC/4 and WA4EY were active in Field Day. Milton: K4EMN is a new ham WB4KUF has an FB signal on 2-meter fm; he uses a homebrew pre-amplifier. Fort Walton/Eglin: W4NIN operated Field Day from a high spot just south of Crestview. Code classes are underway again sponsored by the Playground ARC and taught by WB4KOX. Approximately 40 persons turned out for the PARG Picnic at the beach home of W4SMM. W4FDJ has a new SB-102, WB4EQU is Acting SEC while W4IKB is away. Defuniak Springs: K4VWE is the new EC for Walton County. Chupley: Washington County also has a new EC - WA4ZJM. Panama City: K4FDS and W4RYZ were out for FD as club stations. Port St. Joe: W4WEB added an SB-220 linear Tallahassee: New TARC officers are WB4LOO, pres.; WB4GTY vice-pres.; WN4RCI, secy.-treas. RCI and WN4RCG are new Novices WA4ISJ is working on the fm repeater. Traffic: 8R1Y/W4 142 W4WEB 23, K6UPH/4 14, W4RKH 12, WA5GTJ/4 10, WB4EQU 8 W4IKB 8, W4FDJ 5, K4CFS 3, WB4KUF 2, WB4NHH 1.

SOUTHWESTERN DIVISION

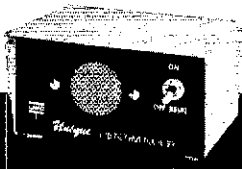
ARIZONA - SCM, Gary M. Hamman, W7CAF - RM: K7NHL, PAM: W7UXZ. Preliminary estimates of total number of contacts for several of the groups operating Field Day are:

FD Call	Name of Group	Xmtrs.	Oprs.	Contacts
W7JN/7	non-club group	4	19	2000
W7IO/7	Arizona ARC	4	38	1800
W7GV/7	Old Pueblo ARC	3	20	827
W7GX/7	Scottsdale ARC	4	20	687

Everybody had lots of fun on a warm week end although Murphy's Law prevailed at times at some FD sites. K7GHS became chairman of the Amateur Radio Council of Arizona since WA7LPR was transferred to El Segundo, Calif., in July. W7OAS is planning to retire in Vista, Calif., in a few months. WA7NBM has moved to Connecticut. WA7HUH remote base has added the necessary equipment to be operable on RACES frequencies. Any amateur interested in being considered for an ARRL appointment, such as ORS, OPS, OBS, OVS, OO or EC, contact your SCM. PSHR: K7NHL 48, W7CAF 27. Traffic: K7NHL 239, W7PG 63, WA7JCK 19, WA7GAE 13, W7GEP 12, W7QUE 5, WA7FEG 4, W7JMO 4, W7LLO 3, W7CAF 3.

LOS ANGELES - SCM, Harvey D.D. Hetland, WA6KZI - Asst. SCM: Phil Goetz, W6DQX. W7GAQ received his certificate for perfect copy on the Armed Forces Day message. WA6BDN added a linear, WA6MCK added a tower and has plans for a tri-bander, while WB6PKA added an 80-meter vertical. K6HV added a 51J-2 receiver to augment the DXing with his KWM-2. WB6ZTI is now helping out as NCS with the Channel Cities Net. K6SE took on the John Blair Trail in 14 days. K6CL has a new beam going up. WB6KPN is working with W6BYN on a new ARRL training film. WB6BBO spoke before the JPL RC on traffic-handling and K6GJY spoke before the LERC RC regarding the various MARS programs. After three Field Days W6QY has become quite proficient with the cross bow, and W6NJU maintains that W6KPM, W6UED, W6QY, W6VSS, K6EVR, K6RF and K6SEN are available for musical concerts following a rousing performance on FD (they bring their own instruments). W6LYY moved to new quarters in Manhattan Beach. WB6DPV is operating portable from San Gabriel during summer vacation from school and is active in the Mission Trails Net (3928 kHz, 7 PM), the Post Office Net (3917 kHz, 7 PM) and the Weather Net (3955 kHz, early morning). W6MLZ is back home after a month in the hospital, but now has a clean bill of health. WB6MCW was elected treas. of the Inglewood RC. New officers of the W6IN Society are WB6UZS, pres.; WA6KZI, vice-pres.; WA6ILL, secy. ZLIBBK visited in Los Angeles as part of a tour of U.S. hospitals.

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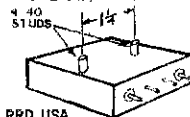
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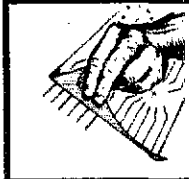
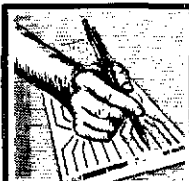


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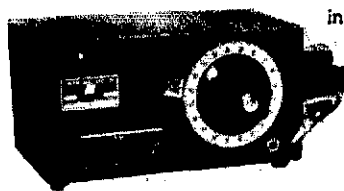
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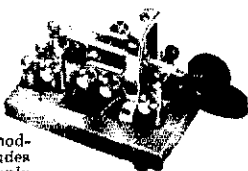
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Two new ECs have been appointed by SEC WA6QZY. They are W60I for the South Bay Area and WB6VYX for the Southern Metropolitan Area. New OPS appointees are WB6GHH and WB6ZVC. Traffic net reports:

Net	Time	MHz	QNI	QTC	Mgr.
SCN	6:30 P.M.	3.6	440	617	W6LCP

Traffic: (BPL/PSHR): W6AM 2/0, WB6BBO 498/0, WA6BDN 3/0, WB6HG 7/0, K6CDW 65/22, WA6CSB 0/20, W6DGH 13/0, W6DOX 9/0, WB6DPV 20/15, K6EA 12/0, W6FAV 5/0, W6FD 11/0, W6FJT 29/34, WA6FKC 1/0, W7GAO 19/10, WB6GHH 11/36, WA6GSV 2/0, W6HJJ 7/0, W6INH 425/39, W6IVC 13/10, W6JPH 15/0, WB6KKG 15/17, WB6KPN 0/5, K6KUO 0/2, WA6KZI 0/3, W6LPI 0/36, W6LYY 8/4, WA6MCK 0/26, W6MLF 246/0, W6NKE 13/10, W6OKO 43/10, WB6OUD 77/23, WB6PKA 214/18, W6QAE 104/36, WB6SSZ 1/0, W6TXJ 6/0, WB6WIT 4/4, WB6ZTI 5/14, WB6ZVC 188/37.

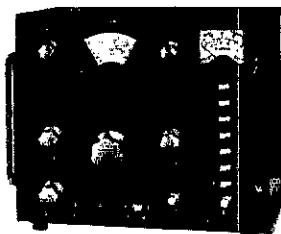
ORANGE - SCM, Jerry L. VerDuft, WA6ROF - Asst. SCM: Richard W. Bierbeck, K6CID. SEC: WB6COR. OBS K6DLY has moved to Vernal, Utah, to accept a teaching position. W6BAM say his OB transmissions on 40 meters are going well with one-day service on bulletins he copies direct from W1AW. OPS W6WUK has a new 35-ft. MINI tower and has applied for San Bernardino Co. RACES membership. W6FB says the Desert RATS has discontinued regular meetings until Sept. 8. Desert RATS has nominated W6FB to run for Division Director. WA6FIT has moved to a new home in Cypress and sports a new tower and beam. OVS K6YNB gave L.A. area vhfers their first Nevada QSO on 6 and 2 meters from Mt. Piolosi. Wayne also netted highest score on the West Coast since 1961 in the VHF QSO Party operating from Blue Ridge. We all regret the passing of WA6KAN, who died of cancer June 2. EC W6KEF says the Orange Co. 6-meter AREC fm net frequency is 57,525 MHz. The Anaheim ARA continues to sponsor the Worked Orange County Award with WB6IOX as award mgr. New officers of the So. Cal. ATV Club are K6INO, pres.; K6VLM, vice-pres.; WB6FXG, secy./treas./editor. All are residents of this section. They are looking to assist any club with parades, etc., by providing video. K6HIJ and W6OYJ, of the San Bernardino Microwave Society, have achieved a new DX record of 214 nautical miles on 3300 and 5650 MHz. The SCM and SEC visited Orange Co., Anaheim, Newport and Fullerton Club Field Day sites and got some good 8mm film of some mighty fancy antennas. W6LCP reports SCN had 30 sessions, QNI 440 (55 different stations) QTC 617. PSHR: W6BNX 64, WA6ROF 51, WB6TYZ 35, WA6FOO has earned a Section Net certificate. Traffic: W6LCP 246, WA6ROF 174, W6BNX 79, W6WRJ 61, WB6IYZ 30, K6DLY 15, K6OT 14, WB6ZEC 11, W6BUK 7, K6GGS 2, WA6YWS 2.

SAN DIEGO - SCM, Richard E. Leffler, WA6COE - Asst. SCM: Art Smith, W6INI. These official stations are now active: ORS: W6BGF, W6EOT, W6LRU, W6VNO, W6YKF, W6MAR. OBS: WA6TJK, WA6HGU, WA6COE. OVS: K6BTO, WB6TTC. OO: K6EC, W6SRS. Your activity should include membership in the AREC. The group now numbers more than 200 and is designed so that you may participate as your time allows. Sign up this month. We need to know your capabilities in case an emergency should arise. Forms are available at Western, and from W6INI or WA6COE. Clubs: SOBARS June meeting had W6SRS speak. El Cajon was introduced to the 2-meter FM Assn. A film on transistorized circuits was presented to N. Shores, Palomar Club meets the 4th Wed. at the Vista Branch of Oceanic Savings at 2000 for north county hams. SoCal ATV Club boasts these SD section members: W6CMQ, W6GTZ, WA6JCG, WB6ROP, WB6UAH, WB6TFC. Stations: WB6IKW is in Europe. WB6UPW is on with a new SB-102 while WA6HGU is on 2 with a TR-108. W6SK checks in with N. Shores members on 75 while on vacation. Glad K6SLS is back after a bout with pneumonia. W6INI was appointed EC for SD (Central District). W6DLN has organized a new group in Imperial Valley. Silent Key: W6QJH. Remember, station appointments are available to ARRL members. Why not consider one for this coming year?Reminder: 5th Annual Calif. QSO Party is scheduled for Oct. 3-5. PSHR: W6BGF, W6LRU. Traffic: (June) W6VNO 389, W6BGF 385, W6LRU 290, W6FOT 277, K6HAV 147, WA6TJK 30, W6YKF 10, WA6COE 8, WA6HGU 5, W6INI 5, W6MAR 2.

SANTA BARBARA - SCM, Cecil D. Hinson, WA6OKN - SEC: W6JTA. RM: W6UJ. The information regarding the meeting of the Thousand Oaks ARC should be corrected to read "the meeting is held the first Thurs. of each month at the Thousand Oaks Recreation Park." For further information regarding the Thousand Oaks Club, call WN6PFY at 4950145. Field Day messages were received from W6LUC on Bell Tower Hill with 15 operators,

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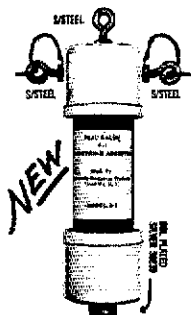
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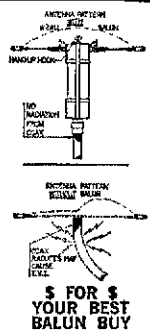
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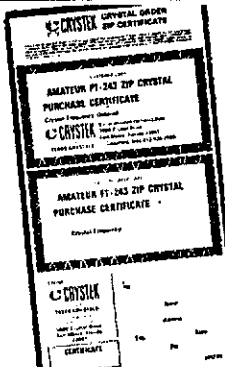
See May QST for more details.

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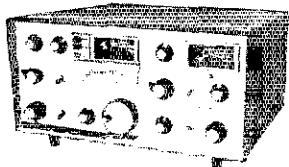
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WB6GYK of Los Osos with 8 operators, W6AB on Orcutt Hill, WB6TCD on Pine Mtn. with 11 operators and WA6UOD on Sulfur Mtn. with 8 operators, W6JTA, our new SEC, is reworking antennas and his emergency power plant. New officers of the Estero ARC are WA6GOR, pres.; WB6ECM, vice-pres.; WB6YCH, secy. The Estero ARC is sponsoring a certificate for Morro Bay Centennial and further information will be reported as it comes to hand. WB6BLI, of Thousand Oaks, has moved to VK5-Land and is expected on 15 meters. W6KZO has a new S/line station and is heard every day on 3895 and 15 meters. Traffic: WA6JEI 170, W6JTA 19,

WEST GULF DIVISION

NORTH TEXAS - SCM, L.E. Gene Harrison, W5LR - Asst. SCM: Gene Pool, W5NFO, SEC: W5JSM, PAM: W5BOO, RM: W5GQZ, Asst. SEC ETech/PAM VHI; WASKHL, Thanks for submitting my name as a candidate for SCM. I'll try to do better with your help. You'll be amazed at the amount of data reaching my office regarding the Lubbock Tornado. Please accept my thanks. Caprock ARC advises that Lubbock hams won top honors in the Novice Roundup. Congrats to WASWZO, WNSWOW and others. Tornado traffic totals: WASOIQ 1000, WASRTB 1500, WASWSI 2000, The club also graduated 9 Novices in '69. WASRTB wants to know if certificates are issued for working all sections on FD. W5FCX was asked to relieve W5GQZ but he is busy, too. W5JSM (SEC) and W5BOO (PAM) were given special recognition for past service at a Texas State Guard meeting (MARS) recently. CO reports are coming in slowly this time of year. W5GWF, W5QPX, W5KYD and W5PBN continue their Observer work despite the heat. W5VJB, Crowley, Tex., is interested in 2-meter ant contacts. W5MNY is interested in a leadership appointment for Gregg county. Your SCM made the Lake Murvaul Hamfest-Fishry June 20-21. Thanks to W5HMO, W5IZU and K5ILL for the invitation. The subject of next year's convention continues to reach the surface at many hamfests-conventions. Who wants it next year? Many large cities are way "past due" in asking for the event. Leadership appointees are reminded to return biographical sketches soonest. SEC reports had QTHs on WASWBK, WASRQS and W5DXT. WASVPL's traffic for Lubbock ran 767 welfare messages, 26 originated, 12 relayed, 2339 points. WASWAI recently moved to Irving from West Texas, FD traffic was received from W5SH/5, W5Z5X/5 and Caprock RC. W5GQZ says someone is working slow-scan TV in Dallas. W5WLA is back from vacation. WASKHL, Asst. SEC Eastexas, recently mailed some 350 applications to ARRL members in his area. Some 80 answers were received, including 2 OVS, 2 ORSs, 5 OPSs, 2 OBSs, 4 OOs, and a number of inquiries regarding EC work. Traffic: WA5TVW 50, WASWBK 46, W5HVF 29, W5JSM 17, W5PBN 16, W5LR 13, W5NFO 10, K5LZA 8.

OKLAHOMA - SCM, Cecil C. Cash, W5PML - Asst. SCM: W.L. Smoky Stover, K5OOV, SEC: WA5FSN, RM and QSL Bureau: W5QMJ. As the SCM is on vacation, this report is being made by your Asst. SCM. Your SCM and SEC visited clubs at Miami June 14 and Madill June 19; also visited FD sites on Sat. at Shawnee, Oklahoma City, Edmond and Enid and on Sun. at Calumet, Altus, Tipton and Lawton. The Lawton Club has a phone patch, thanks to the local ed director. This section needs OBS and OO appointees badly. Congrats to Novices WNSs AZS, BMO, BPK, BPL, BPZ, WHR and ZUI. New PAMs: 6 meters K5DLE; 2 meters WA5ZRU. Congrats to W2FIR/5 on receiving a 45-wpm certificate from Conn. Wireless Assn. K5OCX reports Oklahoma Central VHF Club broke all state records this year, with 1356 FD contacts totaling approximately 9300 points.

Net	kHz	Local Time	Sess.	QNI	QTC
OPEN	391.5	0800 Su	4	138	
OWXN	391.3	1800 M-S	26	364	
STN 1	3850	1730 M-S	26	244	30
SFN 2	391.3	1730 M-S	26	420	77
OLZ	3682.5	1900 M-S	15	31	29
OLZ*	3682.5	1900 M-S	24	47	45
SSZ*	3682.5	2145 M-S	15	30	22
OPON	381.3	1700 M-F	22	372	57

*Late reports for May. Traffic: (June) K5TEY 198, WA5IMt 102, W5QMJ 64, WASZOO 33, W2FIR/5 29, WA5TBB 25, W5FKL 23, W5PML 23, W5MFX 11, WA5FSN 10, K5OOV 5, K5OCX 2. (May) W5QMJ 72, W5FW 36.

SOUTHERN TEXAS - SCM, G.D. Jerry Sears, W5AIR - SEC: K5QQG, PAM: W5KLV, RM: W5EZY. The summer slump seems to have cut down traffic and activity reports. K5SHR/5, trustee for WSAC, reports new club officers are WB2HEY, chairman; WASQEG, vice-chairman programs; WA1KNG, vice-chairman

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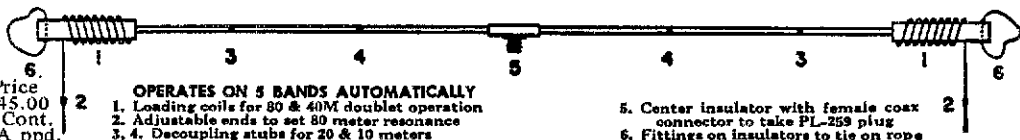
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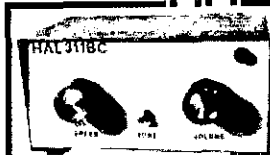


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CANADIAN DIVISION

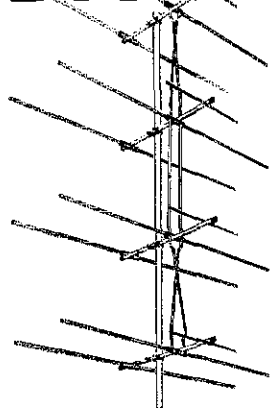
ALBERTA Don Sutherland, VE6EK - SEC: VE6XC, VE6XC reports all AREC records are very much out of date. How about the ECs updating the records and giving VE6XC a good start with his SEC appointment. The Calgary DX Club of the CARA has recently been formed with VE6PL and VE6AP as interim pres. and secy. Elections will be held in Nov. to coincide with the CARA elections. Field Day started with beautiful wx in this area but to no one's surprise a storm came up. VE6WG must have watched "Hams Wide World." No one in his right mind operates at a card table in the open in Alberta. Only CARA and the Border Radio Club appeared to be active this year. VE6HN is organizing his cards for DXCC. VE6NF is talking retirement and moving to B.C. The CARA received the Canadian Safety Council award for work in the Alta. Motor Assn. BEBA Campaign. Traffic: VE6FK 16, VE6HN 8, VE6TY 8, VE6AXN 6, VE6FV 5, VE6XC 5, VE6AD 4, VE6HD 2, VE6HF 2, VE6YW 2.

BRITISH COLUMBIA - SCM, H.F. Savage, VE7FB - New Emergency Coordinator is VE7AEB, for East Kootenays. Field Day was well attended. Point Grey ARC was marine-bound in a fifty-footer when it took a green one over and stove in the ports, so they had to return and dry the gear out. Others were rained upon or stuck in the mud, but all report FD was again a successful adventure in combat with nature's efforts. Vancouver Island's picnic was a packed house. For me it was a great day. I met amateurs I have not seen for years and many new licensees. VE7AYZ is making waves with an FT DX400. Beaver Valley Clicks is digging into the past of VE7s history. Keep it up. VE7BWB has his Class A. The Fort George Radio AC Valuable Ham Award went to VE7BXC for his work on code classes and projects. VE8s: As of July this SCM has volunteered to act as your SCM. You have been asking for one so let's get together. Many Vancouver amateurs and their families had the pleasure of visiting the DOT Geological Survey ship. The old-timers are riding motor-bikes. VE7JD, VE7WM and VE7XW have one for each day of the week; even saw VE7XQ in the bush on one. None mobile. Traffic: VE7BLO 26.

MANITOBA - SCM, Keith Witney, VE4EI - June started the summer season off in style with portable and mobile activities in full swing. The Winnipeg Repeater Society has been testing from its new site and with the repeater unit itself. The club had a very successful meeting and should have the funds to get a duplexer and finish the installation soon. Field Day was well attended this year with VE4s BR, NE, DE, EI and AA heard from. One of the groups, which shall be nameless in case of future embarrassment, has already had its victory party. Interest in propagation is once again showing as several of the boys take their rigs out to the beach. Your SCM has moved, so please check the new address. Several tourists, including some ex-VE4s, have been heard around the bands these days and it is nice to have an eyeball with old friends. It was good to see the WARC van in the public eye for the Dominion Day festivities at the Legislative Building. Perhaps 41A will explain what he was doing with all those stray children; may be they were fans of his radio and TV performances. Traffic: VE4NE 7, VE4QJ 6, VE4RB 5, VE4WT 4, VE4JA 2, VE4LN 2, VE4XN 1.

MARITIME - SCM, William J. Gillis, VE1NR - Asst. SCM: Clarence Mitchell, VO1AW. SEC: VE1HJ. Amateurs throughout the section were saddened to hear of the passing of VE1EV. Gorley was

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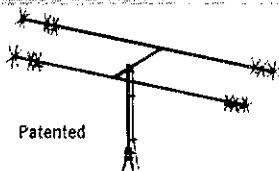
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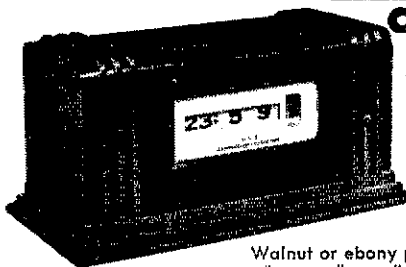
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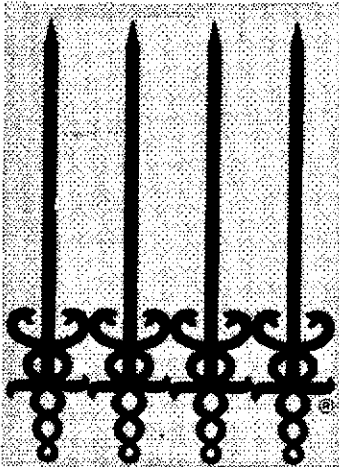
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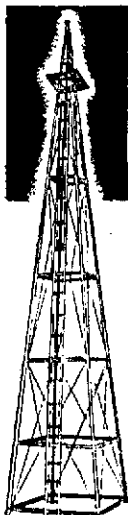
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one of the real old-timers and will be missed by all. Since sympathy to his XYL and family. Thanks to VO1BL St. John's now has a by-law on the books covering TV and amateur towers. Because of the pressure of other business VO1CK has resigned and VO1C now is acting pres. of the NARA. Summer visitors to Nfld, include K1DZG, W1AAS and their XYLs. Field Day reports indicate enthusiastic activity and good scores. There is a very high level of 2-meter fm traffic with several U.S. and Canadian visitors motoring through. Summer activities have reduced reports but next month should see an increase in activity. Traffic: VE1RO 47, VE1AM 39, VE1DV 14.

ONTARIO - SCM, Holland H. Shepherd, VE3DV - SEC VE3EWD. The kids are going back to school, the nights are getting longer and conditions are (hopefully) improving on 80 meter. Ontario-Quebec Net (OQN) CW-section level 3535 kHz *2300 Daily. RM: VE3DBG, Grey Bruce Net (GBN) CW-section level 3644 kHz *2320Z M-S, RM: VE3DPO. Eastern Canada Net (ECN) CW-region level 7040/3540 kHz *2345/0130Z Daily. RM: VE3GJ Northwest Ontario Net (NWO) Phone-section level 3750 kHz *0015Z Daily. PAM: VE3EFX, Ontario Phone Net (OPN) Phone-section level 3770 kHz *2300Z M-S, PAM: VE3ARC Laurentian Net Phone-section level 3755 kHz *2245Z M-S, PAM: VE3BLZ. *add one hour when Standard Time returns. With the exception of OQN and ECN the lack of liaison stations at the section level to carry traffic up to the region and area levels is sadly lacking. VE3CXS moves to VE6-Land. Congrats to OARC on turning out another group of new amateurs. New calls now being heard are VE3EII, VE3JJI, VE3DEP, VE3DGR. Don't forget to have a supply of self-addressed stamped envelopes on file with the Ontario QSL Bureau. Cards are handled as follows: 2 letter calls-VE3CTK, 3 letter calls A&B-VE3AEJ, 3 letter calls C&D-VE3DGG, 3 letter calls E&F-VE3FXZ, 3 letter calls G&H on-VE3GUM. VE3UW is, of course, the QSL Bureau manager. With the large number of Ontario OPSs, ORKs and RMs it is hoped more will seek a spot on the Public Service Honor Roll (PSHR). Close date with the SCM is 5th of the month. Your SCM took in the Calgary Hamfest and Stamped during a camping VHF QSO Party Frequency Measuring Test and for the YLs, YL Howdy Days. We were all saddened to hear of the passing of VE3CKY. Traffic: VE3GI 140, VE3DBG 114, VE3ERU 116, VE3DPO 69, VE3FX 41, VE3GHO 41, VE3GCE 30, VE3DU 21, VE3EHL 14.

QUEBEC - SCM, J.W. Ivey, VE2OJ - VE2ALE shows signs of returning to the hf bands with a new antenna and contacts in Field Day. VE2ASO is a newcomer to traffic circles doing a fine job. VE2OV operates RTTY on 40 meters. VE2AFU is again 2-meter mobile. VE2EC keeps very active on several bands. VE2DFT keeps the St. Jean area on the map with a fine signal, and from the same area VE2BVY is the top traffic-handler. VE2APT is doing the usual fine job on 2-meter nets Mon. and Thurs. VE2DR is to be congratulated on full membership in the Professional Loafers Net because of his retirement recently. Because of noise and poor conditions it is most difficult to copy seven o'clock nets on cw on phone in the hf bands. A recent call from the regional head of the civil defense organization gives us great hope that at last we have found a way to cooperate to the full extent of amateur radio and civil defense for communications. Traffic: VE2DR 21, VE2EC 15, VE2ALE 11, VE2BVY 5, VE2APT 2.

SASKATCHEWAN - SCM, Gordon C. Pearce, VE5HP - Saskatchewan Field Day dawned bright and clear, and stayed that way most of the day. To say that it was hot would be an understatement because the boys were unable most of the time to work in the tents and trailers. Band conditions were not the best. Next issue will have the results of contacts made by the several Saskatchewan clubs and groups. The hamfest in Regina July 3, 4, and 5 was one of the best attended and enjoyed. All activities centered around Luther College and sponsorship was by the Regina Amateur Radio Club, the members of which did a splendid job. The following is the list of elected officers of the Saskatchewan Amateur League, as well as the winners of the various trophies. VESHP reelected pres.; VESWG, vice-pres.; Hammond Trophy (best H/E equipment), VE5DO; Jack Kyle Memorial Trophy (best H/E mobile), VE5VD; Best Commercial Mobile, VESJG; Youngest Ham at 'fest (15 years old), VESVC; Newest ham, OM, VE5RC; Newest ham, YL, VESFO; Hams with largest family, 8 each, VESLN and VESTS; Ham who travelled farthest for 'fest, VE8NP and VE7HP; Gus Cox Trophy (cw proficiency), VESMX; Art Drive Memorial Trophy (proficiency award), VESSC; CKBI Technical Trophy VESPM; Q.C. Trophy, field Day, to be announced later; Liar's Trophy (Wally Pottle fur-lined buttonhole), won by W.W. Flynn; Herb Fredrickson (EJ8BY) Trophy, ORM Award, VE5KF; Transmitter Hunt 80 Meter Fred Lowe Mem, VE5VD, 2 Meters Fred Lowe Mem, VE5RK. A gavel was presented to SARRL as a memorial to Silent Key VESJU by the Regina Club.



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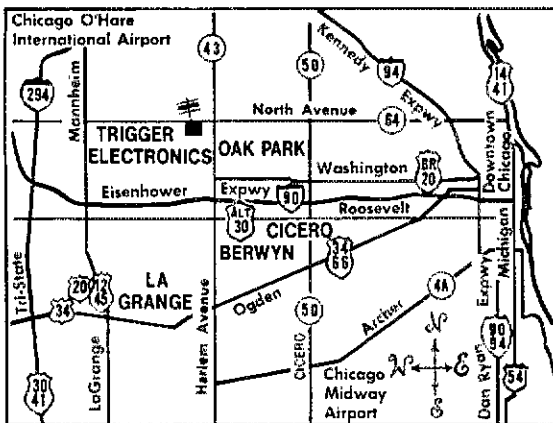
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TORIODS Unceased 88 or 44 Mhfy 5 for \$1.50 ppd. M. Weinschenker, Box 353, Irwin PA 15642.

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. Write for information, A. J. Giwonda, W2JE, Box 394, Marazion, NY 10543.

FREE Sample copy Long Island DX Association Bulletin. Latest DX news. Business size s.a.s.e. to K2APY, Box 74, Massapequa LI NY 11762.

PEORIA Hamfest - September 20, Peoria, Ill., same place as last year. For details see September issue of QST, hamfest calendar. Advance registration \$1.50. Write Ferrel Lytle W9DHE, 419 Stonecreek Rd., Peoria Ill 61614.

CINCY Stag Hamfest: The 33rd Annual Stag Hamfest will be held Sept. 27, 1970, at Stricker's Grove, Compton Road, Mt. Healthy, Cincinnati, Ohio. Lots of food, flea market, model aircraft flying, and contests. Identify Mr. Hamfest and win prize, \$5.00 cost covers everything. For further info, contact John Bruening, 6307 Fairhurst Ave. Cincinnati Ohio 45213.

SAROC, January 7-10, 1971, Flamingo Hotel Convention Center, Las Vegas, Nevada. Sponsored by Southern Nevada ARC, Inc., Box 73, Boulder City, Nevada. Advance registration \$14.50 per person accepted until January 4, regular registration at door, includes Flamingo Hotel late show and drinks, Sunday breakfast, cocktail parties, technical seminars and meetings. ARRL, D.K. FM, MARS, QCWA, WCARS-7255, W9SS-3952 and W9SBA. Ladies program. Flamingo Hotel SAROC room rate \$12 plus room tax, per night, single or double occupancy January 3 thru 12 1971. Mail accommodations request to Flamingo Hotel. Mail advance registration to SAROC.

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HAMVENTION: Albuquerque, New Mexico on 18, 19, 20 Sept. 1970. Gabfest, flea market, technical sessions. MARS, Vhf, Ssb, DX meetings. For information and registration contact Ray Hill, W5SDM 9016 Los Arboles Ave. NE, Albuquerque, NM 87112. Phone area code 505-293-1719.

FOUNDATION for Amateur Radio will award its annual collegiate scholarship in December; applicants should write DeCourt, 8101 Hampden Lane, Bethesda, MD 20014.

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WANT early issues of Radio News, Science & Invention, Electrical Experimenter, Radiocraft, Modern Electronics, Popular Radio, Radio Broadcast, Wireless Age, 1943-1948. Callbooks. For historical library. Wayne Nelson W4AA Concord NC 28025.

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FOR SALE Swan 500C multibander. Swan 250 6 meter transceiver. Power supplies. TX 104. Saturn Antenna. \$700 for all. \$375 each. Rarely used. Milton Lederman 516 LI1-3072 10 Wall Court, Massapequa Park L.I. NY 11762.

MANUALS -- R-390A/URR, BC-639A, SP-600-JX, \$6.50 each. Hundreds more. S. Consalvo, 4905 Roanne Dr., Washington, DC 20021.

FORCED to dispose of my brand-new, factory-sealed Drake equipment. R4B, #290, T4XB, #410, AC4, \$70. TC6 transverter, #155. TC 6500 2MT, #330. SW4A, #235. Socorb, K9KDI, 419 South Euclid, Oak Park, IL 60301.

COLLINS for sale. Receiver & Transmitter 32A-4 and 32S-1. Used less than 3 mo. before stored. Excellent Condition, sacrifice \$750. Johnson POB 12006 Santurce, Puerto Rico call evenings. 809-789-2735.

TAPE Recorders, Ampex 768, #258; Roberts 770X-SS, #258; 778X, #338. All three are \$45-50 below original cost and are in unopened factory cartons. WA7GFT, 4902 E. 13th St., Tucson, AZ 85711.

HEATH "Tene" ten meter transceiver, mike, crystal manual-mint \$28. WB4OTQ, 817 Stanfield Dr., Charlotte, NC 28210.

PHONE Patch, with 2.6 Kc. filter, for Telex coupler, or direct if not required. No tricky adjustments. Kit \$6.95; wired, add \$4.00 HamKits, Box 175 Cranford NJ 07016.

HEATHKIT Sale: HR-10 Ham Receiver, excellent condition, \$49.50. Apache TX-1 transmitter, poor condition, \$39.50. VF-1 1700, \$25. Jim Kennard, WA2EKE Victor, NY 14564 Tel. 716-377-4262.

COMPLETE immaculate S-line 32S-3, 75S-3B late model. 312 B-4, 516F2, 30 S-1 extra tube plus HO-10, HO-13, KW Match Box, 744 Kenwood, padlock #1,350.00. Wiley C. Swan, W4WFF, 536-4872, 709 Chambers Drive, Huntsville, AL 35801.

FOR SALE: Swan 360 with VOX & 117XC P.S. Excellent condx. \$275.00; SBE-34 & SB2-LA. Linear in excellent condx; 34 needs cleaning up, in good condx. \$220.00 Will ship prepaid. Send M.O. Chal Shuler, K4CYE, 5914 Palo Alto Dr., Little Rock, AR 72209 Tel. 501-562-6103.

COLLINS 75S-3 receiver for sale at \$225. Marvin Lee 308 Westport Rd., Winton, CT 06897.

VIKING Invader 2000 in perfect clean condition with electronic TR switch and factory fitted RTTY need space, Bargain \$360 KR8UG 1137 Cedar Point Sandusky OH 44870.

HAMMARLUND -- HQ-145 #125. Apache TX-1 wired for SSB \$75. Both A-1. K8BNV 300 E. 208 Euclid, OH 44123 216-531-9531.

POLYCOMM PC 62 B Transceiver six and two meters. Built in AC, DC, mike, squelch, separate VFO, plus 7 element beam. \$175 WB6WUV 213-287-4423.

SELL DX-60, #43; HG-108 VFO, #20; Hammarlund HQ-110 w/spkr, \$95. WB2OPN 14 High St., Katonah, NY 10536.

WRITE, phone or visit us for the best deal on new or reconditioned Collins, Drake, Swan, Galaxy, Hallicrafters, Hammarlund, Hy-Gain, Mosley, Henry linear, towers, antennas, rotators, other equipment. We will try to beat any deal you can get anywhere and to give you the best service, best price, best credit plan, top trade-in. Write for price lists. Try us. Henry Radio Co, Butler, MO 64730.

HQ-180-C #220, Cheyenne MT1 xmt/supply \$35. SBE-34 \$250. Hank Magrusski, 38 Green Ave. Madison, NJ 07940.

HEATHKIT HW-100, HP-23A, SB-600 all in excellent condition, complete with manuals \$300.00. Gil Voyles W6TOD 5103 Mashburn Ave., Arcadia, CA 91006.

SALE Complete station of W3GQP -- KWM - 1 -- 2KW SSB amplifier (Pr. 3-400Z) 2.5 KW relay controlled solid state pwr. supply (Pr. 400Z) -- \$650. Tel: 9 to 5 216-561-1500, ext. 666 after 5 215-368-3310 Mail P.O. Box 234 Glen Mills, PA 19342.

FOR SALE: HRO-57A1, pwr supply, A,B,C,D coils, coil box, splr, manual, excel. condx.; DX-40, needs new pwr xtormer; VF-1 VFO, manual, excel; offers? K1PVI J. Raibrigh, 3 Old South Lane, Andover, Mass. 01810.

SELL: Brand New, never used, in original box - Eimac 4-250A tube \$40.00 Phil DiPrima 6932-27th Ave Hillcrest Heights, MD 20031.

GROUNDED grid filament chokes 30 amps \$5.00. Plate chokes 300mA \$3.00. 3-30Mcs PPU5A48, William Deane 8831 Sovereign Rd San Diego, CA 92123.

WANTED: SK-43, T-150, R-100, NC-270, any good revr. Sell: Eico 75B/AC - \$100. Swap! K4EPL 35802.

GREENE Center of dipole insulator with or without balun, see ad page 123 June 1970 QST O. Watson Greene Box 423, Wakefield, RI 02880.

COLLEGE Bound: Selling HQ-110, excellent condx. \$140; two 5 watt homebrew transmitters, \$20 each. WB2RJE, 51 Jeffrey, South River, NJ 08862.

80-1B: SB-34 & codepater & service manual -- \$290. 2 Mtr HW-17a with mobile power (HWA-17-1) and FM adaptor (HWA-17-2) \$160. 6 Mtr HF-35 -- \$35. Heath Mohman transistor portable -- \$75. All equipment in good working order. WA1EY 146 Lancaster Terrace Brookline, MA 02146 617-277-8181.

HEATH SB100 with HP23 \$300; Drake Recter \$175. GSB100 #120; HRO50T1 \$100; HBK 6W matchbox new cond \$110; Drake 2E \$150. List available W2ENT, 18 Hillcrest Terr, Linden, NJ 07036 Phone 201-436-6917.

GONSET G-50 6 meter Communicator with D-104 microphone \$150 cash no shipping P. Tucker 16 Wildwood Trail E. Greenwich RI 02814.

FOR SALE: Hallicrafters HT-37 good condition \$175.00. Hammarlund HQ-110 \$100.00 or both for \$250.00. W6WKO Hal Silverman 15142 Vermont St. Westminster CA 92683.

LISTING service -- Gear to Sell? Need Rig? Sellers \$1.00 Lists information year. Buyers free. SASE bring details. W8TXK Listing Service, Box 1411 Benton Harbor, MI 49022.

HW-16 transceiver, crystals. Also R-100A receiver with calibrator, speaker, 8-meter. Bruce Sato, W9NDRD, 562 Suburban, West DePue, WI 54218 414-336-3684.

FOR SALE - SX 46 with all 10M crystals and calibrating equipment, \$160. Good DX100, \$50. Bernard Pollock, Ironia, NJ 07845.

FOR SALE - Collins 180T-2 antenna coupler - Ideal for yacht or apartment - Remotely tunes any antenna 36 feet long from 20 to 30.0 Mcgacycles - Built-in wattmeter - coupler, remote control and 50 foot control cable. \$235.00. Jack Yeacox, WA8YK R No. 4 Washington, C.H. OH 43160.

SALE SB100, \$250.00; SB200, \$195.00; mini beam B-24 \$30.00; Eico V.T. voltmeter \$10.00. W2WHK 210 Utica St., Tonawanda, NY 14150 Tel 716-692-5451.

CAPACITORS Brand New 140ufd Electrolytics at 450vdc. 10 for \$9.50 - Mehaffey K4IHP, Atlanta GA. 30328

SELLING out: All equipment new or like new condition. 75S3A \$395., 312B4 \$145., GSB 201 MK IV \$235., Telex TM30D GEL Beam \$305., Ham-m \$75., TR-EX W-51 Tower with thrust bearing less \$170., HQ 215 with speaker \$225., Ameco model FT Preamp \$29., EV664 Mike & Stand \$35., Telex 40-80 inverted Vee with Balun \$20., W2AU Balun \$7., J Perry 177 Paris Rd., New Hartford 13413 1-315-732-4936.

HEATH Chippewa K1-1, 2K-W Linear with separate RS-1 Power Supply, manuals, \$275. W9HPM Martin Fuhrer, 9201 Ewing, Skokie, IL 60203.

FOR SALE: Eico 763 with 751 AC supply, solid-state VFO. As new, \$175. Richard Tinson, G3PXM/W1, 32 Lawton Ave., Newington, CT 06111, 203-666-2879.

TELEX Custom "Monarch," ruggedized, 6 element 10 meter, and 5 element 15 meter beams, models 10M636, 15M632. Prices of near new condition would expect about 1/2 original prices which were respectively \$480, \$435, but will consider best offer! Cannot ship. Bob Sommerfelt, K2GX1, 120 Yorktown, Buffalo 14226, 839-3335.

FOR Sale: NCC-2000 \$449, TR-4 w/AC-4 \$489, TA-33 \$109, Ham-m \$79, Johnson KX matchbox w/coupler \$109, HRO-60 w/A-J coils \$219, Electro Voice 664 mike w/stand \$39, Heath HO-10 monitor scope \$35, Shure 404C mike \$12, Paea 5 in. Oscope S-50 \$24, B&W low pass filter \$10, Ampex stereo recorder model 761 \$250. All are excellent. Also, SB-400 (dial broken) \$149, Dave K2YHK 6321 Mounford San Jose, CA 95123.

WESTERN Hams, New and reconditioned equipment - exciting new YAESU here. Wireless Shop, 1305 Tennessee St., Vallejo, CA 707-643-2797.

COLLINS 312B-5 station control \$195, Noise Blanker 136B-2 (unused) \$50, PL-172 (unused) \$50, KWM-2 Mobile mount (351B-2) \$50, Panoramic adapter BC-1032A-No manual \$35, Heath converter MP-10 \$25, 4-1000 sockets \$10, Code oscillator Eico 110, "Q" Multiplier Heath - unassembled \$10, Ed Riggs 2914 Tennyson St., N.W., Washington, DC 20015.

ESTATE OF WIBROE: NCX-3, NCX-A, SB200 \$350 contact WINZE, C.R. Brown, RFD Gilman St., Vermont, ME 04086.

NATIONAL NC-300 with XTAL calibrator and matching speaker. Excellent condition, \$125. Will deliver within 100 miles. Richard Beck, WN8FIR, RR No. 4, 3918 Gasper Rd., Eaton, OH 45320.

WANT pre 1921 Wireless equipment and catalogs. Description, price, Dick Septic 1945 E. Orangegrove Blvd, Pasadena, CA 91104.

HEATHKIT SB-610 monitor scope, latest model, P. 70, Wired and tested but not used. Operate mostly CW. D. Shaffer WA4X, RFD 4 Box 71, Glen Allen, VA 23060.

CHRISTIAN Ham Fellowship is now organized for Christian fellowship and witness among licensed amateurs. Free gospel tract sample and details on the organization on request. Christian Ham Callbooks, listing members, \$1 on donation. Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, MI 49423.

SELL: NCX-3 w/H.B.P.S. Very good condition, recently aligned \$150, Dick Freitag, W2CGX, Treestop Road, White House Station NJ 201-439-2615.

GET it from "Grid", W4GJO, Authorized distributor all major ham lines. Personal service. Guaranteed reconditioned ham gear. Top trade-in. Master Charge Credit on new or reconditioned equipment. The Ham Shack, 1966 fillmore, Sarasota, FL 33579.

PET converter kits: 50, 144, 220, \$10.20. Includes silverplated glass-epoxy p.c. board, crystal, coils, trimmers. IF 28-30 MHz, VHF Communications, Box 87E, Topsfield, MA, 01983

SOLID-STATE STRIPLINE TRANSVERTER 144-432. AM-FM-CW. Silverplated enclosure. Requires 1.2 Watts RF in transmit, 1.2 VDC in receive. \$37.50. Spectram International, Box 87E, Topsfield, MA, 01983.

COLLINS: 75S3B-R No. 17679 Absolute mint condition 1 year old, \$575 WB6VCM 959 Chnton Rd., Los Altos, CA 94022.

WANTED - 435MC Xmt and power supply, at least 100 watts to be used for Amateur TV. - Video modulator must be stable. G. Campbell Richmond, MA 01201.

GETTING Married, Must sell Swan 500C with VOX, AC and DC supplies. Mint condx, never mobile, \$425. WA8KBL, 715 W. Jackson, Flint, MI 48304.

SELL: Swan 350 GS 117-C p.s. Both excellent condition, \$295 or Best offer, WA4ZEH, 312 E. Xavier, Temple, TX 76501.

FA-1 keyer w/extra mercury relay, \$65. Model 32ASR teleprinter w/books, tape, paper (boxes), polar adapter, \$285; Budweiser beer neon sign, \$14. K3MND, 8361 Langdon, Pbilu., PA 19152.

COLLINS 75A4 S/N 8003 KWS1 with factory mods excellent condx. \$1000. WA0JXN 2310 S. Ridgewood Wichita Kans 67218 Tel. 316-682-8623.

WORLD QSL Bureau. See display ad elsewhere in this issue.

NOVICE crystals: 40-15M \$1.38, 80M \$1.83. Free flyer. Nat Shinnette Electronics, Umatilla FL 32784.

HT37 mint cond original owner \$275. Johnson match box and other gear pick up only. R.W. Downes, Phone 479-0935, Denton MD 21629.

"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! Swan 500C, \$449.00; Swan 270 CWK, \$419.00; Drake TR-4, \$395.00; RB, \$379.00; TR-4 \$559.00 THO-DX, \$138.95; GT-550, \$415.00; New Rohn 50 Ft. Foldover Tower, price, \$199.95; New Mosiev Classic 53 and Demo Ham-M Rotor, \$199.00; New Gonset GSB 201 MKIV Linear, 2000 Watts, (\$495.00), Cash Price \$349.00; New Swan 350C, (\$420.00), Cash Price \$329.00; Reconditioned Equipment: 75A-4, \$319.00; L-4, \$199.00; R-4, \$169.00; A-4, \$279.00; Ham-M Rotor, \$79.95; HQ-180, \$325.00; Moory Electronics Co. Phone 501-946-2820 P.O. Box 506 Dewitt, AR 72042.

FOR SALE: one Eico 720 \$50.00 and one Hammarlund HQ180 receiver \$200.00. Excellent condition. Little use. Call 516-223-2581 or 516 868-8491 evenings preferred or write Alvin Starobin 464 No. Wood Rd Rockville Centre, NY for inspection appointment.

HEATHKIT Apache #85, Lafayette HA-350 with Heathkit GD125 Q-Multiplier \$95, Knight T-60 \$30, WB4JMD, Chris Galfo, 127 Shore Dr., Williamsburg, VA 23185.

FOR SALE: Ameco TX-62 \$90, NCX-3 w/ps \$200, Ameco CN-50, CN-144 \$30 each, Eico 450 scope \$40, Eico 720 \$40, BC-348 \$30. All in good condition. Alec Steingart WR2MZE, 3356 Frederick St., Oceanside, NY 11572, Tel. 516-678-5080.

FOR SALE DX-60B, 7 crystals, key - all only 10 months old - \$210.00. Excellent condition. Code oscillator and cw sidetone beam filter, 30 ft. RG-8U. All only \$160. WN5ZXW, Wm Windham, 102 E. W.W. Miami OK 74354.

HELP. Help. Does anyone remember small motor for front wheel of bicycles made by Whizzer? Information, address, etc. appreciated. Vandegrift, Matcom-DSO, APO NY 09052.

FOR SALE: DX-100 mod. for SSB, SB-10 SSB adapter \$75 RT accessories too. Lists \$25 cent stamps! W8BLR, 29716 Briarbank, Southfield, MI 48075.

BRAT Rust-Corrosion! How? Ask Walt! Guying, antenna accessories too. Lists \$25 cent stamps! W8BLR, 29716 Briarbank, Southfield, MI 48075.

SIDE-BAND: Gonset GSB-100 transmitter, 80-10 meters, 100 watts, mint \$145. CW ops commercial CW rig with ps. \$100.00. 25 Mcs, xtl, \$75. No shipping. WA1AZW, Carl Mascott, 617-879-0013.

FOR SALE: Drake TR-3 Transceiver, BV-3 Remote VFO with speaker, A-4, PS-3, 2500 w/ps. Perfect condition. Modifications, \$325. E.C. Littler, 640 Snowhill, Springfield, OH 45504, Tel: 513-399-8697.

SELL 75-A receiver with 800 cycle and 2.1 kc filters, vernier knob, manual, \$425.00 Hays Sene, W6RY, 4049 Berkley Drive, Jackson MS 39211.

WANTED: Collins 62 S-1, State age/condition, K6RQT.

POLY-COMM 2-B operator's manual needed by WB2LTV, Hoffman, 115 Highland Ave., Jersey City, NJ 07306.

WANTED: Buy or borrow for copying, manuals and schematics for Collins Receiver R390A. M. Logan Hibrae House No. 5 Poughkeepsie NY 12603.

DRAKE 2-C, 2CS Speaker Gud CondX 160.00, HQ-145 with clock and matching speaker Gud CondX 98.00, Tom Louden 905 E. Adams, Fairfield, IA 52556, Phone A.C. 515-472-8807.

DISCOUNTS! Galaxy GT-550, Factory-sealed carts, \$425.00. Limited supply. Ham-Ms \$98.00 (Lots of 2/more). BTLK-2000 Linear \$449.00. New standard 806, 2-meter FM, 10 watts out, \$299.00. Prices F.O.B. L.A. Amateur Radio Sales, 24214 Crenshaw Blvd., Torrance, CA 90505.

SCR522 XMT and Hallcrafters S-102 Rcvr \$50. Bill, WB8EY, 2484 Crissinger Rd, Marion OH 43302.

TRANSFORMERS Rewound, W4CLJ, 411 Gunby, Orlando, FL 32811

WANTED: Old National HRO receiver. "5" series preferred-Extra low freq. coils-FW diads, other spare parts-W2DY U-560 Marlboro Rd., Englewood, NJ 07631 567-2027.

COLLINS KWM2, perfection please, you will not suffer great loss when selling, \$595.00; 515F2 and 30L1 available, if not best go next best for less than; Drake-line \$495 complete, TR4 \$400, Galax, V-MK111 w/ps \$375.00 Glen Byars, Box 105, Kearney, NE 68847.

COMPLETE Collins Station: 75S3B, 3283, 5-16P2 p/s, 312B4 station control, 30L1 linear, SM2 mike, Package Deal, only \$1245 complete. \$174.45 ship. For condx. Selling estate. Call WILMT 617-458-8285 or WIMXK at 617-453-4875 evenings.

ATTENTION SB100, SB101, SB102 owners! Update your transceiver for better operation. TM-101 - Tracking Modification eliminates the possibility of preselector-driver non-tracking between transmit and receiver. RFM-101-1 Sensitivity Modification increases the receiver front-end gain of your SB100 or SB101 to that of the SB102. Each installs in minutes with no drilling required. Send name and address for all details. Argomats, Box 84, Kings Park NY 11754.

SELL, guaranteed \$146, 807W, 6080, 6550 for \$2 each, \$3 each for 2BPL, 3BPL, 229. W452A \$15, 416B \$6, RR716C \$10, W2TJZ 101 Christie St. Tenafly NJ 07670.

WORLD Radio's used gear has trial-returns-guarantee! KWM2 - \$695, Duobander 84 - \$104.95, Galaxy 3mk2 - \$259.95, 3mk3 - \$279.95, GT550 - \$375.95, 2NT - \$119.95, Valant - \$129.95, SB2L - \$149.95, R530 receiver & 3 filters - \$649.95, Interceptor 6/2 - \$199.95, 7581 - \$299.95, HQ170C - \$179.95, Drake 2A - \$159.95, F455B60 filter - \$19.95, GD104 - \$19.95, Swan TV2(20M) - \$199.95. Free "blue-book" list for more. 3415 West Broadway, Council Bluffs Iowa 51501.

AMATEUR museum buying old radios, books, magazines, catalogs, parts. Selling QSTs and CQs. Erv Rasmussen, 164 Lowell, Redwood City, CA 94062.

QSL samples 10c Fred Leyden WINZJ 464 Proctor Revere MA.

CIRCUIT Board, Fiberglass, any size, 4 cents square inch. Minimum \$3. postpaid. Frontier Electronics, Box 127 Orr MN 55771.

FOR SALE: Gotham Tribander never used, still in carton. First class check over \$20. You can freight or pick up. Steve WB2ESN RR21 Rocky Point NY 11778.

NEEDED: 6Q5G tube for a Dumont 304A oscilloscope. Make offer. David Anderson 4290 Acacia Av Bonita CA 92002.

COLLINS 32S1 \$375 FOB. E. C. Titcomb 8 Surrey Lane, Rolling Hills CA 90274.

SAFETY belt climbing 15, 8 ft dish \$80. 100 kc counter \$110. Rotor prop pitch \$45, 2M duplexer \$115. FOB. Link 1081 Aron, Cocoa FL.

DX Awards Log, 150-page book lists contacts for over 100 major world-wide awards. Individual logs for each award for record of contacts and confirmations. Required over two years to prepare. \$3.95 (\$4.95 foreign). McMahon Co. 1055 So. Oak Knoll, Pasadena CA 91106.

SX101A excellent condition no scratches \$140. Jamie Crandall, McDonough NY 13801.

FOR SALE: Drake ZC 2NT with xtals \$275. Hygain 5BDQ \$30. You pay freight. WN8EJF 11 Ranch Ct, Bowling Green OH 43402.

SELL Heath Apache transmitter. Excellent condition with manuals \$100. Japan, USSR, Chile - no strain! Going transceiver. James Leggore 706 Manor Terrace, Moorestown NJ 08057.

HEATH SB30 station console, manual, Mint, \$45. WSUPG 651 Sanford Av, Akron OH 44305.

HEATH Apache TX1 transmitter with manual \$65. W0DKX 1565 81st St, Des Moines IA 50311.

FOR SALE: Ameco TX62, Ameco CN50 converter W/PS. Ron Allen W8ZJN Route 6 Zaneraville OH 43701.

YAESU linear amplifier never used Model FL2000B. Cost \$300. First \$250 plus shipping. K7EPD 1538 E. Solano Dr. Phoenix AZ 85014. 602-266-8057.

SALE: Heath HW100 with power supply \$275. DX100B \$50. All in excellent condition. Mitch Keamy 18275 Surrey La. Brookfield WI 53005.

SELL like new Koss stereophones PRO4A \$10. New remote control stereo headphone unit. Allied H879 \$2. Accustech IV preamp control center \$50. WTHOT 1127 W 10th Place, Mesa AZ 85201.

BRAND new fully identified epoxy diodes 1000 PIV @ 2 amps includes disc by pass and bridging - resistors, 10 for \$4.50. Diodes only 10 for \$3.50. G.E. line spike suppressors with order \$0c each. Postpaid USA. East Coast Electronics 128 St. Boniface Rd. Cheektowaga NY 14225.

FOR SALE: Mint TR4 SR16764 with AC4 \$500. 217-999-4981. Tamulis W9PQS Member ARRL.

SWAP Allied A2516 receiver featured in Jan QST for a good grounded linear Thomas Cann 1555 Black Rd. Joliet IL 60435.

HAVE new Signal-One sealed carton latest series, warranty at low price. All trade or used. Collins, Drake, Nights 615-384-5643. Don Payne KA1D Box 525 Springfield TN 37172.

SELL SX101A good condition \$100. Clegg 99er \$60. Want HP13 dc supply. Or portable rig. David Shaffer K3NXP/6 Caltech, Pasadena, CA 91109.

DRAKE 2B with 2AC Hallicrafter HT37. Both perfect and on air with manuals \$150 each. W8OKB 4257 Willow Dale Rd. Springfield OH 45502.

TOROIDS! Lowest price anywhere. 40/110 postpaid. Center tapped 88 or 44 mhz. \$82. Lorenz 90 speed page printer with built in repair kit. RD (ASB) \$125. Teletype model 24ESR reconditioned, perfect page printer (60 or 100 speed) \$200. Reproforator type 11/16" \$10c/each. \$0. Stamp for list. Van W2LTF 302Z Passaic Av. Stirling NJ 07980.

SR160 & PS 150 120 AC supply not a scratch \$235. 24 hour Numechron clock \$8. Ham-M \$95. Electrovoice 729SR \$12. Heath SWR bridge \$12. Cantenna \$8. All mint. Cushcraft 3 el 20M beam \$50. 45 ft Rohn T25 tower \$75. Package or separate. Call, Write, Ready to deal. John Yaeger W9PWD 815 S Vine, Hinsdale IL 60521.

HAM station for sale. TMC receiver GPR90R plus GSB1 adapter; Heath Seneca VHF1; Gonset Communicator 4 model 3341 with external National VFO62; 2 Gonset Communicator II; Elmac AF87 with power supply; antenna & rotor; Heath Q meter; CQ magazine complete 1956, 1958-1961 plus many other issues; QST 1953-June 1969 complete plus many earlier issues; also working & non-working Army & Navy surplus equipment, various tubes, parts, books. Warren 20 Edgell Rd. New Haven, CT 06511.

COLLINS amateur station 1 yr old. 7533B, 32S3, 312B4, 516F2, 30S1, MP1, 351D2. Two SR90D-5 mikes. 334A Waters dummy load wattmeter. 376 Waters Region Air quad aluminum spreaders. Hamm rotor, 50 ft tower. Rotor lead & RG8U coax. 40/80 dipole ant. Vibroplex plug. Hustler mobile ant. with 10/15/20/40/80 coils. Estes ignition harness for V8. All leads and connectors. Original factory cartons & manuals. Absolutely mint condition. Must be seen to be appreciated. \$2750. K3VZT. John Rohrbach PO Box 275 Schuylkill Haven PA 17972. Tel. 717-385-2121.

WANTED Lampkin Model 111 PPM meter in good condition. Frank McJannet 108 University St. Seattle WA 98101.

SALE Polymer 6-2 w/mike \$260. Monitoradio DR200 \$80. Master mobile 12V loading coil w/control \$20. All excellent with manuals. Will ship. T. K. Brown 1111 Chenango St. Binghamton NY 13901.

PARABOLIC dish 6 ft diameter TACO P50604 \$65. 3 ft diameter spun aluminum 1/32" thick dish \$20. Pierson KE93 receiver ac/dc supplies \$40. Don K6YPZ 18406 Delano, Reseda CA. 213-344-0870.

QSLs samples 10c. Fred Leyden W1NZJ 454 Proctor Av Revere, MA 02151

SALE Viking Invader 200 sub/am/sw/rtty. \$185. HQ170AC 6m thru 160m hb band receiver \$175 or \$350 for pair. Orrin G McKinney Jr WB8FC 403 S Jefferson St. Lewisburg WV 24901.

AMERITE tower 50 ft tilt base with AR22 rotor. Hygain Elyacac 100 ft tower \$168. Hustlerbolt linear amp 20 watts 2-4-400As \$200. Call 215-644-5186. WA3CTV A. W. Harriman RD1 Dutton Mill Rd. Newtown Square PA 19073.

SELL Ameco PT preamp factory reconditioned mint \$40. FOB Jupiter. W. F. Asbury, Waterway Rd. Jupiter FL 33458.

FILTERS for 7683B 500 cycle \$35. 4kc \$25. S-Line reconditioned guaranteed. A-1, 75B3B \$400. 32S3 with 516F2 \$550. Hallicrafter SX400 cyclone with external speaker and ac supply, can't be told from new \$695. Drake TR4 with ac supply and speaker in cabinet \$550. Heathkit SB101 with ac supply & speaker, perfect \$350. Sensational Signal/One CX7 now in stock. Complete stock of antennas, rotators, keys, parts. Varitronics 2 meter stocked. Douglas Electronics 1118 N. Staples, Corpus Christi TX 78404.

KITS professionally wired, Heath or others. Written guarantee given before assembly. 12% of retail price. W9MZU, Stanfill, Hills MN 56138.

GERTSCH FM6 sig gen/freqmeter 20-1000 MHz+, exceeds FCC requirements. \$0.00001. cost \$3,000; Singer-Metrix spectrum analyzer 50-4000 MHz+ cost \$5,000 \$450 each or trade. TS186D freqmeter/generator 100-10,000 MHz cost \$956. \$65. Parametric amplifier components 220-230 MHz \$820. custom freq receiver other wh/whf gear, swap list SASE. WA4PI Box 4095 Arlington VA 22204.

FOR SALE Gonset G77 mobile transmitter 6 or 12 volts. 80 thru 10 ft 100 W. Ham Radio TBSSC \$30. 60 thru 2. Frequency converter BC221A modified for 100 W. manuals for all. Carl Arnold 4355 Spring St. Middletown PA 17057.

POLYCOMM 6 including manual, factory test sheet, dash mount 110 or 12v. Communicator IV 2 meters, Manual and 110 or 12v. w/extra preamp wired for Hacks Plug. Both mint condition \$135 each. You pay postage. WB4OAY Fred Eberling 4510 Saxon Dr. New Smyrna Beach FL 32069.

SELL DX60 xmitter \$50. HR10 rear \$50. or \$80 takes both. Also have HW32 20m kvcr for \$100. Dave Wright WA2FUA 518-731-8012. RD1 Coxsackie NY 12061.

COLLINS KWM2 \$1300. PM2, CC52 \$750. 30U1 \$325. 75S2B w/extra black \$300. All mint cond. 32V2, 1741, 13T41. DX100B. HA6 w/ps(new). Antennae, misc. K7HERW 685 Emerson Way, Sparks NY 89431.

SELL SBE34 transceiver, microphone and 12v power cord. Will ship. \$230. J. Vick 26 Princeton Circle, Longmont CO 80501.

FOR SALE amateur and engineering book collection. Send SASE for list. KA1PA 3 Sunny Acres, Braitleboro VT 05301.

SELL Drake 2A recvr w/spkr, vfy good cond \$125. Heath IO12 w/probes plus EP2 training kit \$65. James Masica 4936 Weiss, Saginaw MI 48601.

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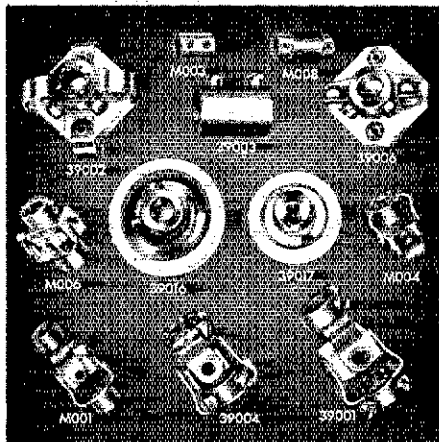
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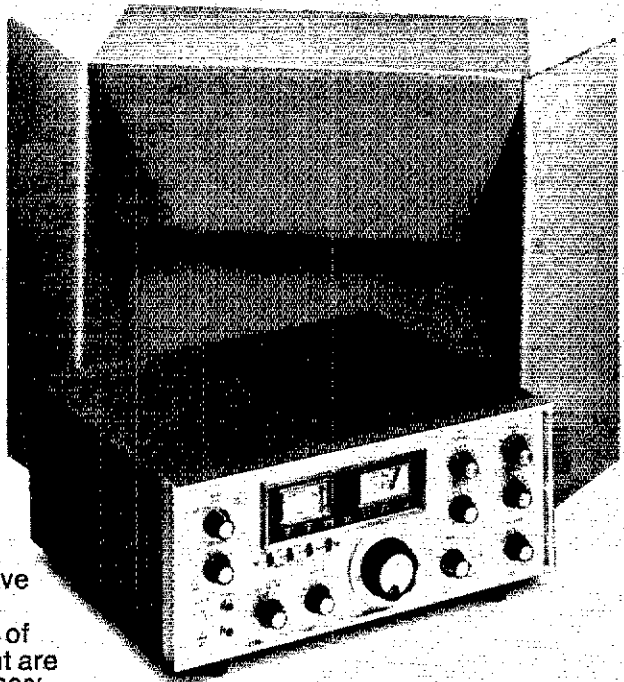
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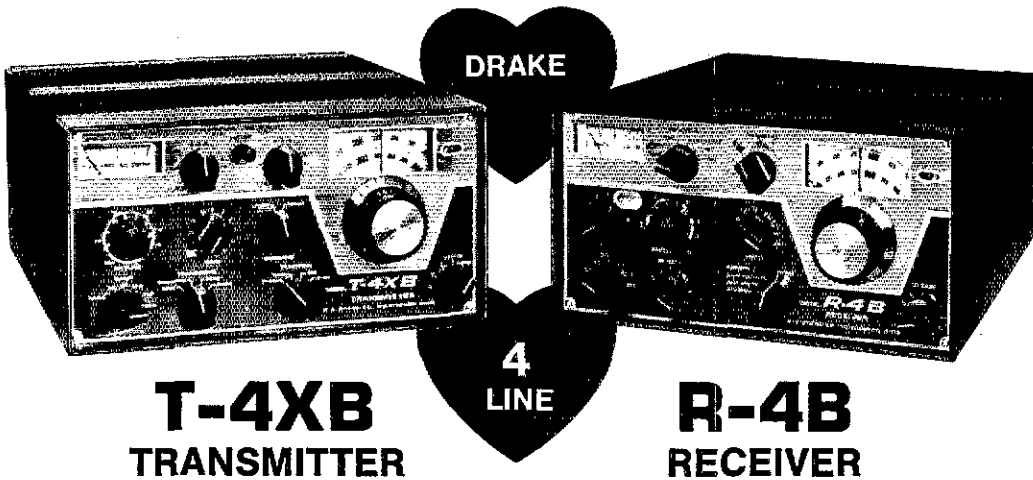
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