QST

September 1966

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JOURNAL OF THE A R R L

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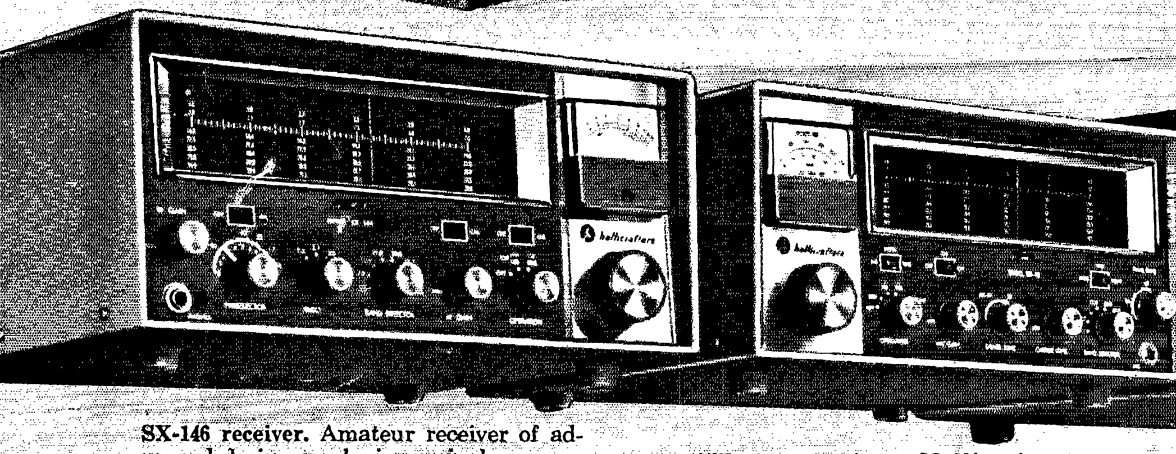

SX-146 receiver. Amateur receiver of advanced design employing a single conversion signal path and pre-mixed oscillator chain for unprecedented frequency stability and adjacent channel-rejection.

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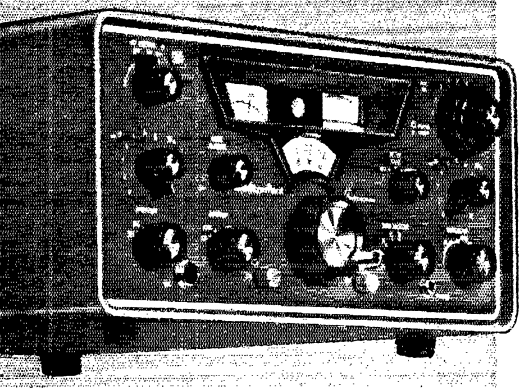

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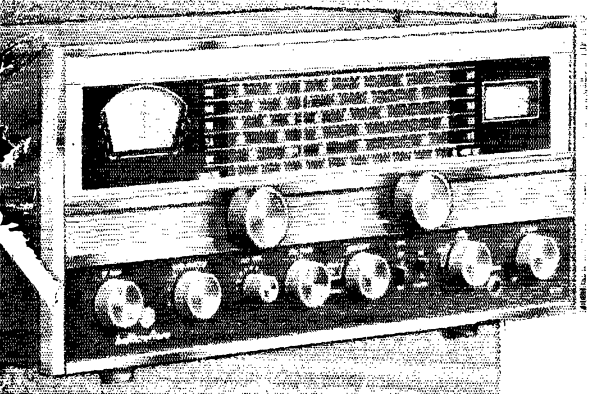

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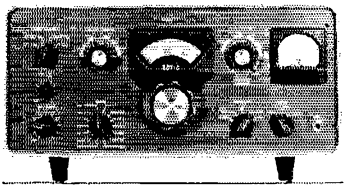

COLLINS

QST

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VOLUME L NUMBER 9

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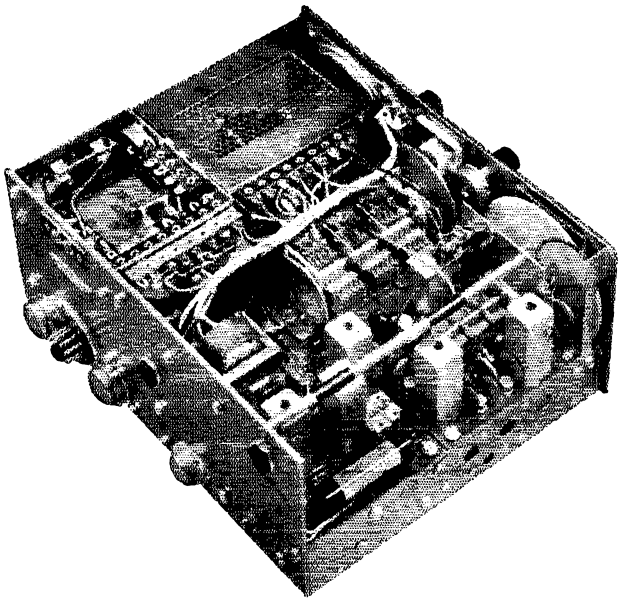
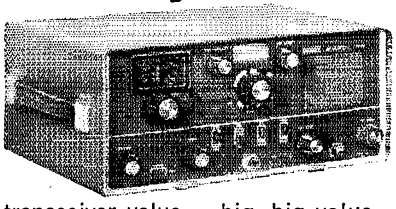
OUR COVER

That's W1ICP adjusting the 15-meter beam described on page 41. Nope, the r.f. didn't burn the grass brown; it's just the New England drought.

—CONTENTS—



Value is everywhere in SB-34



In the **SB-34**, four-band transceiver, value is wherever you happen to be looking. Front panel or rear—inside or out—you see tangible proof that **SB-34** is returning the biggest possible value for every dollar expended.

The top photograph is an example in point. See the steep-slope Collins mechanical filter in lower right hand corner—also some of the transistors used in the advanced bi-lateral circuits and in the highly sensitive **SB-34** receiver. This outstanding receiver is entirely solid-state—draws only 500 mills on standby. The left hand corner gives a peek at the big, big value—the transformer type, solid-state power supply that adds so much to **SB-34** enjoyment by providing **both** 12 volt DC **and** 117 volt AC operation. The heavy-duty transistors for this supply and the 11-pin receptacle that accepts both of the plug/cable sets provided for AC and DC operation are on the rear panel of the assembly shown. The prewired sockets for **VOX** and **Crystal Calibrator are on this same rear panel. Throughout** you see, without exception, the highest quality components available. Don't overlook the price tag. It will say **395.00 . . .** and, yes, the built-in two-way power supply **is** included.

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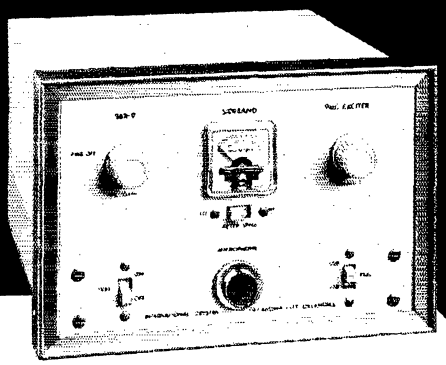

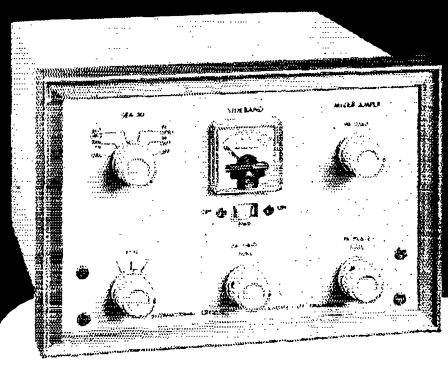

Model SBX-9

SPECIFICATIONS:
Exciter-Driver 9mc

Tubes:	6BH6 Oscillator 12AX7 Audio 7360 Bal Modulator 6BA6 RF Amplifier
Filter:	Four crystal half lattice Carrier Suppression 45db min. Unwanted SB Atten. 40db min.
Output:	Provides voltage drive for mixer such as SBA-50
Controls:	Carrier Balance Microphone Gain Test Switch USB-LSB Switch
Metering:	RF output for balance adjust. Two sensitivity ranges available with front panel switch.
Misc:	Relay included for push-to-talk operation. Crystals for upper and lower sideband included. Requires high impedance microphone. For operation on 117 vac 60 cycle power.

$125.00

Model SBA-50

SPECIFICATIONS:
Mixer-Amplifier 50-54mc

Tubes:	6U8A Oscillator-Mixer 12BY7A Amplifier 6360 Linear power amplifier
Drive:	Requires 9mc sideband signal from SBX-9
Output:	SSB single tone 10 watts
Controls:	On-Off Power PA Grid Tune PA Plate Tune PA Load Tune Metering Switch
Metering:	Oscillator 9mc Drive Buffer Grid PA Grid RF Out
Crystals:	Three positions, uses 3rd overtone 41-45mc range. Crystal frequency = final frequency —9mc
Misc:	Accessory socket provided for connecting keying circuit to SBX-9. Comes with three crystals. Specify frequency when ordering. For operation on 117 vac 60 cycle power.

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is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

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

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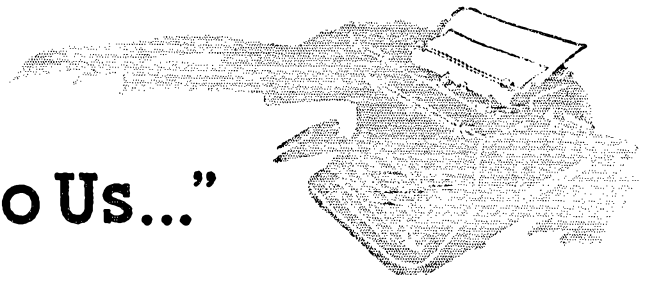


"It Seems to Us..."

THE ALL-TOO-SILENT VOICE OF THE BOOSTER

I am more than mildly concerned at the vast amount of misinformation now being circulated in ham circles — on the air, in discussions at club meetings and in radio-store bull sessions — about the American Radio Relay League and its organization. A disgruntled few are speaking out loudly in an effort to undermine faith in our organization.

Our ARRL is a scientific society, one of the finest in the country. Contrary to the ideas of many, it neither makes nor passes laws regarding amateur radio. It does, however, comprise a large segment of the radio amateurs in this country and Canada. Representing nearly half the ham population of this country, it is our strongest single voice for amateur radio. Indeed, there is really no other.

I have always been proud of my *organization and proud that I am a part of ARRL. Many thousands of you have joined me in your membership support of our League. Now it is time that we speak out loudly and clearly and let others know that we are, indeed, proud of our society.*

— James P. Gillespie, W4LQC/W8BKK

Kudos to Brother W4LQC. Rarely, if ever, has it been put better, more succinctly, or more to the point.

The small, blatant voice of dissension is, unfortunately, always much louder — and thus more apparent — than the big but soft, quiet voice of pride. This is true in national affairs, in family matters, and in the affairs of an organization like ARRL. It just seems to be our nature as the human animal: we are quick to damn and slow to praise — and what is good we take for granted.

The trouble is that this can create some erroneous impressions. Nearly every American is an honest, law-abiding citizen. Most teenagers are responsible, conscientious youngsters. Most college students are serious, eager to learn and advance both personally and as a contribution to their chosen field of endeavor. Yet these facts are not always apparent; at least, you'd never acquire them by reading most of today's front-page newspaper stories.

So it is with an organization like the League. Amateur radio has unique characteristics and requirements, and amateurs have an unusual, personal stake in organized representation. We hams are more directly involved in what our organization does or does not do than are participants in most other leisure activities. Therefore we not only have strong opinions but we frequently can and do express them forcefully. And in ham radio we have the medium for instant communication of our personal views, be they serious, rational discussions — or irresponsible soapboxing, which through human nature often draw the biggest crowd of listeners/participants.

The League expects its share of brickbats and bouquets — especially the former. If we at Hq. did not get a few now and then, we would know we just were not doing our job, for no democratic organization can — or should expect to — please everyone *all* the time. What it must attempt to do is apply its organizational resources and processes effectively, its best skills and judgments, in order to represent and reflect the best interests of the group as a whole.

The catch is that what are indeed the "best interests" of the group as a whole are rarely seen or understood — let alone agreed upon — in the same way by everyone.

Each ARRL director is nominated and elected by the members in his division (a process now under way in half our divisions — see page 74). As your representative in determining policies and guiding the affairs of the League, the director's job is to reflect your wishes and at the same time exercise his best judgment in what he does. How well he succeeds depends in large measure on how thoroughly he is able to find out what his constituents think and how they feel, interpreting these attitudes and opinions to the Board itself, and, finally, communicating the results to his division members.

By and large, almost all amateurs agree that the 50-year record of ARRL accomplishment for and in behalf of amateur radio is a distinguished one. During those years there have been many controversial issues, and associated vociferous discussions while the subject was live; once it became history, however, it became a part of the progressive accomplishments of the past.

There have always been critics — and there always should be. Differences of opinion, if at least reasonably rational, are not only helpful

(*Continued on page 150*)

League Lines . . .

The Waters Report (May QST) indicated apathy as the principal reason why more hams are not club or League members. So a membership campaign, based on a cooperative effort with affiliated clubs, is in the works. September will see the launching of "HAMQUEST 67," stressing the vital amateur/club/ARRL triangle. Full details will shortly be enroute to all clubs; make sure your secretary gives it a #1 spot on your meeting agenda. Clubs need the active support of every amateur--and so does ARRL.

Reprints of the two-part (April-May) WA6FQG article on radio interference have been prepared by Hq. and sent, through the courtesy of the Edison Institute, to several hundred major electric utilities-- with the suggestion they might find the procedures helpful in handling their own complaints on r.f.i. Copies have also gone to affiliated clubs--another League service, and another reason all hams should be members of a local club as well as ARRL.

And did you know that all ARRL affiliated clubs may use the extensive Hq. library of training films, slides, film strips, tapes and quizzes? The only charge is return postage. Has your club used any of the fine items which include popular films on such things as standing waves, RTTY, transistors? If your secretary has mislaid the list of available items, write for another and take advantage of this ARRL service. No freeloaders here--affiliated clubs only.

After unavoidable delays, the new Operating Manual is finally rolling and should be available in late autumn. In addition to collaborating with other amateurs and of course the Hq. staff, author George Thurston, W4MLE, has drawn heavily on his experience as a Section Emergency Coordinator in hurricane-prone Florida and as a general net operator and n.c.s. as well as on his professional skills as a writer-reporter, to produce what we think is going to be a valuable--indeed, necessary--addition to every ham shack. Watch for it.

We know when we've goofed. A sufficient number of members complained about the intended dropping of the phone DXCC certificate (and badgered their directors) to cause a reversal of the DXCC committee decision. Who says there ain't no democracy?

A two-week frequency-allocations seminar, with many foreign government officials in attendance, will be conducted in Geneva during September under the auspices of the International Telecommunications Union. As in other areas potentially vital to our interests, the cause of amateur radio will be represented by the League through attendance of Hq. staffer Dick Baldwin, W1IKE.

The "spirit of FD" bonus was a smashing success. Nearly every log received included newspaper clippings, or other evidence of good local public relations, for the extra credit. FB, gang!

The All-Mode Amplifier provides front-panel control for the bias voltage, making it possible to change from Class AB_1 to Class C operation with minimum effort.

An All-Mode Amplifier for 2 Meters

Stable Operation with 6146B Tubes

BY DOUG De MAW,* W1CER

With the ever-increasing emphasis on s.s.b. operating, v.h.f. enthusiasts are becoming more interested in the use of linear amplifiers than they were in past years. For reasons of simplicity and economy, many owners of low-power, 2-meter transceivers have expressed their desire to boost the transmitter power by adding a linear amplifier to the existing equipment. The amplifier described in this article was designed to fill the needs of such operators. Readily available components are used throughout the unit, in response to the many letters we have received from amateur operators who cannot justify the cost involved through the use of the more exotic (and somewhat expensive) tube types. Although 6146Bs cannot provide high levels of r.f. power, they will permit a significant increase in transmitted signal when used with such units as the popular Heath TWOer. By operating the All-Mode Amplifier under Class-AB_1 conditions, and exciting it with a "Benton Harbor Lunchbox" (or equivalent), a signal increase of 10–15 decibels should result. Used as a Class C amplifier, driven by a Gonset Communicator or exciter of comparable power, the amplifier is capable of delivering a 75-watt c.w. signal. The amplifier can also be used in connection with a low-power s.s.b. exciter, and should produce approximately 75-watts output, p.e.p.

Careful attention was given to circuit stability, during the design and final testing of the unit, to provide trouble-free operation on all modes. As is the case with all linear amplifiers, the input signal to the unit must be clean in order to assure proper operation.

* Assistant Technical Editor, *QST*.

About A.M. Linear Operation

A linear amplifier used to boost an a.m. signal is by no means a magic "cure-all" where efficiency is to be considered. Such an amplifier will justify its use when it is driven by a low-power exciter. Although 6146s do a creditable job below 60 Mc., they are not monuments to efficiency when used at 144 Mc. They do operate quite well in linear-amplifier service on 2 meters, providing approximately 25 watts of carrier output. It is important to remember that you cannot secure more than 25 to 35 per cent of your power input, as carrier power output, when operating a Class AB_1 linear on a.m. Exceeding these boundaries will result in plate saturation of the amplifier during the modulation cycle, causing distortion and shortened tube life.

When operating such an amplifier under s.s.b. conditions, peak-envelope efficiencies as great as 70 per cent are possible, making the amplifier somewhat more attractive to the user. Since it is necessary to derate the 6146B at 2 meters (28 per cent), a 25-watt carrier is about the best we can expect during a.m. operation. The experienced operator can juggle the operating parameters of this amplifier and secure slightly greater output. The voltage and current values given later are tailored to permit conservative trouble-free operation.

The R. F. Section

Electrically, there is nothing unusual about the configuration of the amplifier. Two 6146Bs are used in push-pull with a self-resonant grid circuit. The latter eliminates the need for bringing a tuning control out through the front panel.

Many 2-meter operators using low-power transmitters have shown an interest in a.m. linear amplifiers. The equipment described in this article uses a pair of 6116Bs and makes possible a significant increase in signal level to the low-power a.m., c.w. or s.s.b. operator. A quick change from Class AB_1 to Class C operation is possible, offering additional power output to the c.w. enthusiast.

The input capacitance of the tubes serves to establish resonance in the grid tank, resulting in a broad-band circuit which makes it easy to move from one part of the band to another. A 25-pf. capacitor is in series with the return side of L_1 to help tune out reactance in the line.

The stability of the circuit is excellent and is made possible by careful bypassing at critical points. A decoupling network, consisting of the screen bypass capacitors and RFC_2 and RFC_3, aids in stabilizing the amplifier. Neutralizing stubs are brought up through the chassis and dressed near the sides of the tube envelopes as shown in Fig. 1. To further reduce the chance for instability, Pins 1, 4, 6, 7 and 8 of the 6146B sockets are returned to ground by using short lengths of ¼-inch-wide copper strap at each pin. Examination of Fig. 3 will show how this is done. The rotor of the plate tuning capacitor, C_1, is not grounded, which permits the use of a close-spaced unit. This prevents the high voltage from arcing across the plates to ground, and further assists in stabilizing the amplifier through reduced lead inductance. C_1 is mounted on a piece of epoxy-resin board, which also supports the ⅝-inch-diameter plate-tank lines. A piece of polystyrene sheet stock would serve equally well.

The output link, L_4, is located below L_3 and has a tuning capacitor, C_2, in the return side. This permits proper loading of the amplifier's output circuit — essential to correct operation of linear amplifiers. An additional measure was taken to assure good tank-circuit efficiency through improved Q. This was accomplished by constructing L_3 from sections of ⅝-inch-diameter copper tubing and standard plumbing elbows — available from most hardware stores. The use of large diameter tubing reduces plate-tank drift caused by heating, while offering improved tank circuit Q through greater surface conductivity. A final step toward improved amplifier efficiency was taken by providing forced-air cooling which is directed against the tube envelopes and the oversize heat-dissipating anode connectors.

Construction

Since the power-supply section of the amplifier is of conventional design, there is little point in discussing it in detail. A more compact (and less expensive) unit would be possible by substituting a Thordarson 26R36 power transformer for T_1, T_2 and T_4. The components which are listed in the text were used because they were available in the author's junk box.

The linear amplifier is built on a 12 × 12 × 2-inch chassis. The chassis, panel and matching cabinet are homemade units — resulting in off-standard sizes. A suitable substitute of commercial origin would be a Bud C-975 panel-cabinet assembly and a Bud AC-414 chassis. If a cabinet is not used to enclose the assembly, it would be wise to place a perforated shield cover over the cooling fan and r.f. section of the chassis, to prevent accidental contact with the high voltage. The shield will also help to confine the r.f. energy and thus reduce radiation losses from

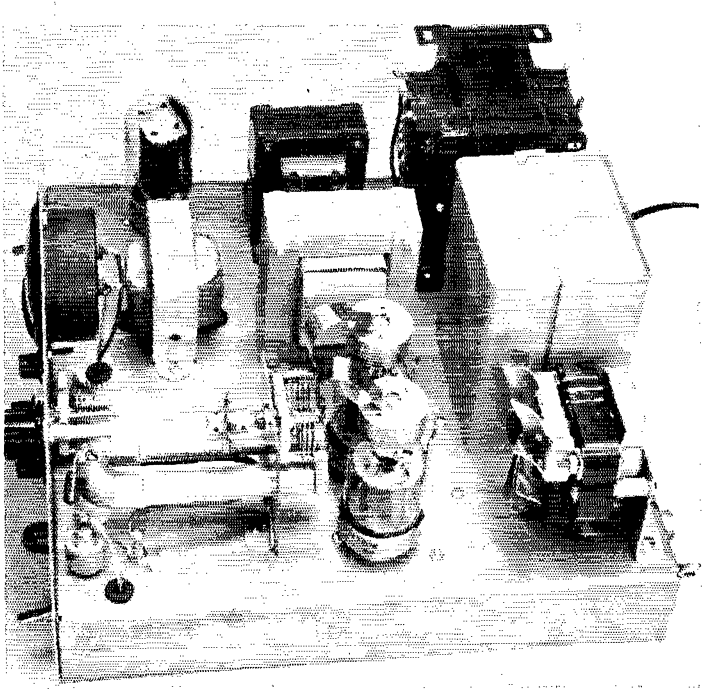


Fig. 1 — Top-chassis view of the 2-meter amplifier showing construction techniques and general layout.

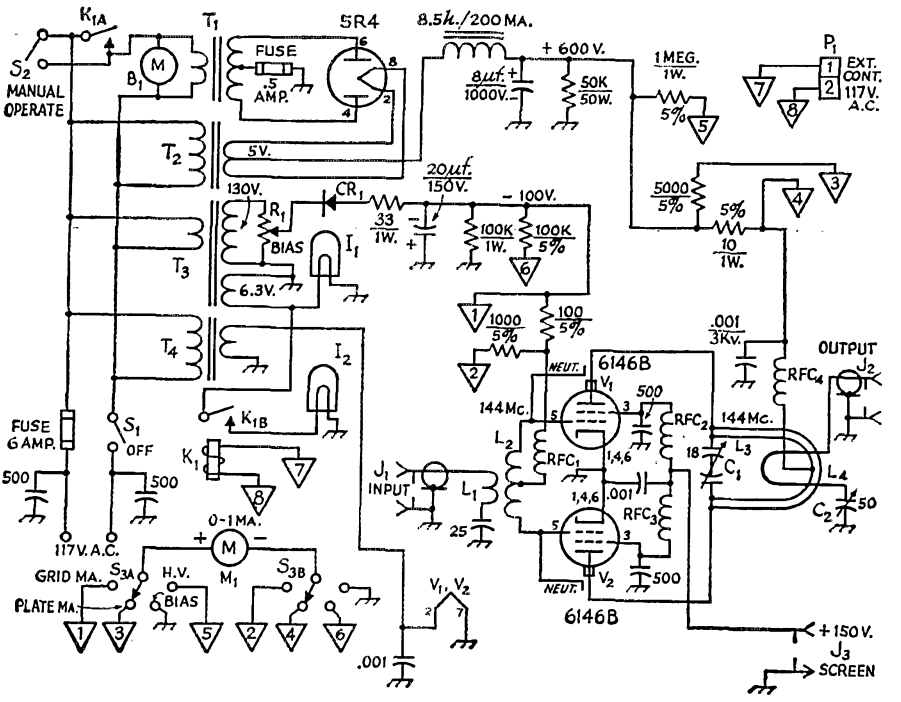


Fig. 2—Schematic diagram of the All-Mode Amplifier. Fixed capacitors are disk ceramic except where polarity indicates electrolytic. Unless otherwise indicated, fixed resistors are ½-watt composition. The shield connections (Pin 8) of the 6146Bs should be grounded to the chassis. Except as indicated, decimal values of capacitance are in microfarads (µf.), others are in picofarads (pf. or µµf.). Resistances are in ohms; K = 1000.

C1—18-pf.-per-section butterfly (E. F. Johnson 167-22 with 2 rotor and 3 stator plates removed from each section).
C2—50-pf. variable capacitor (E. F. Johnson 167-3).
B1—115-volt a.c. cooling fan (Barber-Colman DYAB-6167-1 suitable).
CR1—Silicon rectifier (600 p.r.v., 300 ma.).
I1, I2—6.3 volt 150-ma. lamp (No. 47).
J1, J2—Coaxial chassis connector (SO-239).
J3—RCA phono connector.
K1—D.p.d.t. 115-volt a.c. relay, 15-amp. contacts (Advance PC2C115VA or equiv.).
L1—1 turn insulated hook-up wire, ¾-inch dia. over center of L2.
L2—5 turns ⅛-inch wide copper strip, ⅜-inch dia. x 2 inches long. Tap at 2½ turns.
L3—See Fig. 4B.
L4—Hairpin link made from No. 10 wire, 2¼ inches long × 1¼ inches wide (insulate with sleeving).
M1—0-1-ma. meter.
P1—2-pin male a.c. chassis connector (TV type).
R1—25,000-ohm wire-wound control, 4 watts.
RFC1, RFC4—1.8-µh. r.f. choke (Ohmite Z-144).
RFC2, RFC3—0.84-µh. r.f. choke (Ohmite Z-235).
S1, S2—S.p.s.t. toggle switch.
S3—Single section 2-pole, 4-position ceramic wafer switch (non-shorting).
T1—1300-volt (center-tapped) 200-ma. plate transformer (see text).
T2—5-volt 3-amp. filament transformer.
T3—125-volt 50-ma. and 6.3-volt 2-amp. power transformer.
T4—6.3 volt, 3 amp. filament transformer.

the tank circuit.

Input jack J_1 is located on the rear apron of the chassis and is connected to L_1 through a short length of RG-58/U coax cable. The link, L_1, is attached to a terminal strip which is located near the 6146B sockets. The grid coil, L_2, is fashioned from a length of ¼-inch wide copper ribbon, cut from a sheet of flashing-copper stock, and is supported between the grid pins of the tube sockets. The screen-grid voltage is brought in from outside the chassis via J_3, which is also located on the rear of the chassis. Small rubber grommets are installed adjacent to Pin 5 of each 6146B socket to permit the neutralizing stubs to be brought through the chassis. These stubs are 3-inch lengths of No. 14 wire, covered with insulating sleeving. They should be placed in the same plane as the anode elements of the tubes, and spaced about ⅛ inch away from the glass envelopes.

The plate-tank assembly of the amplifier is shown in Fig. 1 and can be preassembled on the 3 × 2¾-inch epoxy board. The plate lines are cut to a length of 4¼ inches, then fitted into a pair of ⅝-inch i.d. copper elbows. In order to obtain the 1⅛-inch center-to-center spacing between the plate lines, it will be necessary to saw a short length of stock from one of the elbows. The sections are next fitted together and soldered, and a hole is drilled in the center of the "U", to accommodate the solder lug to which RFC_4 is attached. After assembling the plate-tank mounting board, as shown in Fig. 4A, insert L_3 into the two ⅝-inch holes in the board. Mount C_1,

connecting the stator terminals to the plate lines with short lengths of ¼-inch-wide copper strip. The cold end of L_3 is supported above the chassis by a 1-inch steatite standoff insulator. Connection to the anode caps of the tubes is effected by soldering a pair of 3 × ½-inch wide strips of flashing copper to the top pair of stator posts on C_1. The free ends of the straps are then bolted to the anode connectors as shown in Fig. 1. The unusually large anode cooling caps were fashioned from the heat sinks contained on a pair of defunct 2C39A tubes. A pair of Bud TC-1920 heat-dissipating plate caps will also serve nicely. If the caps from 2C39As are used, it will be necessary to rebore the inner diameter to 0.375 inch so that the units will fit properly over the 6146B plate caps. A hole will have to be drilled in the top of the heat caps, then threaded for an 8-32 screw, to permit the copper straps to be attached to the tubes.

The output-tuning capacitor, C_2, is mounted on the front panel adjacent to L_3, and can be seen in Fig. 1. One end of L_4 is attached to the stator terminal of C_2, while the remaining end is passed through the chassis via an insulated feed-through bushing. A short length of RG-58/U coax cable is connected between the under-chassis terminal of the bushing and J_2 at the rear of the chassis. Be sure to ground the shield braid at each end of the coax cable. The remainder of the circuit wiring is not critical. One final word of caution: Use an insulated shaft between C_1 and the front panel, to prevent grounding the rotor.

Initial Adjustment

After the wiring has been completed, check the grid coil, L_2, for resonance by using a grid-dip meter. If the frequency is too high, compress the turns of the coil until the desired resonant frequency is secured. Conversely, if the dip occurs too low in the band, spread the turns until resonance occurs. By peaking the grid tank to 145 Mc., operation from 144 to 146 Mc. should be possible without significant reduction in power output from the amplifier. Next, check the plate tank for resonance at the desired operating frequency. The plate-tank tuning capacitor should be able to tune the circuit from approximately 130 to 150 Mc. If the upper frequency limit is found to be too low, shorten the flexible copper leads that connect the plate caps to the tank circuit. If the reverse condition exists, these leads can be lengthened until the proper tuning range is obtained. Make certain that both 6146Bs are in their sockets and connected to the plate tank when these checks are made.

The screen voltage for the 6146Bs is obtained from an external source. Since a Heathkit TWOER

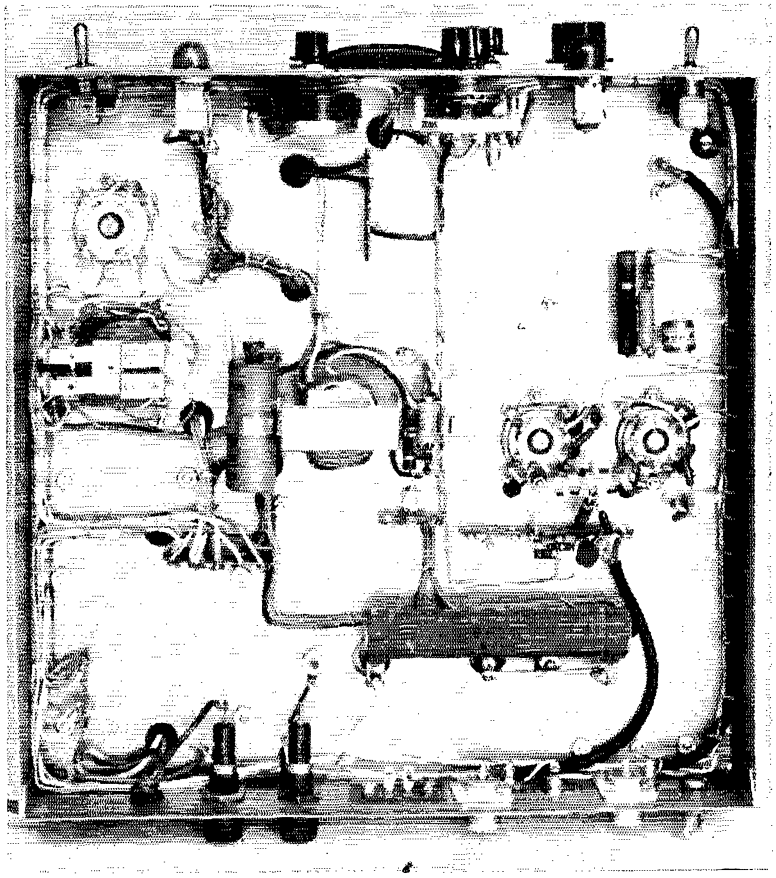


Fig. 3—Under-chassis view of the linear amplifier, showing the location of the components.

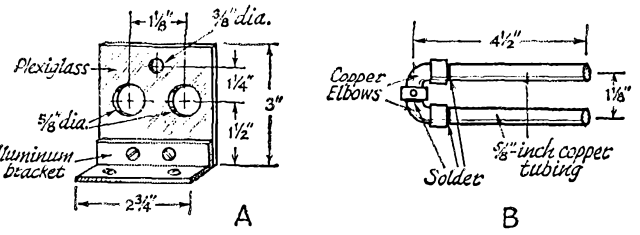


Fig. 4—Details of the insulated support block used in the plate-tank circuit are shown at A. At B, the dimensions are given for L_3.

was used as an exciter, the author installed a 0A2 voltage-regulator tube on the chassis of the TWOER, and connected it to Pin 2 of the TWOER's function switch through a 2000-ohm, 10-watt resistor. This provided 150 volts (regulated) which was fed to the screen circuit of the 6146B amplifier, through J_3. Similar arrangements can be made when other types of equipment are to be used as exciters. After making the necessary screen-voltage provisions, attach the exciter to the linear amplifier at J_1 with a short length of coax cable. A dummy load is next attached to J_2 and should be a noninductive 50-ohm type. A coaxial T-connector can be attached to the dummy-load terminal for sampling the r.f. output. An oscilloscope should be used while making these checks and can be connected to the dummy-load take-off point by using a half-wave coaxial balun transformer which is hooked to the vertical deflection plates of the scope.[1]

AB_1 Tune Up

Turn on the filament switch and allow the 6146B heaters to warm up for approximately 3 minutes. Switch the meter to read plate current, and without excitation being applied, turn on the plate voltage. Since the screen voltage will have to be applied during this part of the test, the exciter will also have to be placed in operation. To prevent r.f. excitation from occurring, simply disconnect the coax input cable from J_1. Next, adjust the bias control, R_1, until the amplifier plate current reads 25 ma. This will be the no-signal plate-current value for Class AB_1 operation with this unit. At this point, apply r.f. drive to the amplifier by connecting the exciter output cable to J_1. Supply sufficient drive to bring the 6146B resonant plate current to 100 ma., with the amplifier loaded as heavily as possible by adjustment of C_2. When tuning C_1 through its range, the dip in plate current should be minor (about 5 or 10 ma.). If this condition cannot be met, turn the power off and move L_4 closer to L_3. Repeat the process until sufficient coupling to the dummy load is achieved. With the amplifier operating, switch to the grid-current position and observe the meter reading. There should be *no* indication of grid-current flow. If too much drive is available, bringing the plate current to a figure above 100 ma., slight detuning of the exciter may be necessary. In cases where this is not possible because of excessive drive availability, a swamping network can be placed between the exciter and the input to the amplifier. A single No. 47 pilot lamp (or series of such bulbs) will serve this need. The amount of swamping will have to be determined experimentally.

[1] "Hints & Kinks," *QST*, August, 1965.

At this point, it would be wise to check the amplifier for proper neutralization. Remove the screen voltage by disconnecting the source at J_3. With a sensitive diode detector circuit attached to the output of the amplifier at J_2 (Fig. 2), apply drive and plate voltage to the unit. Turning off the plate voltage each time an adjustment is made, vary the spacing between the neutralizing stubs and the 6146Bs until a null is detected on the indicating device. When no further reduction in r.f. feedthrough can be obtained, the amplifier can be tested under a.m. conditions. If an oscilloscope is available, the waveform should be observed while the exciter is being modulated. Vary the exciter's audio level until 100-percent modulation is evidenced. Examples of proper waveform patterns can be found in the *ARRL Handbook*, Chapter 11.[2] After the correct operating conditions are established, the amplifier can be given an on-the-air check. Adjusting the amplifier without the aid of an oscilloscope is a somewhat hit-and-miss process. If the waveform cannot be monitored, adjust the modulation level of the a.m. exciter until a slight kick in amplifier plate current is noted, then reduce the audio gain to the point just below where plate-current flicker occurs. On-the-air checks from other amateurs equipped with selective receivers will assist in determining a satisfactory setting for the audio level. Tight coupling to the antenna system is vital and will aid in the prevention of "flat

[2] For additional information see Tilton, "Increasing Power in the V.H.F. Station," *QST*, September, 1964.

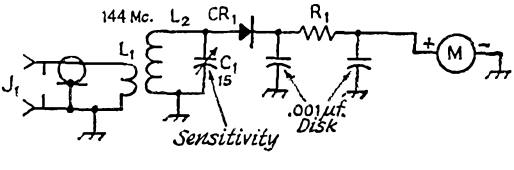


Fig. 5—Schematic diagram of the neutralizing indicator. This unit will also serve as a field-strength meter.

C_1—15 pf. midget variable capacitor.
CR_1—1N34A germanium diode.
J_1—Coax chassis connector (SO-239).
L_1—1 turn insulated wire, ¾-inch dia. over cold end of L_2.
L_2—5 turns No. 20 wire, ⅝-inch dia. × ¾ inch long.
M—0–100 microammeter.
R_1—3300 ohms, ½ watt.

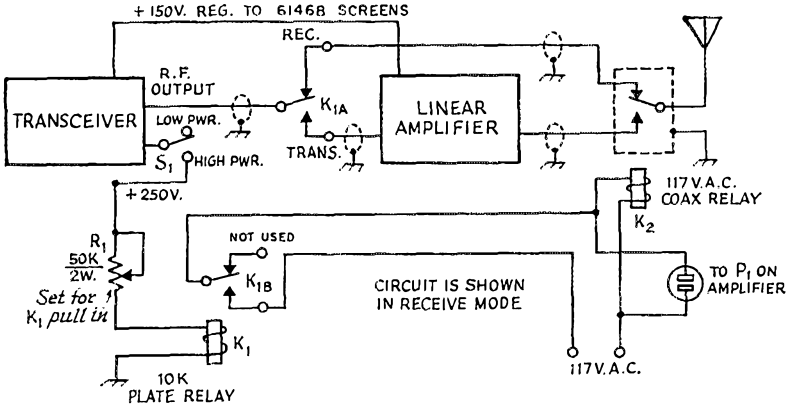


Fig. 6—Block diagram of suggested control circuit for use with the All-Mode Amplifier when transceivers are used as exciters. Switch S_1 permits the linear to be placed in standby if low-power operation is desired. Coax cable should be used in all r.f. interconnecting circuits. (Control voltage for K_1 can be taken from accessory sockets of some transceivers.)

topping." For s.s.b. use, adjust the amplifier for a resonant plate-current reading of 100 ma. (exciter in tune position), still maintaining tight coupling to the antenna system. Waveform monitoring will be required when establishing the proper drive level from the s.s.b. exciter, once the carrier is suppressed.

Class C Operation

When using the amplifier in the Class C mode, an exciter capable of delivering between 5 and 8 watts output will be required. The broad-band grid tank used with the 6146Bs requires more drive than the usual high-Q network. A Gonset Communicator should suffice in this application. If c.w. operation is planned, a keying jack will have to be added to the exciter.

The bias on the 6146Bs should be set at −70 volts. The screen voltage can remain at 150 volts and does not have to be regulated. The control-grid current should be set at approximately 5.5 ma. The plate current should be adjusted (at resonance) to read 200 ma. maximum. If a.m. operation is desired, while using the amplifier in the Class C mode, an outboard 60-watt modulator can be used. Modulated voltage will have to be applied to both the plate and screen circuits of the amplifier. Alternately, controlled-carrier screen modulation can be applied at J_3 while limiting the screen supply to 75 volts (maximum) on voice peaks.

Control Circuits

With some transceiver circuits, the receiver capability may be sufficiently good to merit using it in addition to utilizing the transmitter section. If this is planned, a circuit of the type shown in Fig. 6 will be useful. This will permit the amplifier to be bypassed by the antenna during the receive period. A sensitive relay, K_1, is connected to the low-voltage supply in the transceiver through a potentiometer which is adjusted to permit the relay to pull in when the exciter is activated. The relay contacts are used to activate the remaining relays in the control circuit.

The amplifier's relay, K_1, Fig. 2, must be activated by applying 115 volts a.c. from an external source. The manner by which this is accomplished will depend upon the control system that is chosen by the operator. Switch S_2, Fig. 2, permits manual operation of the amplifier.

The metering circuit permits reading bias voltage, grid current, plate current and plate voltage. A 0-1-ma. meter is used to provide the following ranges: bias, 0-100 volts; grid current, 0-10 ma.; plate current, 0-500 ma.; plate voltage, 0-1000 volts. If a 5-position meter switch is available, the constructor may desire to make provisions for measuring screen-grid current. If this is done, a 0-25-ma. scale will be sufficient.

In Conclusion

The All-Mode Amplifier has given trouble-free operation and good audio quality was evidenced when it was used as an a.m. linear. No instability has been detected and tube life is normal — aided by the forced-air cooling system. By series-connecting the tube filaments, or using 12-volt equivalents for the 6146Bs, mobile operation with this amplifier is possible. A solid-state power supply could be substituted and a d.c.-type cooling fan could be used in place of B_1. An a.m./c.w. exciter, tailored to use with linear amplifiers on 2 meters, was described in September 1965 *QST*. How about it? Does your QRP rig need a boost? QST

The Easy Box

Home-Made Cabinets With Hammer and Vise

TIRED of the same old utility box designs? Here's information on how to form your own cabinets with ordinary workshop tools. All that's needed is a set of sheet metal shears, a vise, and a rubber- or rawhide-headed hammer. The boxes can be made from aluminum, copper, brass, or galvanized iron, depending on choice of the builder. Heavy-gauge stock produces a cabinet with good rigidity. Miniature enclosures can be formed from 18- or 20-gauge material.

The cabinet style shown in Fig. 1 is the outgrowth of an immediate need for a box in which to build an s.w.r. bridge. To keep the cost low, and have a cabinet with a recessed panel, it was decided that "home-brewing" would be the most practical solution. Happily, the effort produced a simple enclosure which took about 30 minutes to fabricate.

Layout and Forming

After deciding what size the box will be, lay out the pattern for the bottom half (Fig. 1B) with a square and scribe, scratching marks on the metal where the bends will be made. Form the bends marked *c* by placing the stock in a vise and warping the metal around the jaws of the vise until a 90-degree angle is secured. When forming bends with large pieces of metal, the stock can be warped over the edge of the workbench by clamping it between the surface of the bench and a piece of angle iron. The angle iron can be held in place with C clamps. Next, form bends *b* similarly. If a sharp bend radius is desired, a rawhide hammer can be used to flatten the metal.

Before forming the cover, part 2, measure the outer dimensions of the completed part 1. Use these dimensions when laying out part 2. The clinker here is that you will have to make bend allowances for the thickness of the metal, at *d*, so that the lid will fit the bottom half of the box. In other words, if the metal thickness is 1/16 inch, allow an additional 1/16 inch of metal for each bend made. A little practice will reveal how easily this can be done.

An angle bracket (item *e*, Fig. 1C) is bolted to each side of the lid with 4-40 hardware. The lid is attached to the lower part of the box by securing the angle brackets to part 1 with No. 6 sheet-metal screws. If additional strength is desired, sheet-metal screws can be used at the points marked *a*. If heavy-gauge metal is used, this should not be necessary.

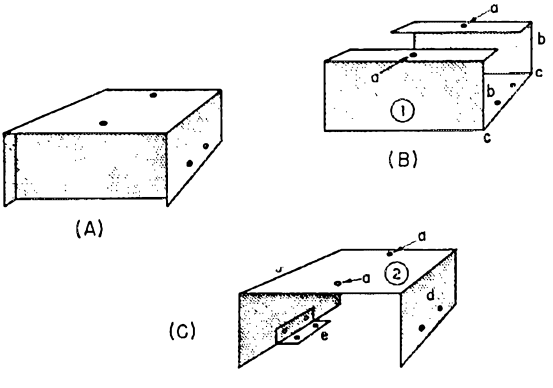
Finishing Touches

Boxes of this style are handy for housing field-strength meters, s.w.r. bridges, transmatches, and similar items. The appearance of such gear can be enhanced by painting the cabinet and labeling the controls with decals. A two-tone finish will add to the professional appearance of the equipment.

Make certain that the bare metal is free of grease and dirt before painting it. A coating of zinc chromate will be useful as a primer, enabling the finish coat of paint to adhere to the cabinet.

Zinc-chromate and finish paints are available at most hardware stores. They are sold in spray cans, making the job of painting a simple chore. If you're interested in having your equipment look a bit more original, try the Easy Box!

— *W1CER*



Details for forming the Easy Box. The completed box is shown at A. Information concerning parts B and C of the drawing is given in the text.

Wide-Range Capacitance Meter

Direct-Reading Instrument with Linear Scale

This easily constructed meter will take the guesswork out of determining the value of a capacitor by one of the various coding systems that have been in use from time to time. It should be particularly attractive to those who depend frequently on surplus or bargain components.

BY JAMES W. GODING,* VK3ZNV

THERE are a number of different ways of measuring capacitance. Perhaps the most common one is the bridge method, which may be very accurate over a wide range. However, the capacitance bridge cannot be easily constructed by the amateur, since it needs a hand-calibrated nonlinear scale. Another way is the resonance method, where the frequency of a tuned circuit made up of the unknown capacitance and a precisely known coil inductance is measured and the capacitance found by calculation. This method is slow and tedious, and not very accurate, but is quite good for small values of capacitance. Various direct-reading capacitance meters have appeared from time to time, such as the Tektronix which works by measuring the difference in frequency between two oscillators, one of which is controlled by the unknown capacitance while the other is fixed in frequency. Meters operating on other principles have been described in amateur magazines. However, most of them have two limitations:

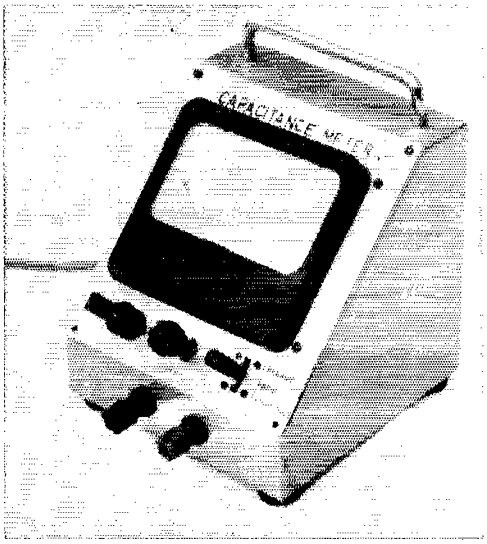
1) The scale is nonlinear and requires hand calibration.

2) Only a relatively small range of capacitance can be measured.

While the meter described in this article has its limitations, it will measure capacitance quickly and accurately over a wide range. It has a linear scale, and covers values from 10 pf. to 100 μf. in eight ranges. The instrument is quite simple, is uncritical in construction, and uses standard and easily obtainable parts throughout.

This instrument has been found particularly useful in measuring the values of mica capacitors with obscure color codes. A large number of capacitors in disposals equipment are color-coded, and are useless unless their values can be established. Since at least six different codes have been used from time to time, the only really satisfactory way of evaluating them is by direct measurement.

* The Worcester Foundation for Experimental Biology, Shrewsbury, Mass.



This direct-reading capacitance meter built by VK3ZNV measures capacitances from a few picofarads up to 100 microfarads. Controls from left to right are range switch, zero-set, and function switch. The capacitor of unknown value is connected across the terminals below.

Theory of Operation

The meter consists of a voltage divider made up of the unknown capacitance and a fixed resistor, across which a constant alternating voltage is applied. The voltage across the resistor is amplified and measured on a meter calibrated in capacitance. Consider the circuit shown in Fig. 1. A capacitor of value C farads is connected in series with a resistor of value R ohms, and an alternating voltage of V volts

applied across the combination. Let the frequency of V be f cycles per second, and let the voltage across R be V_R.

Now the impedance of the resistor at any frequency is R ohms. The reactance X_C of the capacitor at f is given by:

$$X_C = \frac{1}{2\pi fC} \text{ ohms.}$$

The total impedance of the divider is given by:

$$Z = \sqrt{R^2 + \left(\frac{1}{2\pi fC}\right)^2} \text{ ohms.}$$

Since the combination is a simple voltage divider,

$$V_R = \frac{VR}{Z}$$

$$= \frac{VR}{\sqrt{R^2 + \frac{1}{4\pi^2 f^2 C^2}}}$$

$$= \frac{2\pi fRCV}{\sqrt{4\pi^2 R^2 f^2 C^2 + 1}}$$

By squaring and rearranging,

$$C = \frac{V_R}{2\pi fR\sqrt{V^2 - V_R^2}} \qquad (1)$$

If V_R is small relative to V, the expression may be written:

$$C \cong \frac{V_R}{2\pi fRV} \qquad (2)$$

Then V_R is directly proportional to C. Thus, V_R may be measured and the meter calibrated in capacitance. It is clear that the error in assuming (2) from (1) increases as V_R increases (all other terms constant), and thus the inaccuracy of the meter from this source will be greatest at full scale. The range-selecting resistances are chosen so that V_R is about 3 per cent of V at full scale on each range.

Per cent error =

$$100 - \left(\frac{100\,V_R}{2\pi fR\sqrt{V^2 - V_R^2}} \times \frac{2\pi fRV}{V_R}\right)$$

$$= 100 - \frac{100\,V}{\sqrt{V^2 - V_R^2}}$$

If, as in the meter described, V_R = 200 millivolts and V = 6 volts,

$$\text{Per cent error at full scale} = 100 - \frac{6 \times 100}{\sqrt{35.96}}$$

$$\cong -0.06 \text{ per cent.}$$

This error is insignificant in comparison with other errors in the instrument, such as meter-movement inaccuracy and inaccuracy in the range resistors.

Leakage-Resistance Table

Capacitance Range	*Leakage Resistance*
10 pf.	3000 megohms
100 pf.	300 megohms
0.001 μf.	30 megohms
0.01 μf.	3 megohms
0.1 μf.	300,000 ohms
1 μf.	30,000 ohms
10 μf.	3000 ohms
100 μf.	300 ohms

This table shows the leakage resistance that will result in a 10-per-cent error in capacitance measurement at meter full scale for the range indicated.

The Circuit

The amplifier consists of a 6BL8 triode-pentode, followed by a 12AU7 cathode follower to provide a low-impedance source for the meter. To compensate for line-voltage variation and tube aging, a calibration control is included on the front panel. It is set by switching the range switch to CALIBRATE, and adjusting R_1 until the meter reads full scale. The other ranges will then be correct automatically, except the two lowest ones, which require zero adjustment.

The zero control balances out hum picked up by the input leads, which is significant on the two lowest ranges. A small variable amount of a.c. of opposite phase to the hum is applied to the grid of first stage via a capacitor, C_2, made of a couple of turns of insulated wire wound around a short unshielded portion of the input lead. The shield of this lead should be grounded only at the tube end to minimize hum. The required phase is found experimentally and, should the ZERO control fail to work correctly, the leads from the transformer should be reversed. This control is adjusted to give a minimum reading on the 10 pf. range when nothing is connected to the terminals, and allows a zero error of less than 0.5 pf. when adjusted correctly. Since the hum pickup changes when the instrument is put in its case, the hum control should be mounted on the front panel.

The function switch, S_2, has three positions: LEAKAGE, SAFE, and CAPACITANCE. The CAPACITANCE position is spring-loaded and, to measure capacitance, the switch must be held down. This prevents the meter movement from being damaged by large amounts of hum while the capacitor is being connected and the fingers are in contact with the terminals. In the SAFE position, a resistor is connected across the capacitor to discharge it after a leakage test. The meter diodes are not disconnected during a

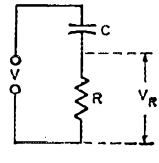


Fig. 1—Basic circuit of the direct-reading capacitance meter.

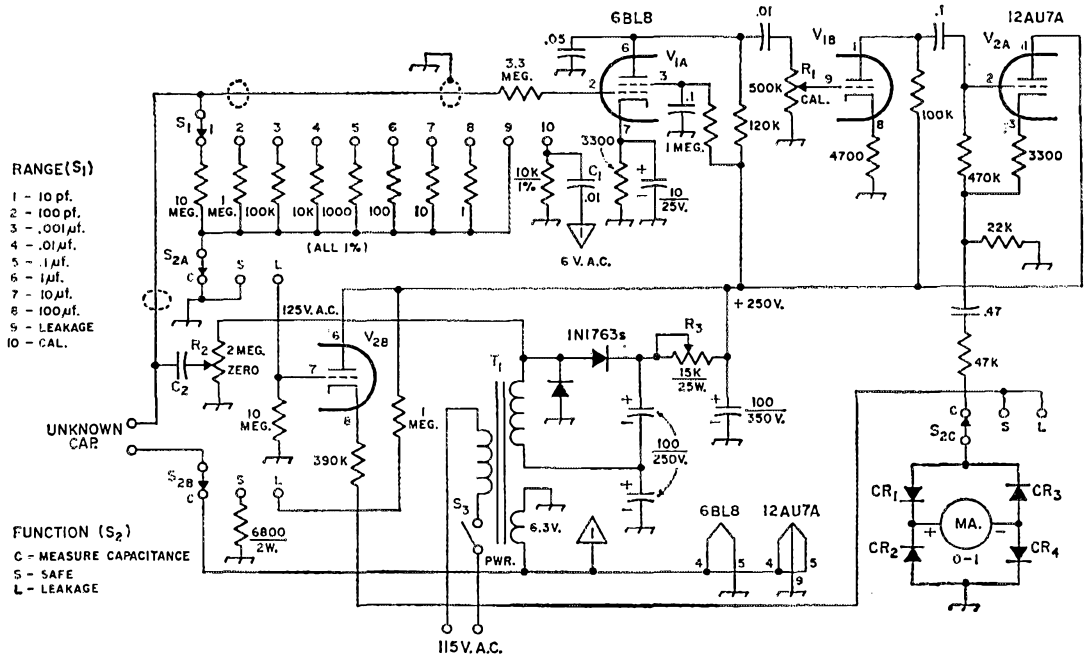


Fig. 2—Circuit of the direct-reading capacitance meter. Capacitances are in μf.; resistances are in ohms (K=1000) unless indicated otherwise. Capacitors not listed below are paper or Mylar except where polarity markings indicate electrolytic. Resistors are ½-watt unless indicated otherwise.

C_1—Silver mica, 1 per cent.
C_2—See text.
CR_1–CR_4, incl.—Any general-purpose germanium diode.
R_1, R_2—Linear control.
R_3—Slider-adjustable. Set for 250 volts output with load.
S_1—Single-section single-pole ceramic rotary switch (10 positions used).
S_2—Single-pole 3 position nonshorting lever switch, one position spring-loaded (Mallory-Grigsby 6M22134, one pole used).
S_3—S.p.s.t. toggle switch.
T_1—Power transformer: 125 volts, r.m.s., 50 ma.; 6.3. volts, 2 amperes.

leakage test because they have no effect on the circuit while d.c. is passing through them.

One unusual feature of the circuit is the 3.3-megohm resistor in series with the grid of the 6BL8 pentode. This resistor has no effect on the capacitance ranges, but serves to isolate the amplifier while leakage tests are made. It was felt undesirable to switch this point, as doing so would increase stray capacitance at this point. This would cause some inaccuracy on the lowest ranges.

To ensure that the amplifier is linear, a couple of precautions were taken in the design. The 47K resistor in series with the meter lead swamps out any nonlinearity in the meter diodes at low current. The cathode follower provides a low impedance source for the meter.

The 0.05-μf. capacitor from the plate of the 6BL8 pentode valve to earth was found necessary to prevent oscillation at high frequencies induced by the proximity of the input and output leads. It has almost no effect on the gain of the amplifier at line frequencies, but reduces it considerably at higher frequencies.

Leakage Measurement

One basic defect of this form of capacitance measurement is that a leaky capacitor gives a falsely high reading. For this reason a leakage test is included in the instrument. The approximate leakage for a 10-per-cent error at full scale is given in the table. However, this defect is only minor since:

1) The capacitance of leaky capacitors is generally unimportant, because they are usually discarded.

2) Although only a very small leakage will cause large errors on the 10-pf. range, most capacitors in this range have mica, ceramic or air dielectric and have very low leakage.

3) The capacitors which commonly develop leakage are the high-value paper-dielectric types, and even a few megohms leakage on the higher ranges has little effect.

The leakage tester consists of a triode biased almost to cutoff by its own large cathode resistor. The meter is placed in the cathode lead and measures the cathode current, which is negligible when there is no positive voltage on the grid. When any positive voltage is fed to the grid through a leaky capacitor, the tube starts to conduct, and the meter reads. The test is quite sensitive; 300-megohms leakage corresponds to about 10-per-cent deflection. However, a dead short across the terminals simply reads full scale and does not damage the meter or the tube.

Note that this check will not reveal leakage that may cause significant errors on the 10-pf. range. To provide a test sufficiently sensitive for this range would be beyond the scope of the simple nature of this instrument.

Since no polarizing voltage is provided, it may not be a good idea to measure electrolytic capacitors with this instrument, because there is 6 volts of a.c. across them when connected for measurement. However, in practice, I have measured electrolytic capacitors with apparently no harmful effects.

Procedure for Measuring Capacitance

Switch the meter on, and wait ten minutes or so for the instrument to warm up. Then switch the range switch to calibrate and adjust the calibration control until the meter reads full scale. Then switch to the 10-pf. range, and adjust the zero control for minimum reading with nothing connected to the terminals. Then connect the unknown capacitor and measure its leakage. If it is not leaky, its capacitance may be measured.

Start with the range switch on a higher range than the expected value of the capacitor, and switch down until the reading is as high as possible without slamming the meter. The capacitance may then be read directly from the meter. When using the meter for long periods, the calibration should be checked every half hour or so, depending on the line-voltage variations in your area. QST

• *Technical Topics*

Noise Figure and Receiver Noise

IN a recent letter to W2LVQ, regarding the latter's 2-meter converter article in *QST* for June, 1964, Donald Halford, W0JVD, Boulder, Colo., makes some points regarding the noise-figure concept. We quote in part: "While one may imagine an 'ideal receiver' that would 'make no sound whatever without an antenna connected,' it is almost always misleading to judge the noise figure of a v.h.f. receiver in this way. The hypothetical perfect receiver with a zero-db. noise figure could have any magnitude of noise output with its antenna disconnected, depending on the adjustment of the front end. The rest of the article is quite good, and my criticism is directed only at the closing paragraphs."

This points up the chance of error in a practice that is common in v.h.f. circles: listening for the noise increase when the antenna is connected to the converter front end. The degree to which this can lead to misconceptions about the receiver's performance depends on the frequency, among other things, since the amount of external noise that will show up when the antenna is connected drops off sharply with frequency in the v.h.f. range. At 50 Mc., the simple antenna on-off check will usually suffice, for external noise is so high that almost any receiver that is working well will show a considerable noise increase with the antenna on. At 144 Mc. and higher the situation is quite different.

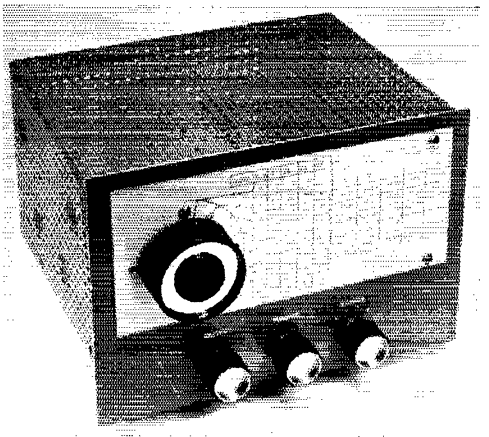
Unless yours is an extremely noisy location, you may have trouble telling whether the noise goes up or not, when you connect an antenna to your receiver, because only the best 144-Mc. front ends are capable of detecting external noise. Even small variations in front-end adjustment, which cause the noise the receiver makes to vary, can make quite a difference in the way the receiver responds to the antenna load. If the first stage is regenerative at all (and most stages are, when operated with no input-circuit load) it may make more noise with the antenna off than on. A better approximation at this frequency is to tune up for maximum noise with the antenna connected, and then short the first r.f. amplifier grid to cathode. This considers the receiver to "start" with the first grid, and lumps the entire input circuit including the antenna into the thermal noise source.

This procedure still doesn't "measure" noise figure. The only way that this can be done is with a noise generator, and even this can be suspect except as a means of comparing receiving systems. Unless the noise generator is one of the best laboratory types, and the person using it knows his way around with such devices, the results at frequencies above about 200 Mc. can leave quite a bit to be desired, if one wishes to quote real figures for receiver performance.

The simple noise generator provides a good start on receiver adjustment, at any frequency where its noise can be heard, but probably the best u.h.f. check of all, for most of us, is that provided by actual reception of a weak signal. To try to adjust a receiver, or compare two or more, in reception of distant signals is a frustrating business, as signal levels may vary at a rapid rate if the source is more than a few miles distant. A solution to this problem is afforded by a low-powered transistor oscillator-multiplier that can be put up somewhere in the radiation pattern of the antenna, and its output level adjusted so that it is just barely heard, with the receiver working well and the antenna aimed "on target."

Such a device provides an instant check on all components of the receiving system. If you can hear it you know you're in business; if you can't, you're in trouble. This, after all, is what we really need to know, in working on bands where occupancy is low and the best of receiving facilities is a must. — *W1HDQ*

V.F.O. Stability — Recap and Postscript



An Examination of Some Design Principles, Old and New

BY GEORGE GRAMMER,* WIDF

In the course of looking into some aspects of c.w. keying it became desirable to build an experimental v.f.o. for obtaining quantitative information on stability. While there is an extensive literature on oscillators, performance data of a kind that is of interest in the keying problem appear to be scarce. We set out, therefore, to get some figures in areas where they were needed.[1]

The experimental work uncovered a few things which, so far as the writer knows, have not been treated before. In addition, others were found not to have had sufficient emphasis placed on them. It therefore seems to be an appropriate time to review the principles of v.f.o. design and construction, with particular reference to frequency stability. Although the present article is concerned with vacuum-tube applications, a corresponding look has been taken at transistor v.f.o. operation, and those aspects peculiar to transistor oscillators will be discussed in a subsequent article.

Overall Approach

It would be pointless to assert that there is only one solution to the many problems in v.f.o. design. Examples of equally good results secured by alternate methods always can be produced. However, a choice of systems has to be made, and after considering the several conditions that must be met for good keying, the conclusion was reached that the conversion-type v.f.o. had enough advantages to overbalance its disadvantages.

In s.s.b. equipment, where the conversion system is a practical necessity, the tunable oscillator commonly operates in the neighborhood of 5 Mc., a frequency which also was suitable for our purposes. A guinea-pig v.f.o. therefore was constructed according to the skeleton diagram of Fig. 1. As it was intended to be a crystal substitute for transmitters in which frequency multiplication is used for getting on the amateur bands above 3.5 or 7 Mc., it was designed for primary output in the 3.5-Mc. band with provision for doubling frequency to 7 Mc. Thus it could replace both 3.5- and 7-Mc. crystals.

This, incidentally, is not the best way to utilize the conversion system, since instabilities are multiplied along with the frequency. However, it does not suffer in comparison with the non-conversion v.f.o. on this point.

A critical look at the transmitting v.f.o. under the right illumination brings some aspects of design and construction into different perspective. This article is specific on points that usually are treated only vaguely, gives a different slant on others that have become a matter of rote, and introduces new wrinkles for unearthing and curing defects that often go uncorrected.

* Technical Editor, *QST*.

[1] Along with the dearth of quantitative information, there is often no indication of the probable measurement accuracy when data *are* given. The measurements necessary to our work could be made to an accuracy within ¼ to 1 cycle per megacycle, and momentary phase shifts of less than a few degrees could readily be detected.

Multiplication of tuning rate on different bands is always a problem when frequency multiplication is used. An adequately slow rate on 28 Mc. requires an extremely limited tuning range on 3.5 Mc. A compromise was reached here by making use of inexpensive surplus crystals spaced at 25-kc. intervals in the conversion oscillator. With a tunable-oscillator range of about 30 kc. (for overlap) the tuning range is 200 kc. per crystal on 28 Mc., 150 kc. on 21 Mc., 100 kc. on 14 Mc., and so on. This fits actual operating practices pretty well from 7 Mc. up, but is restrictive on 3.5 Mc., where six crystals will cover only the first 150 kc. of the band.

Oscillator Requirements

Amateur operation is like that of no other service, in that it consists of relatively short periods of communication which are rarely on the same frequency for more than an hour or so, and usually much less. We move around in our bands, sometimes only a few kilocycles but more often over a considerably wider range, and we jump from band to band. What we need, then, is the best possible *short-term* stability.

The question of whether a v.f.o. will hold within some stated number of cycles over a period of weeks or months at an untouched dial setting is of little practical importance; the dial isn't going to be left alone for very long if much operating is done. However, a v.f.o. that has good short-term stability usually also will do very well in holding long-term calibration. In fact, it can do better than most read-out devices or the operator's ability to reset them.

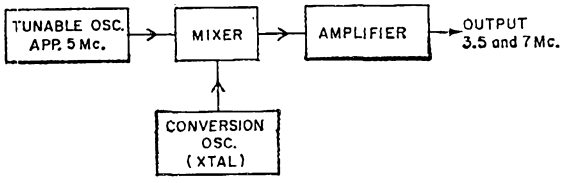


Fig. 1—Block diagram of the conversion-system v.f.o.

Causes of Instability

The principal causes of an unwanted shift in the frequency generated by an oscillator are:

1) *Voltage variations* — a change in the voltage applied to any eleWent of the active device, be it tube or transistor, is accompanied by a change in characteristics that reflects as a variation in frequency;

2) *Loading* — a change in the load on an oscillator changes its operating conditions and in turn causes the frequency to shift;

3) *Temperature* — the electrical values of all components vary with temperature, and these variations in turn affect the frequency; and

4) *Shock and Vibration* — these, too, cause changes in the electrical values of components or the circuit as a whole.

An exceedingly annoying effect, not readily classified, is an unpredictable sudden jump in frequency usually associated with minute instabilities in components (particularly fixed capacitors and resistors) or construction.

It is well established that the circuit-design feature of most benefit, especially in reducing the effects of voltage changes, is loose coupling between the tube and frequency-determining circuit. To make the most of this, the tuned circuit must have a high operating Q and the tube must have a high value of transconductance. If the loose-coupling principle is observed the rest is theoretically just detail. However, it is these "mere" details that make the difference between a good v.f.o. and a poor one.

The Oscillator Tube

All the oscillator circuits in common use are basically triode circuits, whether or not the tube has more than one grid. The widely used "hot-cathode" oscillator is generally a Hartley or Colpitts having the anode grounded for r.f. When a screen-grid tube is used as an electron-coupled oscillator, Fig. 2, the screen is the principal anode, with the plate helping out to an extent that depends on the form that the plate circuit takes. If the plate circuit is tuned to the generated frequency, the plate itself is partially disconnected from the oscillator circuit because of the plate-to-ground impedance of the tuned circuit.[2] Because slight detuning of this circuit reduces the impedance, detuning puts the plate more-or-less in parallel with the screen. The effect of varying an output tuning control, then, is to change the tube characteristics — inevitably accompanied by a change in the oscillator frequency.[3]

Very frequently the plate circuit is nominally a resistor or r.f. choke, as in Fig. 3. This "untuned output circuit" is actually a capacitive reactance (consisting of the oscillator tube's output capacitance, the following tube's input capacitance, and stray capacitance in the circuit) in parallel with the input resistance of the following amplifier. Unfortunately, tuning the following tube's plate circuit usually causes a change in its input capacitance or resistance, or both. This is turn affects the oscillator frequency, since the e.c.o. plate load is not constant.

What this adds up to is that the electron-coupled oscillator *by itself* is not the answer to all stability problems associated with reaction of following-stage operating conditions on the oscillator frequency. The clue to effective isolation lies in the use of a buffer amplifier so designed that nothing that may happen in its output circuit can have any effect whatsoever on the os-

[2] For this reason, the rated transconductance of a tetrode or pentode does not constitute a real figure of merit for the tube as a stable oscillator in a circuit of this type. The grid-to-screen transconductance, which is not published, is a highly important factor.

[3] Capacitive coupling between the plate and grid, another cause of frequency variations with plate-circuit tuning, often is blamed for the *entire* plate-tuning reaction, although it is only partly responsible. Stray coupling between the output and oscillator circuits also can be harmful, but the remedy for this is obvious.

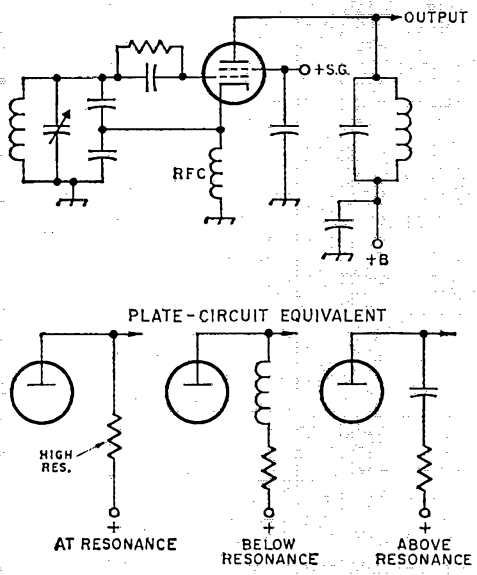


Fig. 2—Electron-coupled oscillator with tunable plate (output) circuit. The three possible equivalents of the tunable circuit are shown in the lower drawings. Since the a.c. component of plate current has to flow through the plate tank, the effect of varying the plate tuning control is to change both the amplitude and phase of the plate's contribution to the oscillator operation.

cillator. Practically, this means that the buffer must be used for stability *only*, not for power output. It should not be asked to develop more than a couple of volts of r.f., and that only into a circuit whose constants are not subject to variation. Gain, either in power or voltage, is the last thing that should be expected of a true buffer.

A pentode amplifier — one designed for use in receiving applications and therefore having very low plate-grid capacitance — will provide well-nigh perfect isolation in a properly-designed circuit. Tube structures suitable for this are to be found in several dual tubes, the other structure being a triode which, in general, will have excellent characteristics as an oscillator. A medium-μ triode and sharp-cutoff pentode make a good combination; the latter usually has lower grid-plate capacitance than the remote-cutoff type. Better overall performance can be expected from such a pair than from the tetrodes or pentodes commonly used singly as e.c.o.s. No more components are needed than for the e.c.o., and there is still only one tube envelope.

After comparing characteristics of the various triode-pentode types available, the 6U8A was selected for the v.f.o. discussed here. It has a high-transconductance triode[4] and a pentode section with as low grid-plate capacitance as any.

The Oscillator Circuit

Theoretically, equivalent results can be obtained from any of the several basic oscillator circuits. The writer prefers the Colpitts, since it allows the use of large shunting capacitances directly across the tube elements. The capacitance values are usually about the same in either the straight high-C circuit or the series-tuned version; in this case, the high-C arrangement was used in the thought that a relatively small coil could be made more resistant to vibration. In the actual circuit, Fig. 4, the number of components in the tank has been reduced to a minimum; the smaller the number, the fewer the chances of running into random frequency variations of the type mentioned earlier.

One way of looking at the question of light coupling between the tank circuit and the tube is that the tube must see a low impedance, especially as viewed from its plate circuit. That is, the effective amplification in the tube must be low — just great enough to sustain oscillation. For this reason the L/C ratio must be low, and in Fig. 4 the coupling is further reduced by making the plate section of the capacitance, C_2, larger than the grid section, C_1. Although the effect of varying the capacitance ratio was not investigated extensively, the 2-to-1 ratio is a quite satisfactory one for the 6U8A triode, as judged by results.

Hum Modulation

One undesirable feature of the hot-cathode circuit arrangement is that heater-cathode leakage or capacitance often causes frequency modulation of the oscillator at the supply-frequency rate. Although this becomes more apparent at the higher multiples of the oscillator frequency, it is sometimes observable even at the fundamental. It can be avoided by grounding the cathode, as is done in Fig. 4. If only a small frequency range is to be covered the tuning capacitor, C_3, can be simply a "vernier" across one or the other of the main tank capacitors; it will not affect the capacitance division to any noticeable extent. In this case it is across C_1. If a larger tuning range must be covered the tuning capacitor could be across the whole tank. This would require that its rotor be insulated from ground. Alternatively, a split-stator capacitor could be used.

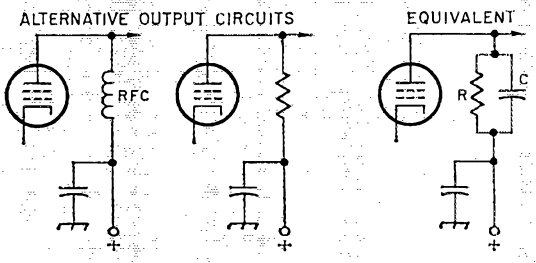


Fig. 3—"Untuned" output circuits for the e.c.o. The equivalent is the same in both cases, since an r.f. choke (at its useful frequencies) acts as a small capacitance in parallel with a large resistance. In the circuit at the right, R is composed of the plate resistor (or the choke equivalent resistance) in parallel with the input resistance of the following stage. C includes all tube and stray capacitances.

[4] Transconductance figures given in the tube data are not strictly comparable from type to type, since no two tubes seem to be measured under the same conditions. The published values therefore should not be taken too literally.

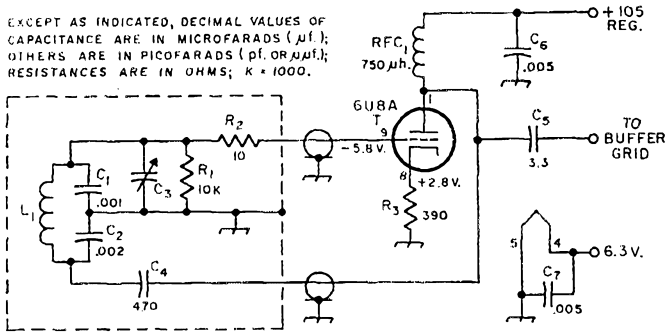


Fig. 4—High-C Colpitts oscillator. See text for discussion of functions and values. Dashed line represents the shield box shown in Fig. 5.

C_1, C_2, C_4, C_5—Silver mica.

C_3—Capacitance range dependent on bandspread range desired. Capacitor in Fig. 5 is 50 pf. (Millen 19050).

C_6, C_7—Disk ceramic; value not critical, but should have low reactance at operating frequency.

L_1—For 5 Mc., approximately: 9 turns No. 18, 1 inch diam., 8 turns per inch (Miniductor 3014 or equivalent).

For 2.5 Mc., approximately: 19 turns No. 20, 1 inch diam., 16 turns per inch (Miniductor 3015 or equivalent).

R_1, R_2, R_3—½-watt composition.

RFC_1—750-μh. r.f. choke (Millen 34300-750).

With the grounded-cathode circuit it is necessary to use parallel plate feed. The choke should be one that is good at the operating frequency, but otherwise it is not a critical item. Neither is the plate blocking capacitor, C_4, although the smaller its capacitance the looser the coupling between the plate and the tank. A silver mica capacitor is advisable for best stability.

Plate-Voltage Stability

The circuit features already discussed are the primary ones in determining the frequency stability with changes in plate voltage. This point has had so much attention over the years that it hardly needs more discussion. The question is largely academic, if the oscillator is not keyed or otherwise turned on and off, because the plate voltage ordinarily will be stabilized by a voltage regulator. However, this is no excuse for neglecting to make the best possible oscillator in the first place. The circuit should be designed for as good voltage stability as it is possible to get — *before* adding the VR tube or other means of regulation.

It is characteristic of oscillators that the maximum rate of frequency change with a change in plate voltage occurs at the lowest voltages. For this reason the voltage should be as high as is consistent with the somewhat conflicting requirement that for minimizing tube heating the power input should be low. With a small triode such as the one in the 6U8A, which has a rated plate dissipation of 2.5 watts, 105 volts is a reasonable value for the plate voltage. In the circuit of Fig. 4 the plate input is 0.7 watt.

Heater-Voltage Stability

Although plate-voltage variations resulting from changes in line voltage are easily overcome with a simple regulator, the line-voltage variations continue to be transmitted to the tube heater. The oscillator frequency is, in general, sensitive to such changes. However, the reaction is not quite the same as that caused by a change in plate voltage. If the line voltage fluctuates — as it often does when the load of a power amplifier is keyed on and off — the reaction usually takes the form of a fairly rapid, although not instantaneous, frequency change followed by a not-too-slow drift. The effect of heater voltage on frequency has too often been ignored in writings about oscillator stability, although it has had attention in a recent article.[5]

In the early work with the oscillator described here, frequency shifts of the order of 170 cycles, over a period of 20 to 30 seconds, were found to occur when the line voltage was changed rapidly from 100 to 130 volts, even though the VR regulator held the plate voltage constant. A separate heater supply was installed with Variac control, and it was found that the frequency variations were caused entirely by heater-voltage changes. Furthermore, the frequency changes were much too rapid to be attributed solely to temperature changes in tube elements. The oscillator plate voltage at this time was 30 volts (through a dropping resistor from a regulated source) and the grid leak, R_1, was one megohm. Both values are in line with the "maxim" that low plate voltage and a high-resistance grid leak should be used for best stability.

In looking for ways to reduce heater-voltage effects it was found that a higher plate voltage, 105 volts directly from the VR tube, and a lower grid-leak resistance, 10,000 ohms, effected a worthwhile improvement. Also, it was observed that tubes varied in their sensitivity to heater voltage, and in particular that the 6U8A was markedly superior to the older 6U8. This may be related to the difference in heater construction in the "controlled-warm-up" tubes.

Further investigation showed that the rectified grid voltage of the oscillator reacted almost immediately to a sudden change in heater voltage. Since this presumably could only be caused by a change in amplification, it suggested a possible

[5] Gordon, "A Different Type of V.F.O. Circuit," *QST*, July, 1965.

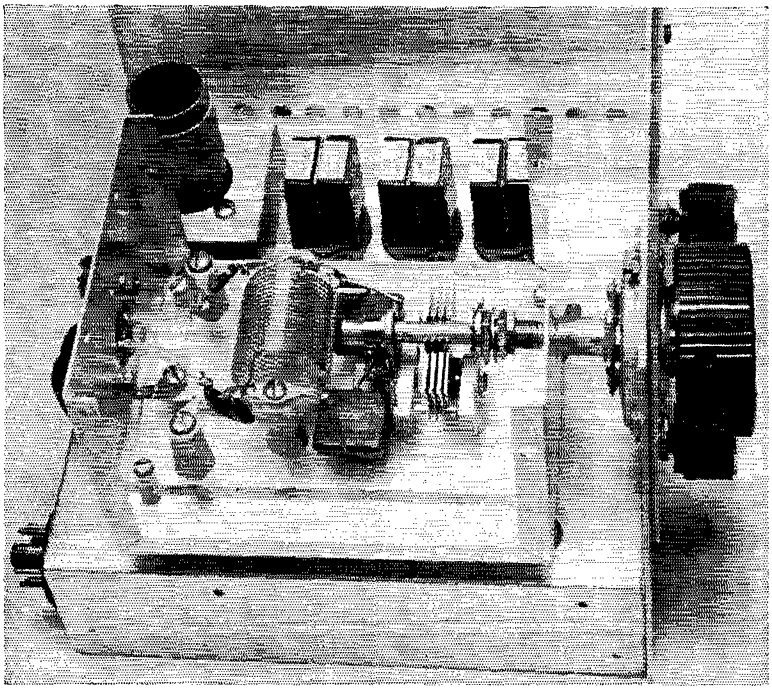


Fig. 5—Oscillator tank circuit construction. The container is a 3 × 4 × 5-inch Minibox. The components enclosed in the dashed box in Fig. 4 are mounted on a rectangular plastic plate supported at the corners by ⅜-inch pillars. The fixed tank capacitors rest flat on the plastic plate, and all components are solidly supported.

remedy, negative feedback, to stabilize the amplification. The simplest method of adding negative feedback, an un-bypassed cathode resistor, was tried with encouraging results. This resistor is R_3 in Fig. 4. The more resistance the better, up to the limit where the oscillator will refuse to start when plate and heater power are turned on simultaneously. A value of 390 ohms was found to be optimum, in the sense that the improvement was almost maximum and the circuit started willingly with any of a collection of tubes. The fact that the resistor adds d.c. bias is incidental; bypassing the resistor for r.f. destroys the action completely.

As a result of these several changes, the frequency shift with the same change in line voltage was reduced to a total of 5 to 10 cycles, depending on the particular 6U8A in use.[6] The major improvement came from the cathode resistor. Cathode-resistor stabilization was subsequently applied to triode oscillators in other equipment with equivalent results.

A beneficial effect of this type of stabilization is that *rapid* variations in frequency are eliminated. If the line voltage is suddenly shifted 20 or 30 volts in either direction, there is no detectable change in frequency for a few seconds, and if the voltage is quickly restored to the original figure, no frequency change occurs at all. In other words, the oscillator is impervious to transient "bumps" in the line voltage. If the line voltage is shifted and then maintained at the new value, there is a very slow drift beginning after a few seconds. However, since the total frequency change is small the fact that the frequency has shifted is seldom perceptible to the ear, either as a change in c.w. beat-note frequency or as a change in the "quality" of an s.s.b. signal. The residual shift is probably an actual temperature effect, which would be expected to be slow.

Frequency Drift

The slow change in frequency — "drift" — with changes in temperature has several possible causes:

1) Heating of the oscillator tube, which causes small changes in interelectrode capacitances and operating characteristics.

2) Changes in the electrical values of components because of changes in the temperature of their surroundings.

3) Similar changes in component values caused by direct conduction from a high-temperature source such as the tube.

4) Changes in electrical values of components because of internal heating from current flow.

Tube Heating

The tube generally gets blamed for a major share of the drift, especially the "warm-up" drift. In many cases it actually is responsible, but not for reason (1) listed above. What really happens in oscillators constructed according to the mania for short leads is that the tube is too close to the tank components; the heat it generates is only too effective in raising the *tank-circuit* temperature.

[6] With a 560-ohm cathode resistor it was reduced to 1 or 2 cycles under the same conditions, but some tubes would not start oscillating with this much resistance unless the circuit was given a shock by touching the grid connection.

This is not a new thought by any means.[7] However, the fact that there are *two* ways by which tube heat can be transferred to the tank does not seem to have been emphasized. The obvious one is by radiation and convection from the tube envelope. In the first layout tried for the oscillator being discussed, the tank coil and tuning capacitor were mounted exactly as shown in Fig. 5, but the tube socket was mounted on the back wall where the two leads now leave. The tube extended horizontally outside the box, so the wall protected the tuned circuit from radiated heat. C_1 and C_2 were mounted right at the socket, with leads of almost zero length. A number of drift runs were made, with curves *A* and *B*, Fig. 6, being typical. The frequency changed 350–400 cycles during the first 20 minutes, after which the oscillator stayed nominally on frequency (within 50 cycles) for the next two hours. As the cover was not on the box during these runs the tank circuit components were in open air. Room temperature was essentially constant during the period.

On the assumption that the rapid initial drift was caused by heat conducted through the tube pins, C_1 and C_2 were moved to the location shown in Fig. 5, between the coil and tuning capacitor. The character of the drift was changed completely as a result of this simple modification, as shown

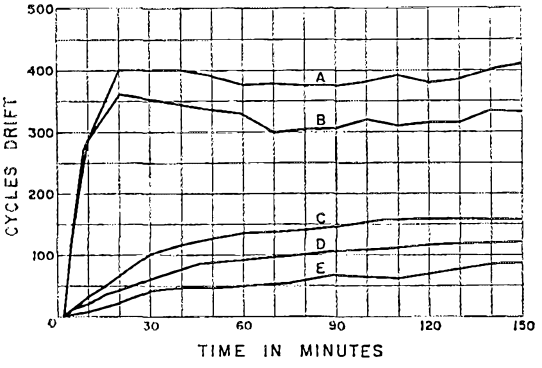


Fig. 6—Typical frequency drifts with short leads between fixed tank capacitors and tube (A and B) and with the tank-circuit layout shown in Fig. 5 (C, D and E).

by curves *C*, *D* and *E* in Fig. 6. It would be difficult to say just where the "warm-up" period ends, but the important point is that at *no* time is the drift rapid enough to be noticed in ordinary operation. A "cold start" in these tests means that all power to the oscillator had been off for at least 12 hours prior to the test, and that measurements were started 2 minutes after turn-on. This allowed just enough time for the tubes to get their operating characteristics up to par.

From a practical operating standpoint there appears to be little basis for choice between the two sets of curves after a 30-minute warm-up. But during that 30-minute period the *C-D-E* set is far better; the transmitter can be put into operation immediately, with no annoying initial drift. The total drift is likewise less over a longer period of time, but the difference is hardly enough to be perceptible in the setting of the tuning dial.

In considering the curves, it should be kept in mind that the tank circuit was well ventilated in these tests, and was not subjected to general heating such as would occur in the stove-like atmosphere of a crowded complete transmitter. In other words, the curves show primarily the effect of heat *conducted* from the tube to the tank.

Tube Capacitances

The remaining effect of tube heating — that is, the changes in interelectrode capacitances of the tube as it warms up — was investigated by the simple process of allowing the oscillator to stabilize over a period of several hours, then removing the oscillator tube and quickly plugging in a cold one.

The maximum frequency drift that could be attributed to tube changes alone, in several tests of this type, was approximately 25 cycles at a test frequency of about 5 Mc. The time required for the new tube to settle down was 15 to 20 minutes. This cause of drift seems to have been somewhat overrated.

Components

If the tube itself is a negligible factor in frequency drift — as it *should* be in a high-*C* circuit — the onus falls on the other circuit components. Since the electrical values of all components are affected by temperature, two things logically should be done: first, select types of components that are *least* affected; and second, keep their temperature as constant as possible, especially during an operating period.[8] (In line with the earlier assertion about calibration, it does not matter if the frequency is different at the same dial setting in *different* operating periods; what we want is a v.f.o. that will hold its frequency better than the other fellow's receiver does *while we're in contact with him.*)

Silver-mica capacitors have quite low temperature coefficients, as is well known. The ones shown in the oscillator tank photograph are the old-style molded "postage stamp" type. The more modern "dipped" type was substituted, but the drift was greater. We have no explanation for this, since temperature-coefficient data were not available on the postage stamps and they could not be compared with the dipped variety in this respect. The latter appeared to be within

(Continued on page 154)

[7] A highly effective remedy was used by Goodman in a v.f.o. described in September 1949 *QST*, where short lengths of coax cable were connected between the tuned circuit and the tube. This idea was carried farther by Long ("Cutting Down V.F.O. Drift," *QST*, August, 1952) by making the tuned circuit an entirely separate unit — the "remote-tuned" v.f.o.

[8] There is another school which says let it drift and then add compensation to overcome it. Where it is impossible to use optimum circuit design and layout practices this may be the only approach open. However, the better the performance without compensation the easier it is to get still better performance with it.

Zener-Regulated Low-Current Transistor Supply

In many transistor applications a d.c. power supply having very good voltage regulation is required, and while dry batteries may meet this requirement nicely when fresh, they become less "stiff" as they wear out. If a.c. can be used the regulation can be maintained indefinitely, and the first cost is the last cost. The supply shown here, built to power an experimental conversion-type v.f.o., is useful either as test-bench equipment or as a component that can be dropped into a chassis assembly.

The circuit, Fig. 1, is not at all novel; it is simply a voltage doubler working from a 6.3-volt filament transformer, plus a filter and a Zener voltage-regulator diode. By selecting the appropriate diode the output voltage can be placed at practically any desired value in the 6- to 12-volt range. (Diodes are available in 1-volt or smaller steps in this interval.) The load current was not expected to be more than 30 or 40 ma. in the writer's case, and for currents of this order the filter capacitances are adequate, in conjunction with the smoothing contributed by the diode regulator. (The advantage of the minimal capacitances is that the capacitors are physically small.) For larger currents all capacitances should be increased in proportion to the increase in load current.[1]

R_1 and R_2 in series act as a current-limiting resistor for the regulator diode. In addition, R_1 doubles as a filter resistor between the input and output capacitances; although it could be omitted entirely, it does help filter out the higher harmonics of the rectified a.c. In general, R_2 should have the lion's share of the total resistance — at least two thirds of it — because there must be an appreciable voltage drop between point A and the positive output terminal if the 200-μf. capacitor is to contribute much to the filtering.

Fig. 2 can be used to find a first-approximation value for the sum of R_1 and R_2, provided the capacitances are as given in Fig. 1, and assuming that the regulation is to hold for line voltages down to 100. For example, if the maximum output current needed is 25 ma., the total current can be assumed to be 30 ma., allowing a minimum of 5 ma. for the diode. As shown by the solid curve, at 30 ma. the approximate d.c. voltage at the filter is 15.5 volts. If the diode regulates at 8 volts, the difference, 7.5 volts, must be dropped in R_1 and R_2. At 30 ma. this requires a total resistance of 7.5/0.03 = 250 ohms. R_1 could take 75 ohms of this total, and the nearest standard value, 180 ohms, could be used for R_2.

The results obtained using Fig. 2 will not be exact, for a number of reasons, but will give a fair approximation of the amount of resistance needed. If the range of line voltage over which regulation must be maintained is critical, the resistance values should be adjusted experimentally to fit. Usually, R_1 as calculated above can be used without change, R_2 alone being adjusted to the required value.

Zener Regulators

Voltage-regulator diodes may differ among themselves considerably, even when rated for approximately the same Zener voltage. A couple of bargain-counter unbranded diodes originally tried in this power supply gave very disappointing results; the output voltage varied over a range of about a volt when the line voltage was swung between 100 and 130. Subsequently, a number of branded diodes were tested, and although uniformly much superior to the "bargain" ones, still showed variations between types. The difference appears to be in the "break" characteristic; a "soft-break" diode will show a smooth variation in voltage and a somewhat indeterminate transition between regulating and nonregulating. The "sharp-break" type will hold the

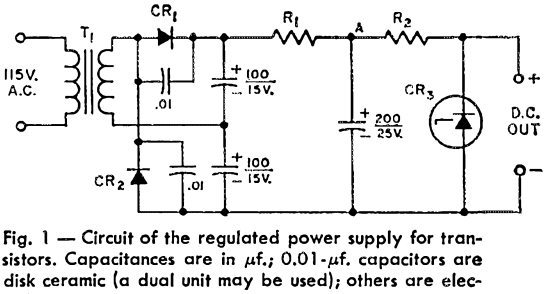
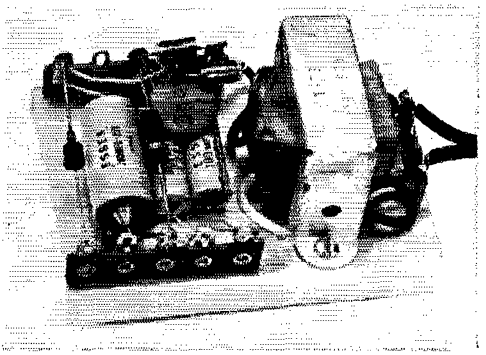


Fig. 1 — Circuit of the regulated power supply for transistors. Capacitances are in μf.; 0.01-μf. capacitors are disk ceramic (a dual unit may be used); others are electrolytic.

CR_1, CR_2—Any silicon diode having a p.i.v. rating of 50 volts or more; current rating 75 ma. or more.
CR_3—Voltage-regulator diode; see text.
R_1, R_2—½-watt resistors; see text.
T_1—Filament transformer, 6.3 volts, 1 amp.

[1] An effective method for larger currents is the "electronic filter," used in the power supply described by the writer in June 1962 *QST*. However, the output of that supply was not regulated.



Transistor power supply with regulated output voltage. This circuit is useful for up to 12 volts output at load currents of 50 ma. or less. It is assembled on a piece of aluminum measuring 3¾ by 2½ inches on top, with ⅜-inch side lips. The three screws holding the three tie-point strips are longer than the lips are deep; this allows mounting the assembly on a chassis as a unit. The regulator diode is at the left in this view.

output voltage more constant over its useful current range, and will go out of regulation quite suddenly. This is the more desirable type for the purpose. Of the low-priced ones, the writer has found the General Electric Z4XL series to be excellent.

The precise voltage at which a diode regulates depends on its temperature, increasing slightly as the temperature increases. The regulated voltage is therefore tied in with the power dissipation in the diode. It is advantageous to work the diode at a relatively-low current compared with its maximum rating, since the temperature variations will be lessened over the operating range of primary voltage. A 1-watt diode operated at ¼-watt maximum dissipation will run cool and the temperature variations will be negligible under ordinary conditions. If the diode is a sharp-break type, it can be expected to hold the output voltage constant within about ±0.05 volt over a ±10 percent variation from the nominal 115 volts a.c. on the primary. The change will be considerably less if the primary voltage excursions are more reasonable.

Manufacturing variations are such that the regulated voltage can be given only in terms of a specified tolerance. The tighter the tolerance the more you pay. It is worthwhile to get the 10 percent type if you use the GE diode mentioned earlier, since it costs only a few cents more. Of several of these tried, the actual voltage was much closer to the nominal value than the rated tolerance would indicate, but this is, of course, not guaranteed.

Hash Suppression

If the rectifier diodes, CR_1 and CR_2, happen to have a sharp transition from nonconduction to forward conduction, r.f.-type hash noise is generated. The filter used for smoothing will not suppress this, but the 0.01-μf. capacitors shown in Fig. 1 across the diodes will eliminate it.

Although the hash may not be present with all diodes, the suppressor capacitors are worthwhile insurance.

— *W1DF*

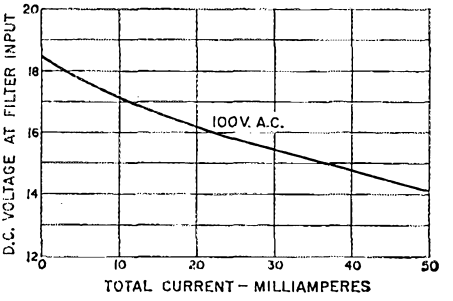


Fig. 2—This curve is useful for determining R_1 and R_2 values as related to load current and regulated voltage. Some variation is to be expected in practice because of component differences. The filament transformer used as a power source in making these curves had an output voltage of 7.5 at no load and 7.0 at a d.c. load of 100 ma., although rated at 6.3 volts.

• *New Apparatus*

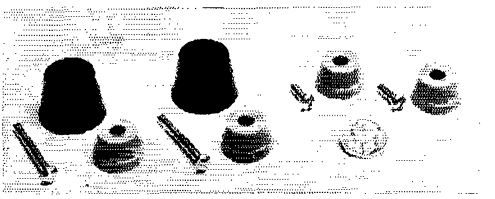
Budwig Equipment Feet

Much of the tabletop equipment that passes through the ARRL laboratory is supplied with black rubber feet. If the gear sits around for any length of time, especially if it's heavy equipment, or if a unit is slid across a bench top, black feet marks usually appear. After a while, many of the rubber feet begin to crack.

The Budwig Manufacturing Company has introduced a series of soft plastic feet that aren't supposed to crack or fall off. From what we have observed, they won't leave any "footprints" either. The feet are part of a kit the manufacturer has dubbed "Cab-Pac." As shown in the photograph, each Cab-Pac consists of four soft plastic feet with brass inserts, two rigid plastic extenders and four 6-32 mounting screws. The extenders are useful for tilting a cabinet or chassis; they are normally installed between the soft rubber feet and the front of the cabinet's underside.

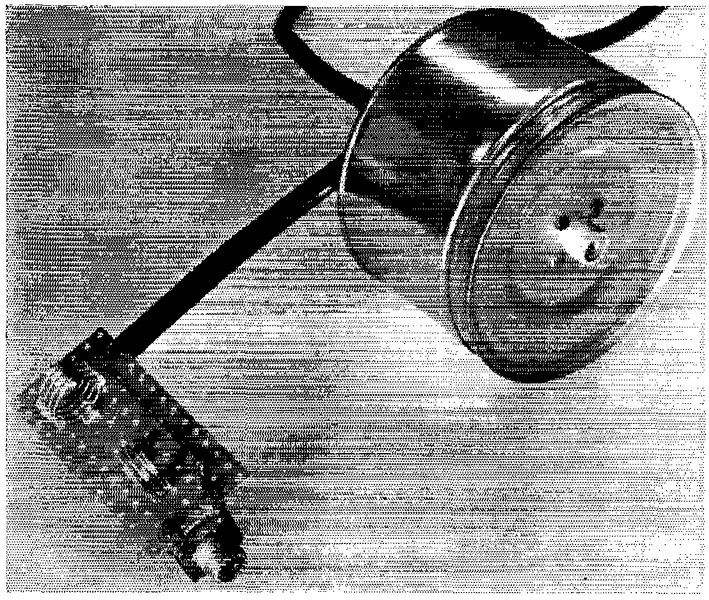
Cab-Pacs are available in four color combinations: all black, all gray, black extenders with gray feet and gray extenders with black feet. Cab-Pacs can be purchased for less than $1.00 from the Budwig Manufacturing Company, Post Office Box 97A, Ramona, California 92065.

— *W1YDS*



L Networks for Reactive Loads

Calculation for Matching Antenna System to Transmitter



Two L networks designed by the author. To the right, the 3950-kc. network sketched in Fig. 4 is shown enlcosed in a coffee can. The 14-Mc. network to the left was photographed before mounting in a similar shielding enclosure.

BY ROBERT E. GORDON,* WØKFI/ex-W1KUL

The usual L-network formulas for transforming an antenna-system impedance to a value appropriate for the transmitter assume that the antenna impedance is a pure resistance. The author observes that this condition seldom occurs in practice, and proceeds to discuss the more prevalent case of a complex antenna load.

An article by W8CGD in an earlier issue of *QST*[1] describes an inexpensive device for measuring antenna or other complex impedances, with ample accuracy for most purposes. I have made use of it in designing L networks to transform odd antenna impedances to the 50-ohm resistive load my transmitter prefers.

The *Handbook* formulas for the design of L networks are limited to cases of transforming pure resistances. Unfortunately, a feed-point impedance which contains no reactive component is about as rare as a dodo. Accordingly, I derived formulas for transforming any load impedance to a pure resistance of any desired value.

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[1] Strandlund, "Amateur Measurement of $R + jX$," *QST*, June, 1965.

The L network has two possible configurations. When the resistive component of the load is greater than the desired generator resistance ($R_O > R_I$), the parallel element will be on the load side, as shown in Fig. 1A. Conversely, when the resistive component of the load is less than desired generator resistance ($R_O < R_I$), the parallel element will be on the generator side, as shown at B. In the case of a load resistance equal to the desired generator resistance it is not necessary to use the formulas, since it is apparent that compensation will be required for the reactive component only and this may be obtained by a single series element having the same numerical value of reactance as that contained in the load, but of the opposite sign. For example, if we wish to present a 50-ohm resistive load to the transmitter, and the antenna impedance measures $50 - j30$ (capacitive), we would place an inductor of reactance $+j30$ in series with the antenna. The transmitter will now see $50 - j30 + j30$, or simply 50 ohms, resistive.

The formulas for the two networks of Fig. 1 are different, so we will look at them one at a time, and work out an example for each. In all of these formulas, the subscript 1 refers to the

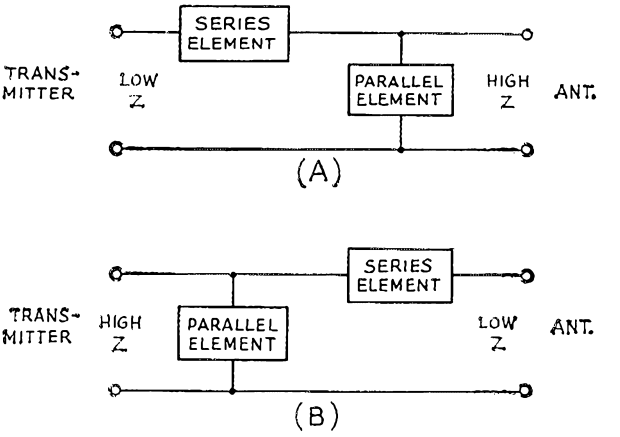


Fig. 1—L-network configurations, (A) for stepping up the input impedance, (B) for stepping the input impedance down.

input resistance of the network, o to the output impedance of the network, and s and p to the series and parallel network reactances, respectively. Hence, if we are trying to match a transmitter to an antenna, R_I represents the desired resistive load we wish to present to the transmitter, and $R_O + jX_O$ represents the actual antenna impedance which we have measured.

The Step-Down L Network

We will start with the case where the resistive part of our load (R_O) is less than the desired input resistance (R_I). See Fig. 2 for the network sketch and formulas. The factor A has been introduced to simplify the arithmetic. My transmitter, which is designed to operate into a 50-ohm resistive load, would not tune up to the antenna on 3950 kc. Measurement on the antenna using W8CGD's device showed the reason: a measured impedance of $17 - j6.5$.

Here is how we proceed to design the required L network:

$$R_I = 50 \text{ ohms}$$
$$R_O = 17 \text{ ohms}$$
$$jX_O = -j6.5 \text{ ohms}$$

1) $$A = \sqrt{\frac{R_I - R_O}{R_O}} = \sqrt{\frac{50 - 17}{17}}$$
$$= \sqrt{1.94} = 1.393$$

2) $$jX_S = -jX_O + jR_OA$$
$$= j6.5 + j(17)(1.393)$$
$$= j30.2$$

3) The plus sign tells us that the required reactance is inductive. The inductance required to yield a reactance of 30.2 ohms at 3950 kc. is then:

$$L_S = \frac{X_S'}{2\pi f} = \frac{30.2}{(6.28)\,(3.95 \times 10^6)} \text{ henrys} = 1.23 \ \mu\text{h}.$$

4) $$jX_P = -j\frac{R_I}{A} = -j\frac{50}{1.393} = -j35.9.$$

5) The minus sign tells us that this reactance is capacitive. The capacitance required to provide a reactance of 35.9 ohms at 3950 kc. is:

$$C_P = \frac{1}{2\pi f X_P} = \frac{1}{(6.28)\,(3.95 \times 10^6)\,(35.9)}$$
$$= 1120 \times 10^{-12} = 1120 \text{ pf}.$$

The circuit is then as shown in Fig. 3A.

Now, on to the junk box. It produced a 1000- and a 200-pf. mica capacitor, and a piece of ⅝-inch 16-pitch coil stock. The *Handbook* graph says 10¼ turns of this will come pretty close to 1.23 μh., and the capacitance is pretty close to what we need. Adding one coffee can, coax and connectors, and a couple of hours in the cellar, produced the object shown in the sketch of Fig. 4 and the photo. With this network patched into the antenna lead, the previously-reluctant transmitter now loads without difficulty from 3900 to 4000 kc.

Before leaving this topic, it should be mentioned that there is also another pair of reactance values which would do the same job if the inductive and capacitive elements are transposed. The values required may be computed in the same manner as given in the example, but using these formulas:

$$jX_S = -jX_O - jR_OA$$
$$jX_P = j\frac{R_I}{A}$$

where A has the same meaning indicated earlier.

Using the data of the foregoing example, these formulas yield results as follows:

$jX_S = -j17.2$ $\qquad$ $C_S = 2350$ pf.

$jX_P = j35.9$ $\qquad$ $L_P = 1.44$ μh.

The circuit is as shown in Fig. 3B.

A network using these values would have performed equally well, but the required com-

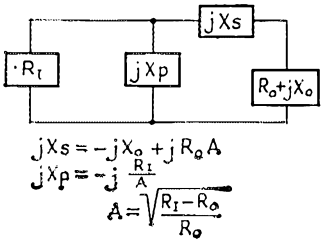


Fig. 2—Formulas and configuration for the case where the resistive component of the load impedance is smaller than the desired load for the transmitter.

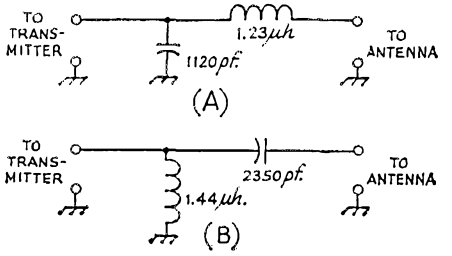


Fig. 3—Inductive and capacitive elements in an L network may be transposed with suitable changes in values, as discussed in the text. Values shown here are for the author's case of transforming a measured 17−j6.5 antenna load at 3950 kc. to 50 ohms resistive for the transmitter.

ponents are larger, and the internal d.c. ground on the coax center conductor found in most transmitters would be blocked from the antenna by the series capacitor. It may be worthwhile to figure the values both ways, and choose the arrangement you like best.

The Step-Up L Network

The other network configuration (Fig. 1A) must be used when the resistive part of our load (R_O) is greater than the desired input resistance (R_I). See Fig. 5 for the network sketch and formulas. None of my antenna measurements produced values of R_O greater than the desired R_I, so I have invented some values, for the purpose of an example, as follows:

$$R_I = 50 \text{ ohms}$$
$$R_O = 70 \text{ ohms}$$
$$jX_O = +\,j20 \text{ ohms}$$
$$f = 14.1 \text{ megacycles}$$

1) $Z_O^2 = R_O^2 + X_O^2 = (70)^2 + (20)^2$
$= 4900 + 400 = 5300$

2) $$jX_S = j\sqrt{Z_O^2\left(\frac{R_I}{R_O}\right) - R_I^2}$$
$$= j\sqrt{5300\left(\frac{50}{70}\right) - (50)^2}$$
$$= j\sqrt{3785 - 2500}$$
$$= j\sqrt{1285}$$
$$= j35.8$$

3) $$L_S = \frac{X_S}{2\pi f} = \frac{35.8}{(6.28)\ (14.1 \times 10^6)} = 0.404\ \mu\text{h}.$$

4) $$jX_P = \frac{Z_O^2}{\left(\frac{R_O}{R_I}\right)\left(jX_S\right) + jX_O}$$
$$= \frac{5300}{\left(\frac{70}{50}\right)\left(j35.8\right) + j20}$$
$$= \frac{5300}{j50.2 + j20} = \frac{5300}{j70.2}$$
$$= \frac{-j5300}{70.2}$$
$$= -j75.5$$

(It will be noticed that j was shifted from the denominator to the numerator with a change of sign. This is accomplished by multiplying both numerator and denominator by $-j$.)

5) $$C_P = \frac{1}{2\pi f X_P} = \frac{1}{(6.28)\ (14.1 \times 10^6)\ (75.5)}$$
$$= 150 \text{ pf.}$$

As in our previous case, there is another pair of values which will also do the same job, obtainable by the following formulas:

$$jX_S = -j\sqrt{Z_O^2\left(\frac{R_I}{R_O}\right) - R_I^2}$$

$$jX_P = \frac{Z_O^2}{\left(\frac{R_O}{R_I}\right)\left(jX_S\right) - jX_O}$$

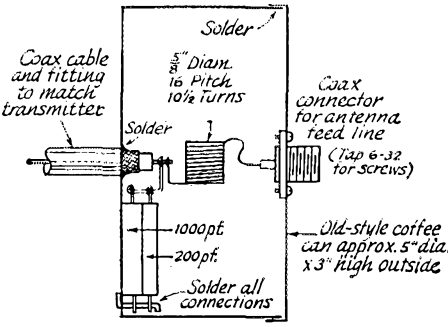


Fig. 4—Sketch showing the construction of the network of Fig. 3A.

Again using our same data, these formulas yield results as follows:

$jX_S = -j35.8$ $\qquad$ $C_S = 317$ pf.

$jX_P = j176$ $\qquad$ $L_P = 1.99\ \mu$h.

A network using these values would do the same impedance-matching job as the preceding one.

As a concluding comment applicable to both network configurations, I would point out that

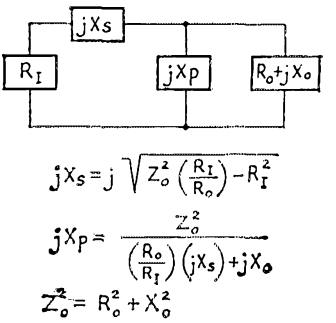


Fig. 5—Configuration and formulas for an L network for the case where the resistive component of the load impedance is larger than the desired load for the transmitter.

in some cases both the series and parallel elements will be of the same kind (L or C), so if you come out with this result it doesn't necessarily signal an error in arithmetic.

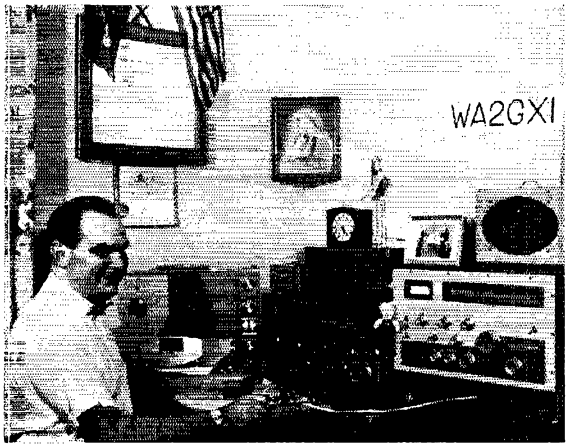
The photograph shows the coffee-can job described earlier, together with a prototype 20-meter job which, not being canned, is more photogenic. It has since been canned to reduce undesired local radiation. This one, you will notice, required two inductors. The companion set of formulas yielded an LC combination, but Miniductor is a lot easier to trim to size than a molded mica brick.

These networks have been wholly successful in enabling me to feed my NCX-5 transceiver into a trap dipole, with plenty of room to spare on the transmitter adjustment, where previously it had been impossible to achieve the manufacturer's recommended conditions of loading.

I should like to acknowledge the many helpful suggestions of Doyle Strandlund, W8CGD, during the preparation of this article.

Now with a few hours of effort, you can really transform the needles, noodles, and wet string to $50 + j0$. Who will be the first to build an r.f. noodle drier? QST

Ray Boduch, WA2GXI Receives Anne Sullivan Award



Ray Boduch, WA2GXI *(photo by Robert J. Koch)*

Ray Boduch, WA2GXI, of Lackawanna, New York, is totally blind and deaf. In 1961, the Vocational Rehabilitation Service of N. Y. State was instrumental in transferring Ray from a sheltered workshop job in Brooklyn to an apprenticeship in electronics as a technician at Sierra Research Corp. in Cheektowaga, N. Y. Also, part of the time, Ray studied a two-year course in basic electronics and communications and was tutored by Dr. Irving Chriswell, W2RUN. At the close of the two-year course, Ray was awarded a Certificate of Achievement, signed by the President of Canisius College and the President of Erie County Technical Institute.

Ray Boduch was honored again this April when the Perkins School for the Blind and the Industrial Home for the Blind chose him to be one of a small group of deaf-blind persons to receive the Anne Sullivan Award. The award is given to those who help to prove that deaf-blind persons can be truly independent, thereby serving as a constant source of inspiration to many others. QST

• *New Apparatus*

Meter Protector

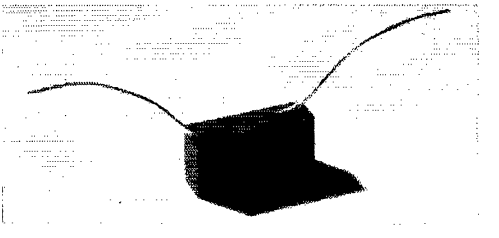
THE semiconductor device shown in the photograph can save you many dollars in meter repair bills. Known as a Meter Protector, it measures about the same size as a small silver-mica capacitor. When installed properly, it will protect meters of the D'Arsonval type from heavy overloads by shunting most of the excess current around the meter. It isn't practical or necessary to bypass all the extra current around the movement, as most meters can stand overloads of several hundred per cent with little or no damage.

In a test in the ARRL laboratory, the meter protector was placed in parallel with a 200-microampere movement (0.2 volts full scale) and was found not to affect the normal readings. Current through the combination meter and meter protector was increased from 0 to 1000 ma. while the voltage across the meter went up to only 0.82 volts (about 4 times the full-scale rating). The meter protector limited the excess current through the movement to well within the meter's overload capabilities. As most meters use basic movements with 50 to 200 millivolt full scale ratings (with a shunt as required), the meter protector should safeguard the meter regardless whether it is a 10 microampere or a 1 ampere unit.

The meter protector has no polarity. It is always installed in parallel with the basic meter movement. This normally poses no problem, except when an internal multiplier resistor is used. In this case, the meter must be opened to get at the two leads going to the moving coil.

The meter protector is rated to handle a continuous overload current of 1 ampere and a short term overload of 10 amperes. If overloads of more than 1 ampere are anticipated, the manufacturer recommends that a 1- or 2-ampere fuse be installed in series with the meter.

The meter protector sells for under $2.00 from Barry Electronics, 512 Broadway, New York, N.Y. 10012. — *W1YDS*



High-Performance RTTY Filters

Improved Designs for Better Reception

In Two Parts — Part II*

BY IRVIN M. HOFF,** K8DKC

The "Mainline 1170" Filter (Fig. 6)

This is a narrow-shift bandpass input filter of 275 cycles bandwidth, intended for tones of 2125 and 2295 cycles. It can be arranged in conjunction with the original 850-shift bandpass input filter so that either may be switched in or out automatically as the 850- or 170-shift channel filters are selected. This could easily be done with a 6-pole multi-position switch such as the CRL PA-2022 in use in the author's unit.

For comparison, Fig. 7 shows the output curve for the original bandpass input filter for 850 shift that was included in the TT/L schematic (page 30, August 1965 *QST*.)

The Mainline "2" and "3" Series Filters

The filters in these groups are 3-pole Butterworth designs with good skirt selectivity. They use three 88-mh. toroids each.

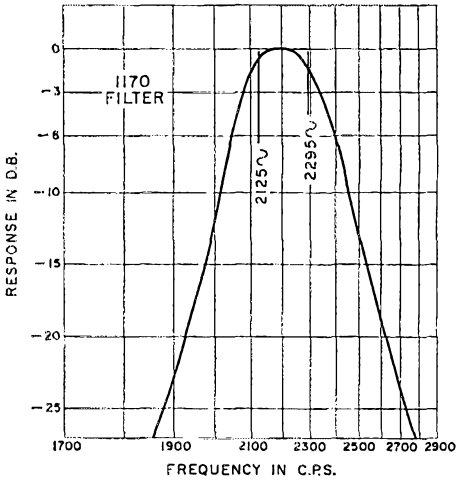
Most commercial filters have similar input and output impedances — usually 600 ohms. The design of 600-ohm filters requires inductors of far different value than the 88-mh. toroid, and to use the toroid it is necessary to allow the impedances to be much higher. This is no problem; in fact, it assists in using these particular filters in the TT/L. It also explains why the 850-cycle bandpass input filter and the Mainline 1170 bandpass input filter for narrow shift use the type of input network they do. It also accounts for the fact that the broad filters have a lower input impedance than the more narrow filters.

Every bandpass filter is potentially an impedance transformer. No matter how the filter is developed, its input and output impedances can be made different from one another. Therefore, in the following designs the output impedance is very high while the input impedance is only medium high. The filter then acts as a step-up transformer, and instead of having substantial voltage loss, as would most filters, will actually show a voltage rise. In introducing the filters into the TT/L no additional matching components or amplifier stages are needed.

Since these three-pole Butterworth filters are designed to terminate in a very high impedance, the 270K grid-return resistors shown on Pins 2 and 7 of V_1 in the TT/L should either be removed entirely or else changed to 10 megohms. This change will have no effect even when the original filters are switched back in, as those 270K resistors were only included originally to protect the tubes in case no input section was plugged into the main unit. This is not likely to occur.

The "Mainline 2850" Filters (Fig. 8)

These filters are nearly 200 cycles wide and are intended for use on general 850-shift copy either with or without the limiter. Because they have less "capture area" than the 8850 filter, for instance, they will have better noise-cancellation qualities at the input to the decision threshold computer stage. Their use will be particularly beneficial on limiterless copy, where they will allow some tolerance in incorrect shift or minor drift. Their output curve is shown in Fig. 9.



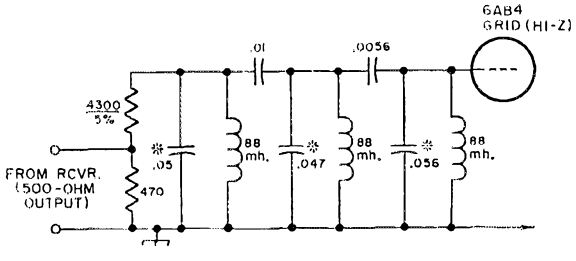


Fig. 6—The Mainline 1170 bandpass input filter for 170-cycle shift. The bandwidth is about 275 cycles and the output is high impedance. Capacitances marked (*) are approximate values. Each section is tuned to the same frequency, 2200 cycles, for standard tones of 2125 and 2295.

* Part I appeared in Aug. *QST*, p. 16.

** 1733 West Huron River Drive, Ann Arbor, Mich. 48103

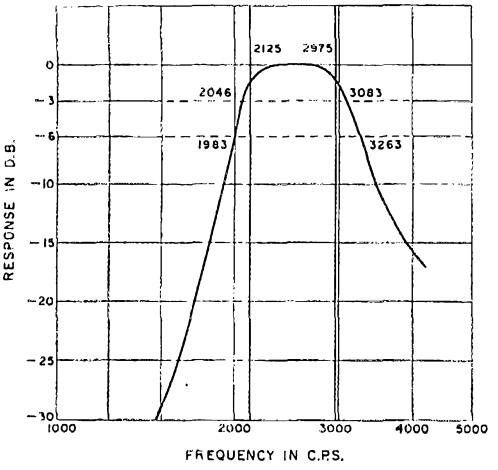


Fig. 7—Output curve for the Mainline TT/L bandpass input filter for 850 shift. (Circuit in August, 1965, *QST*.)

The "Mainline 3850" and "3170" Filters (Fig. 8)

These filters, like the bandpass input and the 2850 filters, are of a basic 3-pole Butterworth design.[5] They are only 80 cycles wide at the −3-db. points. The response of the 3170 filters for 170 shift is shown in Fig. 10. The table below is representative of the performance of this type of filter. The figures given are for the 2125-cycle filter; the others are comparable:

Response in db.	*Bandwidth, c.p.s.*
−3	80
−6	100
−10	122
−15	157
−20	183
−25	226
−30	261

Probably the first 15 db. of any filter establishes the primary effectiveness of the system, in which case the filter is still only 157 cycles wide at the −15 db. point. The 3-30-db. shape factor is about 3 to 1, which is quite good for such a simple filter.

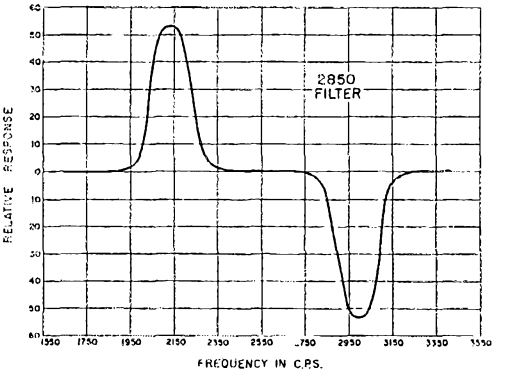


Fig. 9—Output curve of the Mainline 2850 filter system. Note that shifts of less than about 700 cycles would not be received. Each filter has approximately 200 cycles bandwidth.

[5] Other designs such as the Thomson linear-phase filters offer some theoretical advantages for pulse reception, such as RTTY signals, but to get comparable passband characteristics at least two extra sections (for a total of five toroids in each filter) would be needed. The author believes that the small advantage of the linear-phase types would be more than offset by the added difficulty of making them at home, plus the extra cost and size. If commercial filters are obtained, the four- or five-pole linear-phase types might well be considered at the higher cost.

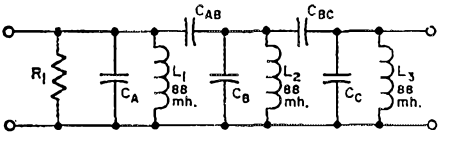


Fig. 8—Circuit for the Mainline 2850 and 3170/3850 filters. Values are given in the table below. The capacitors should be 10 percent-tolerance Mylar or better; C_{AB} and C_{BC} should be 5 per cent tolerance if possible. Values for C_A, C_B and C_C are approximate; see text for tuning procedures. Where an unusual capacitance value is shown smaller values may be connected in parallel; e.g., 0.05 + 0.008 = 0.058. Capacitances are in μf. except where otherwise specified. R_1—5% tolerance.

The "Oddball" Filter (Fig. 8)

Typically, the RTTY operator who thinks he is on 850 shift is more often than not transmitting a shift of 750–800. This situation is improving as more operators get facilities, such as the Mainline TT/O Semi-Counter,[3] for accurately setting and checking shifts. However, many enthusiasts advocate the use of a heterodyne filter system so that two good filters can be made to tune nearly any shift likely to be received. The author has found that the addition of one "odd-frequency" (2905 cycles) filter to the 80-cycle bandwidth filters for 170 and 850 will enable the operator to copy about 90 per cent of all shifts likely to be encountered.

Type	*Frequency*	*Bandwidth*	R_1	C_{AB}	C_{BC}	C_A	C_B	C_C
2850	2125	200≈	6800	.0068	.0042	.056	.051	.058
2850	2975	200≈	13K	.0024	.0015	.032	.03	.033
3170/3850	2125	80≈	20K	.0025	.0018	.061	.06	.062
3170	2295	80≈	22K	.0021	.0013	.053	.051	.053
3850	2975	80≈	39K	910 pf.	620 pf.	.031	.031	.032
Oddball	2905	80≈	36K	0.001	680 pf.	0.033	0.032	0.033

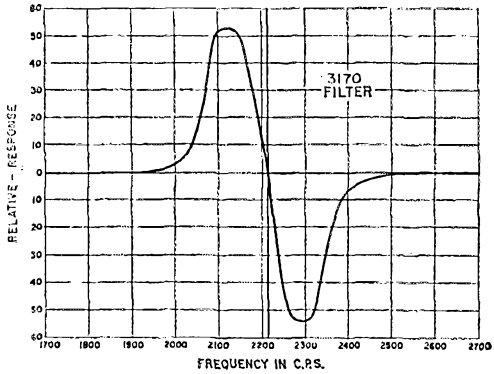


Fig. 10—Output curve of the Mainline 3170 filter system for 170 shift. Bandwidths are 80 cycles each.

As more operators add the Semi-Counter[3] to their station equipment the need for both the 2905 filter and heterodyne filter system will diminish.

Installing the "2" and "3" Series Filters

Fig. 11 shows the easiest way to install the 2850 and 3850 (or 3170) filters in the TT/L. The design was chosen so that these filters could replace the original TV-coil system, thus offering the operator the choice of using or not using the limiter to improve the copy. This method gives similar output voltages without resorting to additional amplification or optional input units, such as the a.m. input section.

Balancing the Various Filters

Assuming the operator will plan to use the basic broad-band 5850 or 8850 filters, he should install that system first and then carefully set the balance control for equal mark and space voltages at the input to the DTC stage. An ordinary d.c. voltmeter may be used as this is a low-impedance point and does not require a vacuum-tube voltmeter. You will get a negative voltage for mark and a positive voltage for space. It might be handy to put a small feedthrough connector from this point (cathode of V_{2B} of the TT/L) to the top of the chassis as a permanent test point to facilitate easy checking.

Now switch in the new filters and adjust the control on each until once again the voltages are equal but opposite from mark to space. In the case of the 2850 or 3170/3850 types, the two controls may be adjusted to equal the voltages obtained from the more simple broad-band filters. This will allow the operator to switch between the various filter systems, know each has been independently balanced correctly, and at the same time require no changes of the indicator-sensitivity controls.

Making the Filters

The filters can be built in almost any form that suits the individual operator. The author assembled them on small Vector boards and then mounted the boards in plug-in containers made from small Miniboxes, each fitted with an octal plug. Several others have built the filters into regular Vector plug-in containers. A few have built them on printed-circuit boards and mounted them beneath the chassis on angle brackets.

Tuning the Filters

Few amateurs have a test bench that would have a digital audio counter such as is available to the author, but other schemes can be used. First let us list quickly the various items that will be needed:

1) A source of audio sine waves — an audio oscillator, a tape recorder, or the receiver itself may be used.

2) A means for determining the frequency to be used for reference. There are several possibilities:

- a) Tuning forks,
- b) Accurate audio oscillator,
- c) Musical instrument such as a piano,
- d) Tape recorder with prerecorded audio tape,
- e) Capacitor decade substitution box[3], or
- f) Digital audio counter.

3) A means for measuring maximum output of the filter while it is being tuned, such as:

- a) Oscilloscope,
- b) Regular v.t.v.m. with a.c. scale,
- c) A.c. v.t.v.m.

The biggest problem, of course, is determining just what 2125, 2295 (for 170 shift) and 2975 "really" are. As this question was discussed in detail in the Semi-Counter article[3] it will not be

[3] Hoff, "Checking RTTY Shifts," *QST*, May, 1966.

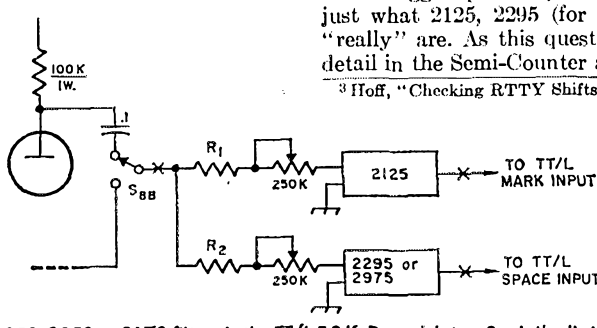


Fig. 11—Installing the 2850, 3850 or 3170 filters in the TT/L F.S.K. Demodulator. S_{8B} is the limiter bypass switch, allowing the limiter to be used for f.m. copy, or to be switched out for limiterless a.m. copy. The series resistors are not used for the 2850 filters, and are 150K for the 3850 or 3170 filters. A three-pole multiposition switch at points marked "X" allows quick switching from these filters to others described in the article.

gone into here; as described there, the "standard" is the 88-mh. toroid, which has been determined to be actually 88 mh. within very close tolerances. The setup for tuning a toroid to a particular frequency is shown in Fig. 3 on page 37, May *QST* (an a.c. v.t.v.m. may be substituted for the scope), and a step-by-step tuning procedure is given.

Tuning the toroids will actually only take a few minutes each, once the equipment has been set up. When all toroids needed are tuned, they can be wired into the filter circuit along with the associated resistors and other components.

For the simple filters such as the 8850, 7850 or 8170, tune the toroids without the series resistors, and then after the toroid-capacitor combinations are finalized, install the series resistors and other components. If the toroids are tuned with the series loading resistors, the filters will be much more difficult to tune accurately because their bandwidths will be much greater.

How To Tune the Multi-Toroid Filters

Tuning the three-toroid filters, such as the Mainline 1170, 2850 or 3170/3850, is really quite simple. It involves a few more steps, but is no more difficult than tuning a simple filter.

The basic filter schematic is shown in Fig. 12. In reality, this consists of three parallel-tuned sections, as given in Fig. 13. The capacitors on top, C_{AB} and C_{BC}, are the "cross-coupling" capacitors which establish the primary filter characteristics. The parallel capacitors, C_A, C_B, and C_C, are used to tune each filter section to a specific frequency.

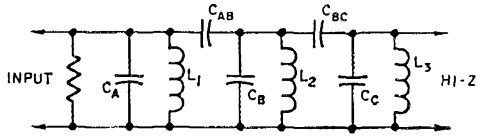


Fig. 12—Basic layout of the three-pole Butterworth filter used for the Mainline "1," "2" and "3" series.

First, set the audio source to the desired tone frequency by the tuning-fork, tape-recorder or decade-box[3] method. Then tune each section in Fig. 13 independently to that same audio tone. In Fig. 13A, do not change or remove C_{AB} but instead add to the value of C_A until the meter peaks, showing that the desired frequency has been reached. (Turns may also be removed from the coil, if more appropriate.) When this section has been tuned, remove capacitor C_{AB} and connect it in the second section as in Fig. 13B. Tune this section to the identical audio frequency by varying C_B or the turns on the inductor. Set aside, removing capacitor C_{BC}, which is then used to tune the third section as shown in Fig. 13C. When this section has been tuned to the same audio frequency put the filter together as in Fig. 12, making sure no (more) turns are removed from any of the toroids in the process. This completes the filter tuning.

Other methods of tuning the filters can be used — indeed, many different schemes are possible. It is the author's intent to attempt to convince the reader that elaborate and expensive equipment is not required, although in some instances it might make the job a bit easier. It would appear that an audio tape recorder in conjunction with a capacitor decade box and vacuum-tube voltmeter would be an ideal method available to most individuals. Just the decade box with a v.t.v.m. and a reasonably stable audio oscillator probably would work just as well.

Summary

Although intended primarily for the TT/L demodulator, some of these filters are now in use in other converters, such as the "W2JAV," the "W2PAT," the "Twin Cities" and the K6IBE (now W4DDE) TU-D. They could be adapted to any converter you may be using, to enhance its operation, although in most older units the limiter cannot be switched out as there is no threshold corrector such as the DTC circuit in the TT/L.

These filters will allow those using the TT/L to achieve the maximum performance that is inherent in it when operated with really good narrow filters in the limiterless mode. Although the TT/L with the original filters has given those using it improved copy over demodulators used previously, installing some of these filters will change it into a truly high-performance unit — one in a completely different class from anything the operator probably has used before. Frankly, it is fantastic how the limiterless unit will pull signals through unbelievable interference. It makes the difference between good copy and a hopeless muddle. Good filters and limiterless operation can "do that" for weak signals.

Those who have never operated narrow shift with a first-rate demodulator have a most pleasant surprise in store. However, words alone will never convince you — give it a try and become a believer! QST

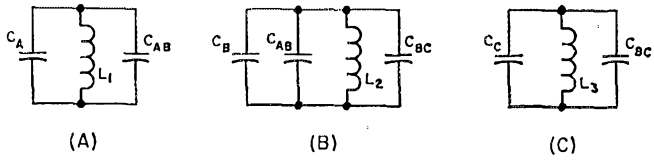
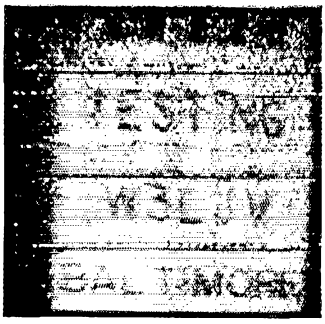
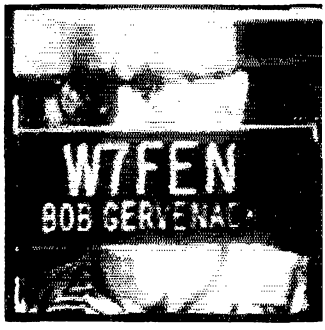


Fig. 13—The three-pole Butterworth filter shown in Fig. 12 breaks down into the equivalent of three separately-tuned circuits as shown above. Tune each of the three to the same frequency (see text), then build into the final circuit of Fig. 12.

Twenty-Meter Slow-Scan Tests



W3LJV got this picture into Colorado Springs in spite of high-weekend QRM and low-power a.m.



W7FEN to W9NTP.

This shot was recorded by HC1WD, Quito, Ecuador.

W9NTP to W7FEN, 100 watts, 1800 miles.

IN spite of the lack of "long distance" frequencies, a small but enthusiastic group of radio amateurs has held to their faith in the great potential of slow-scan TV[1]. When WAØNLQ was asked to speak at the Rocky Mountain ARRL Convention recently, the FCC was asked for and gave permission to a slow-scan group of five stations[2] to use frequencies in the 20-meter phone band for a demonstration during the convention which was held June 17 to 20.

The transmitting and receiving equipment used by all stations in the tests was standard, unmodified amateur phone gear. The slow-scan "audio" was fed to the transmitter mike input and a slow-scan monitor was connected to the receiver headphone or speaker terminals. Ordinary home tape recorders were used to record the receiver audio output at each station, so that pictures could be reexamined and photographed later by playing the tape back into the slow-scan monitor. Picture transmission with running commentary was successfully accomplished several times during the test period by transmitting voice on one sideband and slow-scan on the other.

Literally thousands of Q5 pictures were received by participating stations. With signals piled several deep, received signal levels of 100 to 300 microvolts at the receiver were found necessary to achieve perfect copy. With a fairly clear channel, perfect pictures were obtained with receiver inputs in the 10 microvolt range.

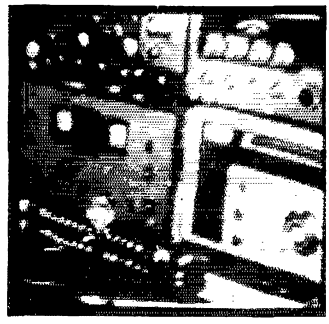
The live demonstration was a big success at the convention and amateur reaction was impressive to say the least. The accompanying photographs show some of the test pictures.

Thanks go to the following stations who helped make the slow-scan tests a success: W6BJ, W6DMN, W6EBW, K6GM, W6KVH, WA6RNG, HC1WD, and VK3AHR. It is hoped that in view of the strong positive reaction to the slow-scan demonstration, some priority will be given to a review by the FCC of the ARRL petition to permit slow-scan TV operation in the 10- and 15-meter phone bands. QST

[1] *QST*, September 1958, August 1958, April 1960, February 1961, January 1961, March 1964, August 1965, July 1965, and May 1965.

[2] Copthorne MacDonald, WAØNLQ, Robert Gervenack, W7FEN, Don Miller, W9NTP, Sol Leise, W3LJV, and Robert Stanley, WØITB.

W9NTP to VK3AHR, 9800 miles. Thanks to W9TCT who arranged the schedule. That's W9CNW in the photo.



W9NTP to WAØNLQ, 1000 miles.

W7FEN to WAØNLQ, 200 watts. Received signal strength was 9 to 15 μv.

WAØNLQ to W9NTP, photo is WAØNLQ.

Technical Correspondence

HERTZES? WHY NOT?

Technical Editor, *QST*:

Let's see now; we have Mr. Ohm's ohm for resistance, Monsieur Ampere's amps for current, Mr. Faraday's farads, Mr. Henry's henrys for inductance, and for all I know, Monsieur Voltaire's volts for potential, so I guess it is perfectly logical to have Hertzes.

After all, there is certainly no point in making electronics simple. If we did that, any old citizen could understand it, and then where would the status be in the statement "I'm in *Electronics*"? So why use an understandable word like "cycles" when we can use a mysterious word like "hertzes?" Why don't we track down the discoverers of lots of other phenomena electronicana and use their names for the descriptions of the things they discovered or first investigated?

For example: Let us suppose Herr Schultz discovered the short circuit, Mr. Fink invented the switch, Monsieur Pernoud discovered radiation, old prehistoric Ug discovered heat, Mr. Smythe discovered spark, and Mr. Ginsberg invented the key. Mr. Bolyznewitz, we shall assume, discovered electrical shock, and Mr. Valisloff first successfully used the electrostatic shield. If this had been so, just think of the soaring verbosity possible in a simple description. Try this for size:

> "The technician must exercise great care in installing the valisloffed link in the area of the pernoud section. The ug generated by the intense smythe can easily schultzify into the ginsberg and produce a severe bolyznewitz."

Makes perfect sense, doesn't it? Another advantage of this principle is that practically no one outside the electronic fraternity could understand it. Think of the job security! Ordinary conversation would be unintelligible to the average man, and the prestige of those in the know would skyrocket. It might even permit the TV-service man to get an extra buck or two out of his unenlightened customer. Finally, there is justification in other professions for this sort of verbal snow job. Medicine has done it for centuries. Law is loaded with such gook, so why not electronics too?

Think about it. Isn't that sensible? Or is it! — *August F. Huge, Jr., WA5BTO, 9783 Westview Drive, Houston, Texas 77055.*

REACTANCE SIGNPOSTS

Technical Editor, *QST*:

Recently I had the problem of adjusting a new beam antenna and needed an r.f. bridge to do the job properly. After consulting my file of *QST*s and finding the answer in August 1955 ("An Improved Antenna Bridge"), I decided to consult the originator, Stu Seely, K4ZO, ex-W2ZE. Among the many suggestions that he made, I found that he plugged in an external capacitor across either the unknown reactance or the standard resistor at the bridge. This gives a quick indication of the direction and magnitude of the unknown reactance. The accuracy of the bridge is greatest with a zero-reactance load so only readings taken with reactance tuned out should be considered.

My r.f. bridge uses construction similar to that in the *Handbook*. This gave me enough room for permanently mounting a 100-pf. variable capacitor across the "unknown" jack and one across the 51-ohm resistor. The one across the unknown is labeled "X_C," indicating that capacitive reactance is required to bring the load into resonance. The one across the standard resistor is labeled "X_L," indicating that inductive reactance is required to correct the load. The bridge is calibrated and initially set up with these capacitors at minimum settings. The amount of either capacitance required for getting the best null gives a quick and rough indication of what is needed to bring the load (antenna) into resonance. No attempt was made to calibrate these reactance indicators because of the many variables involved.

I found this a very handy modification of the simple r.f. bridge, and it greatly simplified the tuning up and matching of the beam. — *Wayne W. Cooper, K4ZZV/W6EWC, 9302 N.W. 2nd Place, Miami Shores, Florida 33150.*

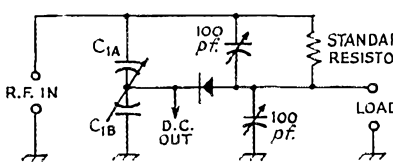


Fig. 2

TRANSISTOR REGENERATIVE DETECTOR

Technical Editor, *QST*:

In "Technical Correspondence" in June 1966 *QST* some criticism has been made on the design of my transistor detector circuit published in January 1966 *QST*. To clear up the situation I would like to make the following explanation.

The article was not written for technicians so much as to present a proved circuit to those who like easy-to-build equipment. The analogy explanation is not a direct translation of the original German article and therefore should not be analyzed too critically.

However, I definitely do not agree that currents in the order of 50 microamperes are optimum for all germanium transistor detectors. This may be valid for alloy transistors, which nowadays are of no practical interest for h.f. applications. Besides this, everyone experienced in transistor circuitry will admit that germanium transistors should not be operated at such low current levels because of instabilities due to leakage currents and temperature effects. Furthermore, the f_T of the transistor will fall off very rapidly.

Today, drift-field, mesa and planar transistors must be considered. The detector circuit published is based on the Valvo-Philips drift-field transistor AF-114, which is similar in characteristics to RCA's 2N1177. The data sheet on this transistor

shows a marked optimum of nonlinearity between base-emitter voltage and collector current at about 1 ma. Within 60 mv., the transconductance changes by a factor of 10. Therefore, this operating point is well suited for signal detection. It is not always necessary to operate the transistor near absolute cutoff but merely at the cutoff point of the high-transconductance portion of the I_C/V_{BE} curve. The same adjustment is found by experiment, regardless of regeneration being used or not.

Other transistor types may need different currents for optimum detector operation. Germanium mesa and silicon planar transistors with an f_T of 500 to 1000 Mc. will operate best at about 0.2 ma., a value which is close to the recommendations given by Shea for silicon transistors.

When adjusting for the best operating point it is bad practice to modify the base divider if large changes in collector current must be made. The voltage between the base and the positive terminal (for p-n-p types) should be maintained at about 2 to 3 volts; otherwise, performance of the d.c. feedback circuit will be degraded. To change the collector current, the emitter resistor should be varied.

If regeneration is used with the transistor detector, it is necessary to vary the collector resistor correspondingly to maintain a collector-emitter voltage of about 0.7 volt. This does not disturb demodulation but provides a self-limiting effect when the circuit is made to oscillate for c.w. reception. Without this limiting, the r.f. amplitude generated becomes so high that the operating point is shifted toward zero collector current, causing a quenching action which is heard as a growling tone.

In the original German article it was clearly emphasized that rectification takes place by virtue of the nonlinear transfer characteristics of the transistor at the operating point chosen. It is not necessary to develop an a.f. voltage across the base-emitter-diode of the transistor. Therefore, it is advantageous to short-circuit the base-emitter diode for audio frequencies by using an r.f. choke and an electrolytic capacitor. This eliminates the a.f. noise generated in the detector transistor itself by the d.c.-current flow. Therefore, when regeneration is not used the noise level of the receiver is determined by the first audio transistor, which should be a low-noise type. When good performance is required the detector transistor should have an f_T at least five times the maximum operating frequency.

The above indicates that no essential improvements can be expected from modifications of the circuit published. Among several units built in the Munich area just one did not perform normally on the 10-meter band. It was found that, because the transistor had unusually high f_T, the circuit started to oscillate at v.h.f. before the 10-meter regeneration was effective. This could be cured by inserting a 15-ohm ¼-watt resistor between the regeneration control, C_3, and the band switch, S_{1B}. Generally, as far as I have been informed, all builders were delighted at the excellent performance of this inexpensive set. — *Hans-Joachim Brandt, DJ1ZB, Zschokkestrasse 65/11, 8000 Munich 12, Germany.*

TV BOOSTERS

Technical Editor, *QST*:

I read with interest the note by WØUGR on TV antenna amplifiers. As one directly involved in the design, manufacture and servicing of these units, let it be said that, with the exception of some pioneer models that suffered from some mechanical difficulties, nearly all of the amplifiers of domestic manufacture are, in fact, properly designed to do the job for which they were intended.

Unfortunately, the biggest single problem we manufacturers have to face is that of misapplication. The TV viewer's attempts to use these amplifiers in areas of high signal strength can lead to amplifier overload and subsequent oscillation. No transistor amplifier of any manufacturer can overcome this misuse. It is for this reason that JFD Electronics Co. produces fifteen different models; to cover as many areas of application as are economically feasible.

All of our amplifiers start to roll off at 54 Mc. and above 220 Mc. None of them have gain in the two-meter band. This trapping was designed into the circuit to alleviate as many problems as possible.

However, the fact remains that the final results are dependent upon end use. With much time and money spent on exhorting the customer to be sure that he is using the amplifier properly, it is still quite necessary to advise those who have returned their units to us for so-called repairs that they shouldn't have purchased a transistorized amplifier for use 200 yards away from a TV transmitter! — *Budd Meyer, K2PMA, JFD Electronics Corp., Brooklyn, New York, N. Y.*

ESSA II

Technical Editor, *QST*:

You may be interested to know that I got my first Essa II weather picture starting with a recording at 9:45 A.M. DST on June 9, when the path was almost directly overhead.

The equipment was built from the article by Wendell Anderson, K2RNF, which appeared in November 1965 *QST*. I have also put up a 4-turn 137.5-Mc. helix antenna with a 4 × 4-foot reflector in accordance with Doug DeMaw's article in the same *QST* issue.

The lack of definition in the low-amplitude areas is due to some fault in the amplifier, but despite all this I am rather proud of the picture. Hurricane Alma was moving up the west coast of Florida at the time the picture was shot. When you consider that the area is 2000 by 2000 miles you will realize that Alma was quite a fat lady! — *Charles H. McKnight, W4MKM, Stove Point, Dellaville, Virginia.*

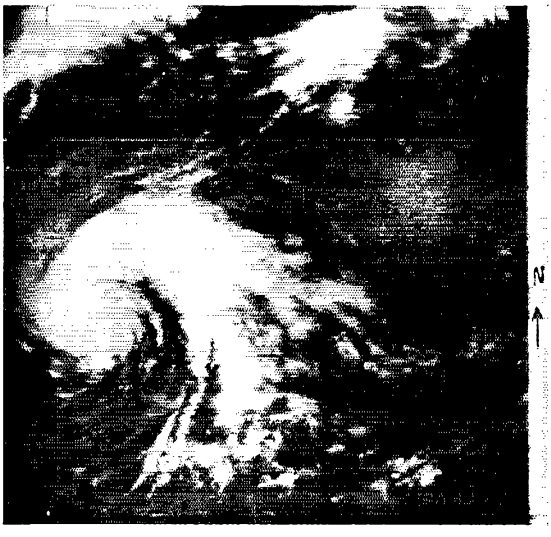


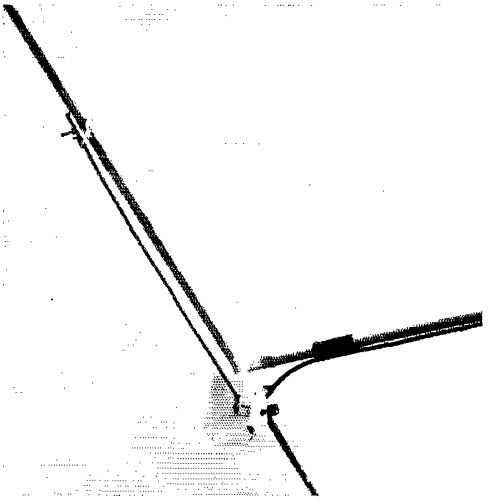
Fig. 1

A Two-Element Beam For 15

Do It Yourself Using Do-It-Yourself Aluminum Tubing

BY LEWIS G. McCOY,* W1ICP

One of the real "fun" things in amateur radio is building, adjusting, and using your own antenna. Here is a two-element beam for 15 that will hold its own, or out-perform many three element trap jobs and it is easy to build, too.



Here's the gamma match, driven element. Note the coax dressed along the boom.

THOSE hams who have come into amateur radio in the last four or five years and are interested in operating on 15 and 10 meters are in for a very pleasant surprise. Radio conditions are tied in quite closely with the number of sunspots present on the sun. When the sunspots are numerous, conditions on the 15- and 10-meter bands are usually excellent. What many hams may not understand is that the sun goes through cycles. The number of sunspots, or sunspot activity, steadily increases from a low point until they reach a maximum, and then decline again until another low is reached. The length of a complete cycle is about 11 years. The most recent low spot in the current cycle occurred during 1964 and we are now in a gradual upswing, with the predicted peak in sunspot activity to occur in a few years. As the sunspots increase, conditions on 15 and 10 meters will improve. By conditions, we mean the bands will be open for skip contacts to most parts of the world. When these bands are open, it is possible to make many world-wide contacts using very low power. In fact, when we said a "very pleasant" surprise we meant just that. An amateur's first venture on 15 and 10 under open band conditions is a revelation.

In addition to the low-power feature, it is possible to build antennas with gain and directivity which would prove almost impossible to construct on the lower bands, 80 and 40. Not only is it possible to build your own antenna for 15 and 10, but here is also a chance to do a little home construction and learn a little about directive antennas.

In this article we'll describe the construction of a 2-element rotary beam for 15-meters. However, before getting into the actual construction details, let's discuss rotary beam antennas so we'll have a better understanding of what they will do.

A simple half-wave dipole, Fig. 1 at A, will radiate in a bidirectional manner, two lobes with equal amounts of radiation broadside to the plane of the wire. If we could make the dipole rotatable we could then take advantage of the directivity of these lobes and, in fact, many amateurs use rotatable dipoles. A half-wave dipole on 80 meters would be about 130 feet long so it would be rather difficult to make a rotatable dipole of that size. In addition, in order to get the two directional lobes from a dipole, it should be something more than a half-wave above earth ground. On 80, this would mean a support at least 130 feet high! However, on the higher bands, this doesn't pose as much of a problem; a half-wave on 15 is slightly more than 20 feet and most of us can get an antenna up that high or higher.

If we place another antenna, in front or in back of our half-wave dipole, and modify the

* Beginner and Novice Editor

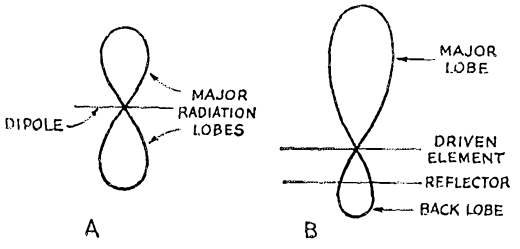


Fig. 1—At A, typical pattern of a dipole and at B, a two-element beam.

length of this second antenna, it is possible to change the lobes radiating from the half-wave dipole. This second antenna is called a "parasitic" antenna or parasitic element. Such an antenna system is shown at Fig. 1B. In this case, the parasitic element is made slightly longer than the antenna, or "driven" element and is called a reflector. If the added element is made shorter than the driven element it is called a director.

Adding this additional element to the antenna modifies the lobes radiated from the system. Instead of an equal bidirectional radiation pattern, more energy is radiated in one direction than the other. We don't have any more power radiating from the system but what we have done is concentrated or "beamed" most of the energy in one direction and such an antenna system is called a "beam." If you compared the dipole at A to the beam at B, the beam would radiate more energy in its best direction than the dipole and the beam could be said to have "gain" over the dipole.

As mentioned earlier, a half-wavelength on 15 meters is slightly more than 20 feet. A two-element beam, driven element and reflector, would consist of two elements about 20 feet long and they could be mounted on a boom 8 feet or less in length. This complete structure can be built with aluminum to make it lightweight, and mounted up in the air and rotated so that the signal can be beamed in the most favorable direction. This is exactly what the antenna shown in Fig. 2 is, a two-element beam for 15 meters. The gain of this antenna is approximately 5 db. over a half-wave dipole alone.

To give you an idea of what 5 decibels means let's assume you are running the maximum Novice power, 75 watts input and getting 50 watts output. The 5 db. would increase your effective radiated power about three times in the favored direction, or to something slightly more than 150 watts! Additionally, the beam will have a property known as front-to-back ratio with about 20 db. of attenuation of signals arriving from the rear of the antenna. This is helpful in cutting down QRM.

Finding Suitable Materials

Some hams may be fortunate to live near junk yards where aluminum tubing is available and at reasonable prices. However, many hams live in areas where there are no surplus or junk markets. Fortunately, there is one source that is available to all hams and that is the Reynolds "Do-It-Yourself" material available in practically any hardware store and in most Sears retail stores. The Reynolds stock may be slightly more expensive than surplus aluminum but the ease of procurement makes up for the price difference.

The Reynolds tubing that is used to make up the elements in our beam comes in eight-foot lengths. The readily available sizes are 1-inch and ¾-inch diameters. A single element consists of one of the larger-diameter lengths and two of the ¾-inch diameter sections. When the smaller diameters are telescoped into the larger piece, the fit is very loose. We searched around for some type of readily-available material so the element sections could be telescoped a little more rigidly. While we didn't know it at the time, and neither do most stores who stock the aluminum, Reynolds manufactures a ⅞-inch diameter stock for the primary purpose of telescoping their other two sizes together. The reason we are stressing this point is because the average dealer doesn't know this stock exists, mainly because his catalog doesn't show it,

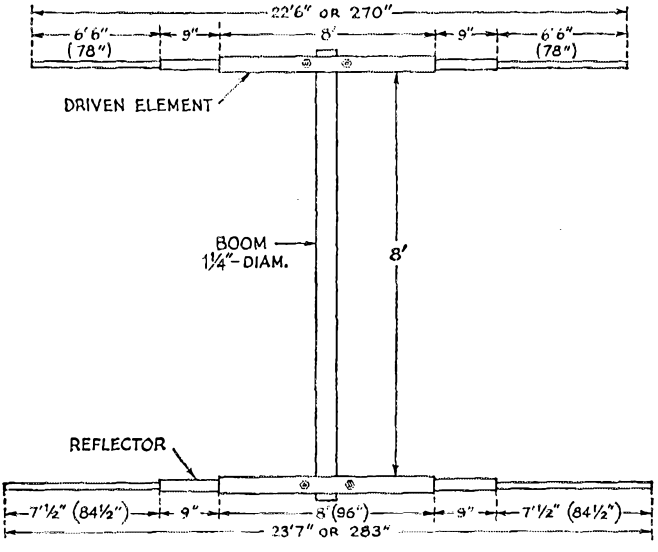


Fig. 2—Dimensions for the two-element beam.

or isn't up to date. Our dealer was quite happy when we showed him the latest catalog because of past requests he had for just such material!

We've included a bill of materials to make your shopping easier but, to reemphasize that ⅞-inch diameter stock comes in 6-foot lengths, and the Reynolds stock number is 185. The boom is 1¼-inch diameter, 8 feet long and Reynolds has such an item available or you can get a TV mast section from any TV store.

Constructional Information

Fig. 2 provides all the dimensions of the completed beam. The Reynolds ⅞-inch diameter stock is 6 feet long and this should be cut into four equal lengths, 18 inches long. This will provide the required sleeves for joining the other two sizes of stock together. In order to mount the 1-inch tubing to the 1¼-inch boom the smaller stock must be drilled to take the U bolts as shown in Fig. 3 at B. Take extra precautions when measuring the 1-inch stock for drilling the U-bolt holes. The stock that we used was exactly 8 feet long but don't take that for granted; measure each piece yourself and be sure the U-bolt holes are drilled exactly each side of center so that the element will be balanced when mounted to the boom.

After you cut the ⅞-inch diameter stock into four lengths, carefully deburr and smooth off both the inside and outside of the cut ends with a file or knife blade. The fit between the two size tubings is quite precise and if the sleeves aren't smoothed, you are liable to "lock" up the pieces when sliding them together and have a nasty job trying to separate them.

We carefully marked off the tubing with pencil marks at the dimensions shown in Fig. 2 and then rechecked the lengths about three times to be sure they were correct *and then* drilled holes to take No. 6 metal tapping screws. The holes were drilled about one inch in from where the tubing meshed. When the metal tapping screws were screwed in, all "looseness" in the elements disappeared.

Bill of Materials

Quantity	*Length (ft.)*	*Diameter (in.)*	*Reynolds No.*
2	8	1	9A
4	8	¾	8A
1	8	1¼	10A
1	6	⅞	185

2 U-bolts, TV antenna to mast type.
1 variable capacitor, 150 pf. maximum, any type, 1 plastic freezer container, approx. 5 × 5 × 5 inches, to house gamma capacitor.
Gamma rod, ⅜- to ½-inch diameter aluminum tubing, 36 inches long. (Aluminum curtain rod or similiar.)

A freezer container of the non-rigid plastic variety was used to house and protect the gamma capacitor, C_1. Either No. 12 or No. 14 solid copper wire can be used to connect from the stator and rotor to nuts and bolts mounted on the side of the plastic box. Incidentally, a good source for short lengths of No. 12 or 14 solid wire is ordinary house-wiring cable. Any hardware store will sell you whatever you need and you'll find it a lot cheaper than buying a whole roll of wire. The plastic container was mounted to the boom via the U-bolt that holds the driven element.

Either 50- or 70-ohm coax can be used to feed the beam and we used 50-ohm in our installation. It is suggested that the larger-diameter cable be used, RG-8 polyfoam type, as it has less loss than the smaller type, RG-58/U. To prepare the coax for feeding the beam first remove about 6 or 7 inches of the insulation that covers the outer braid. Separate the braid from around the inner conductor and then tape the cable where the two conductors separate in order to weatherproof the cable. We used the Scotch electrical tape which makes a good weatherproof seal.

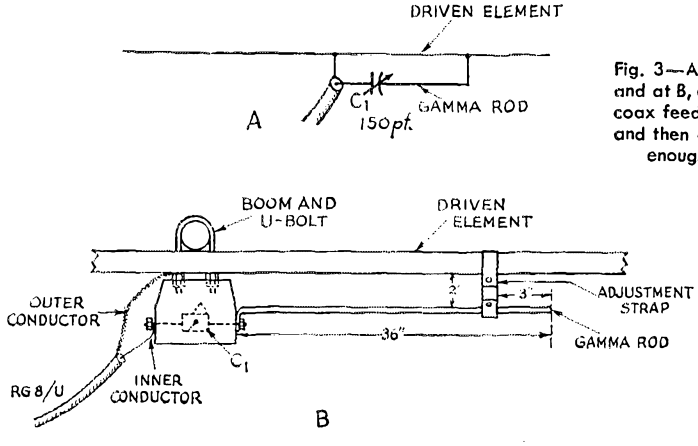


Fig. 3—At A, method of using gamma feed and at B, constructional details of gamma. The coax feed line should be taped to the boom and then down the supporting mast, allowing enough free line at the mast to permit rotation of the beam

The outer braid should be fastened to the boom at the center of the driven element. We did this by clamping the braid under one of the U-bolt nuts that holds the plastic box. The inner conductor of the coaxial line should be connected to one of the nuts and bolts that connect to one side of C_1. The other nut and bolt connecting to C_1 is used to support one end of the gamma rod, the other end of the gamma rod is supported by the adjustment strap, see Fig. 3.

There are so many ways in which a beam can be mounted that we won't go into a great deal of detail here. However, a couple of hints may help. First, this entire beam weighs less than ten pounds so a TV rotator will easily handle the antenna. Along the same lines, TV hardware and masting could be used for supports. The only real problem is mounting the boom to a supporting pipe. One of the simplest methods is the device shown in Fig. 4. This consists of four TV U-bolts and a metal plate, aluminum or steel, 1/16 to 1/8-inch thick, and 8 inches square. Two of the U-bolts hold the boom and the other two bolts hold the plate to the mast.

Adjusting The Gamma

In order to adjust the gamma match you'll need a reflectometer.[1] This is a device that is quite easy to make and when installed in the coax-feed line, it will show when the antenna end of the line is properly matched. Also, it will serve as a constant monitor or output indicator and tune-up device.

If it is possible to adjust C_1 and the gamma adjustment strap with the antenna in its normal location, then do so. However, in many cases, it won't be possible to reach the antenna to make adjustments so they will have to be made with the antenna near the ground, on a garage or on a step ladder. Try to get the antenna as high above earth as possible and still be able to reach the gamma adjustments. The closer the antenna is to its normal location, the less change there will be in the match. The feed-point impedance of an antenna changes with its height above ground. Hence, we want it as high as possible so we'll get the least change after it is once adjusted.

While the dimensions given for the gamma settings in Fig. 3 may be the same for your beam, it is quite likely that because of construction differences, height above ground, and so forth, you will probably have to make some adjustments in the gamma. The object in adjusting a gamma is to have your reflectometer read zero in the reflected position versus full scale in the forward position. This would indicate a matched condition and an s.w.r. of 1 to 1.

For a trial setting, place the gamma adjustment strap at the dimensions shown in Fig. 3 and set C_1 near maximum capacitance, 95% meshed. Tune up the rig on 21,200 kc. and feed enough power through the system to get a full-scale reading on the reflectometer in the forward position. It won't take much power to get a full-scale reading and it is a good idea to make your adjustments at as low a power level as possible. Switch the reflectometer to read reflected power and note the reading. Any reading of less than one-tenth of full scale would indicate an excellent match. However, you'll probably want to experiment and shoot for a "perfect" match. Try increasing or decreasing the setting of C_1 and then comparing forward and reflected readings to see if the match improved or worsened. Be sure to keep notes so you'll know which way to go with C_1, or the new setting of the shorting strap. Try moving the shorting or adjustment strap about one inch at a time, either out or in from the boom, and go through the adjustment range of C_1 again. Eventually, and if your patience doesn't wear out, you'll get a perfect match.

The antenna shown in the article was designed to resonate at 21,200 kc. at about the center of the band. However, the antenna was essentially "flat" across the entire 21-Mc. band. For those hams who want to work both ends, the lengths for 21,200 kc. are ideal. However, if you want the antenna for just phone or c.w. the formula for finding the element lengths for any given frequency is quite simple.

$$\textit{Driven element length} = \frac{473}{f}, \text{ where } f \text{ equals}$$

the frequency in megacycles, and the answer will be in feet. The reflector should be made five percent longer than the driven element.

If this is your first experience with a beam antenna you'll be in for plenty of surprises. You'll note that when the beam is sideways to a station, the station will be practically inaudible but when the beam is aimed at him, a real 5-9er! You'll probably want to make many front-to-back checks with other stations and don't be discouraged if each report doesn't check out with the other. Depending on the angle the signal leaves or arrives at the back of the antenna, the front-to-back can be excellent, or practically non-existent. You should note a pronounced front-to-back ratio on nearly all local stations, those that are more or less line of sight from your station. However, on the skip stations, the difference will vary considerably. This fall and winter should be a real humdinger on 15, don't miss it!

QST

[1] De Maw, "The Varimatcher," *QST*, May 1956 or *Understanding Amateur Radio*, page 209.

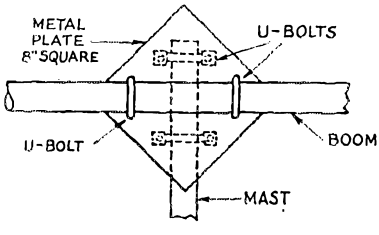
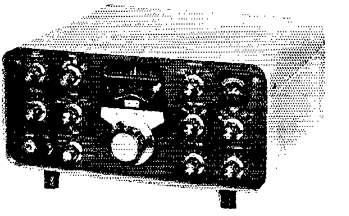


Fig. 4—Details for mounting beam to mast. All U bolts are TV-antenna hardware type.

Recent Equipment

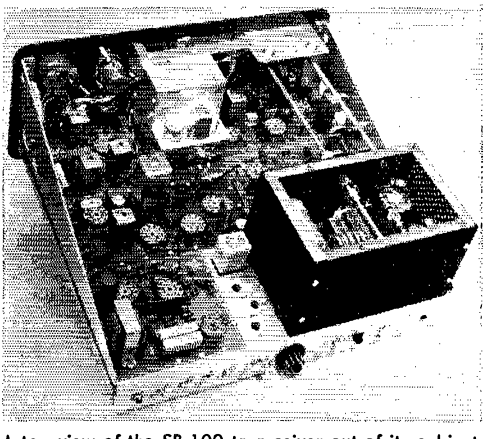
To acquaint you with the technical features of current amateur gear.

The Heathkit SB-100 Transceiver



AFTER contemplating what looks like thousands of components and parts in the SB-100 kit package, the experienced old-time kit builder would probably resign himself to many grueling hours of work. Such is not the case. What with printed circuit boards and a new technique in bandswitch assembly and construction, the SB-100 can probably be put together in half the time it takes to complete an equivalent old-fashioned hand-wired job. There is wiring to be done, of course, but it is restricted to interconnecting the circuit boards and panel components.

The writer kept a fairly accurate account of time spent on the kit. It totaled about 33 hours, not counting the alignment and testing. A rough breakdown of this total showed that unpacking and sorting took 4 hours (if they could only put those resistors, capacitors, and hardware items in separate packages according to value and size!), circuit board assembly 7½ hours, mechanical assembly 5 hours, wiring harness hookup 7½ hours, and general wiring 9 hours. If everything works the first time (this one didn't), the alignment and testing could probably be done at one sitting in a couple of hours.



A top view of the SB-100 transceiver out of its cabinet. The vacuum tubes and the final r.f. amplifier shielded-compartment cover have been removed in this photograph. At the top right corner of the photograph, are three miniature controls mounted on a plate. They are (l. to r.) VOX SEN, VOX DELAY, and ANTI-TRIP. The linear-master oscillator assembly, which comes put together in the kit, is the silvery box just to the left of the above-mentioned controls.

The SB-100 is a 5-band transceiver covering 500-kc. segments in the amateur 80- through 10-meter bands; 10 meters is covered in four 500-kc. segments. Transmitter input power is rated at 180 watts p.e.p. on s.s.b., and 170 watts c.w. Provision is made for selectable upper or lower sideband and c.w. There is no provision for a.m.

Circuit description of the transmitter and receiver sections of the SB-100 will be treated separately, although some of the tubes and circuits are used for both functions.

Transmitting

Fig. 1 shows a block diagram of the SB-100 with the transmitter components grouped at the top and receiver components at the bottom. A circle or square marked with an asterisk indicates that these items are used for both receiving and transmitting.

When the SB-100 is set up for s.s.b. transmission, output from a high-impedance microphone (or low-impedance input to a jack at the rear of the chassis) is amplified in V_1 and then applied to a semiconductor ring-type balanced modulator. Transmitter carrier suppression is rated at 50 db. down from single tone output. Output from the carrier oscillator, V_{16}, also feeds to the balanced modulator. The frequency of the carrier oscillator is controlled by one of three crystals, depending upon the mode — upper sideband (3396.4 kc.), lower sideband (3393.6 kc.), or c.w. (3395.4 kc.). The sideband selected is amplified in V_2 and applied to a 6-pole lattice crystal filter, FL_1, which has a center frequency of 3395 kc. and a usable bandwidth of 2.1 kc. minimum at 6 db. down, 5 kc. maximum at 60 db. down (2:1 nominal shape factor at 60/6 db.). Transmitter unwanted sideband suppression is rated at 55 db. down from single-tone output at 1 kc. reference. Third-order distortion is 30 db. down from 2-tone output. Spectrum analyzer checks in the ARRL lab found the SB-100 well within the above ratings.

After amplification by V_3, signals from the filter are combined in the first mixer, V_{5A},

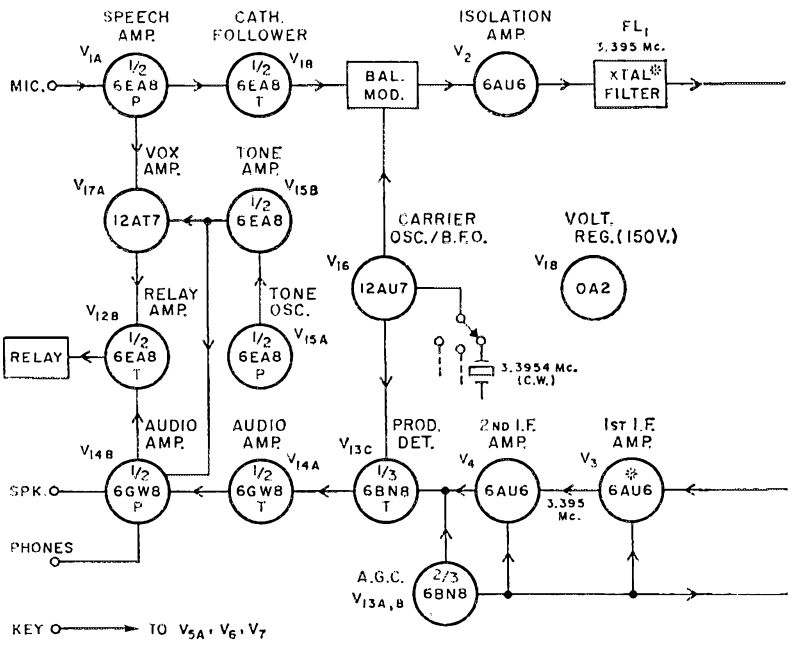


Fig. 1—Block diagram of the Heath SB-100 Transceiver.

with the output of the linear master oscillator (l.m.o.), which can be continuously tuned over a frequency range of 5 to 5.5 Mc.

The l.m.o. is factory-assembled and sealed and is simply bolted to the chassis during kit assembly. Frequency drift is rated at less than 100 c.p.s. per hour after a 20-minute warm-up, and less than 100 c.p.s. for plus or minus 10 per cent line-voltage variations. The l.m.o. is mechanically driven by way of a pinch drive through the panel main tuning knob.

The main assembly has two dials. The lower circular dial is divided into one hundred 1 kc.-segments. The upper slide-rule dial is numbered from 0 to 5 and is divided into five 100-kc. segments. The distance between any two consecutive numbers on the upper dial is equal to 100 kc., or one revolution of the 2½-inch diameter tuning knob. Dial mechanism backlash is rated at less than 50 c.p.s. With a dial knob ratio 4 to 1, about 10 feet per megacycle of bandspread is achieved. Visual dial accuracy is within 200 c.p.s. on all bands, and electrical dial accuracy is rated within 400 c.p.s. after calibration at the nearest 100-kc. check point.

For fixed-frequency operation, a special feature associated with the MODE switch on the transceiver allows for crystal, instead of l.m.o., control of the unit for MARS or net operation. With the MODE switch in the AUX 1 position, the transmitter operates at a fixed frequency that is determined by a crystal (not supplied with the unit) located in the crystal oscillator circuit of V_{5B}. By placing the MODE switch in the XTAL position, *both* the transmitter and receiver frequencies are determined by the crystal. Information is given in the SB-100 instruction manual for calculating the crystal frequency.

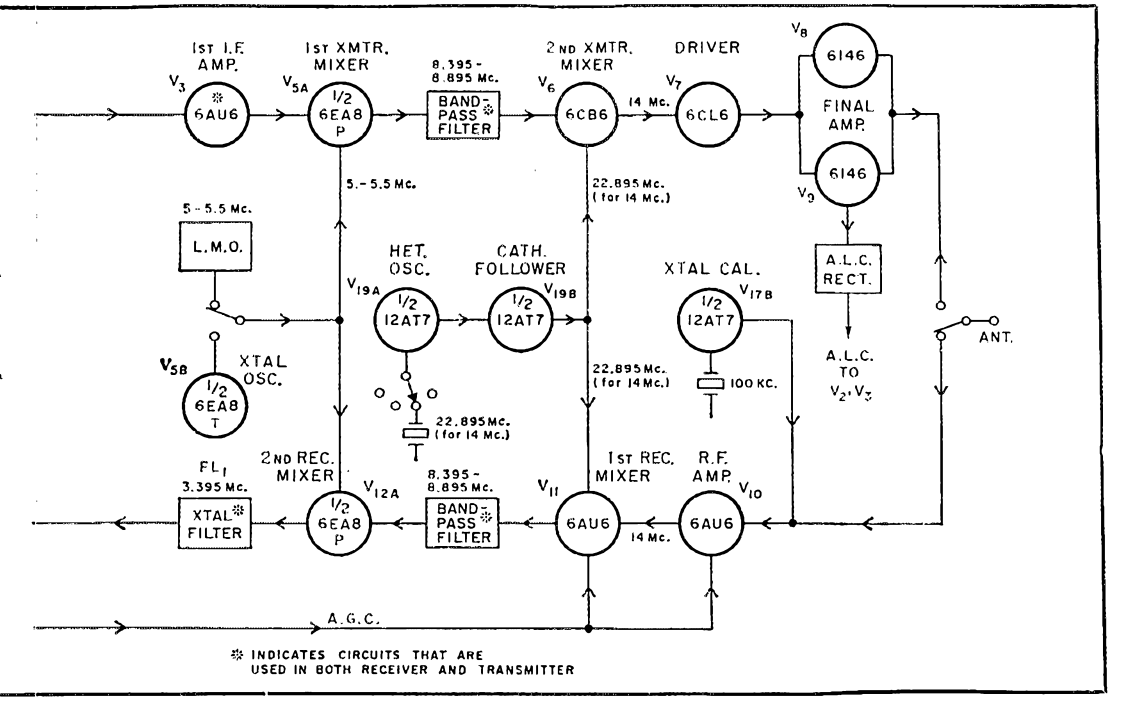
The 5-Mc. range l.m.o. (or crystal) signal and the 3.395 Mc. energy from V_3 are combined in the first mixer to give 8.5-Mc. output which is passed through a bandpass filter and to the second mixer, V_6.

Signals are heterodyned to the desired amateur-band frequency in the second mixer. Injection is furnished by a crystal-controlled heterodyne oscillator, V_{19}. The frequency of this oscillator is always 8.895 Mc. higher than the lower edge of the desired-band segment. For example, V_{19} would be oscillating at 22.895 Mc. for 14-Mc. operation. The necessary crystal is placed in the heterodyne oscillator circuit by the panel BANDSWITCH.

A neutralized 6CL6 driver, V_7, provides the necessary amplification to drive the parallel 6146 r.f. linear amplifiers, V_8 and V_9, which are operating in class AB_1. All of the tuned circuits, except the final amplifier plate and loading, are ganged tuned by the panel DRIVER PRESELECTOR control.

A pi-network couples the output of the amplifier to the antenna load and the circuit is designed for a 50- to 75-ohm load with not more than a 2 to 1 s.w.r. Output from the transmitter is rated at 100 watts on 80 through 15 meters, and 80 watts on 10 meters. However, our unit delivered well over 100 watts on all bands.

Automatic level control (a.l.c.) is used in the SB-100 to prevent overdriving the r.f. amplifiers. In addition to the conventional method of obtaining a.l.c. voltage from the control grids of the final tubes V_8 and V_9, the SB-100 also



samples variations that occur in the final amplifier screen supply voltage.

Fig. 2 is a schematic diagram of the a.l.c. circuit. Any audio frequency voltage developed on the control grids of V_8 and V_9 is coupled through C_2 to the voltage-doubler diodes CR_1 and CR_2. Speech peaks will produce variations in the final amplifier screen-supply voltage, too, and this signal is coupled to the voltage doubler through C_1. The combined a.l.c. d.c. voltage from CR_1 and CR_2 is treated in an RC network to give it a fast-attack slow-release time constant. This d.c. bias is applied to amplifiers V_2 and V_3 to control their gain for best operation. The r.f. compression, as a result of the a.l.c. action, is rated at 10 db. or better at 0.1 ma. final grid current.

Metering is quite complete in the SB-100. On transmit there are five different values that can be monitored — one at a time, of course — final grid current, final plate current, a.l.c. voltage, relative power output, and power-supply high voltage. When receiving, the meter is a relative signal-strength meter with the meter switch in the a.l.c. position.

The SB-100 can be switched from receive to transmit by either the voice-operated transmitter (VOX) or push-to-talk method. The usual anti-trip circuits are employed to prevent the speaker signals from activating the VOX. Controls associated with the VOX circuit include the VOX SENSITIVITY, VOX DELAY, and ANTI-TRIP, and they are all located on a panel inside the cabinet.

Keying the SB-100 is accomplished simply by

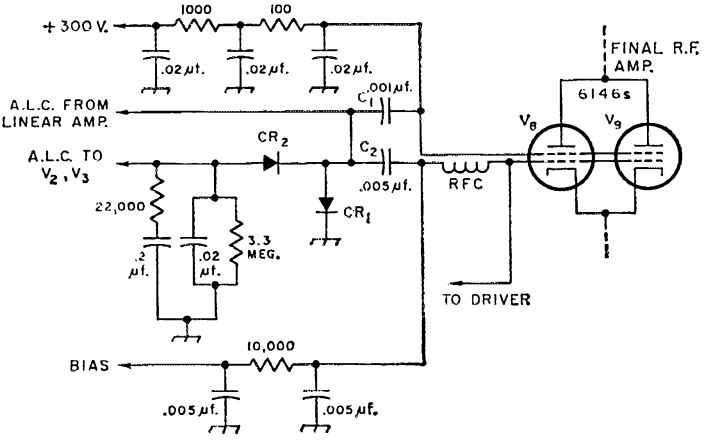
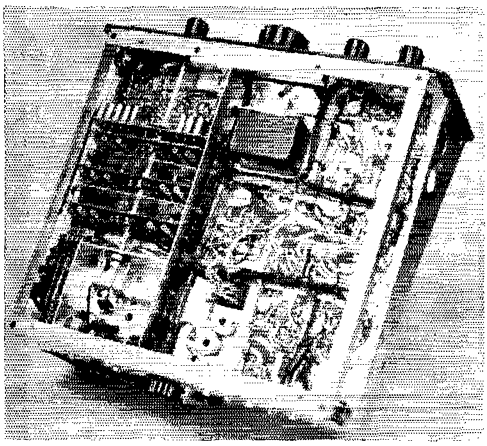


Fig. 2—Automatic-level control bias is developed at the control grids and screen grids of the final amplifiers. See the text for details on a.l.c. operation.



A wiring harness makes for a neat appearance in this bottom view of the SB-100 transceiver. The black object at the top center of the chassis is the crystal filter. An aluminum plate has been removed from the left side of the chassis bottom to show the switch-board, coil and bandswitch assembly.

plugging in the key to a rear-chassis key jack, turning the mode switch to the c.w. position, and sending. When the key is closed, cathode follower V_{1B} and some of the VOX circuits are cut off to prevent any stray audio signals from reaching the balanced modulator. The c.w. crystal is connected in the carrier oscillator, V_{16}, and the balanced modulator is unbalanced to produce an output signal which is fed down the line to the r.f. amplifiers. Keying is done in the transmitter mixers, V_{5A} and V_6, and the driver amplifier, V_7, using grid block keying. A.l.c. is disabled on c.w., and drive to the final amplifier is controlled manually by the panel MIC/CW LEVEL control.

Another feature of the transceiver is a c.w. sidetone for monitoring your own keying. When the key is closed a 1000-c.p.s. tone, generated in V_{15}, is fed to the audio amplifier, V_{14B}, and is available at the speaker or the phone jack. There is a CW TONE VOLUME control inside the cabinet to adjust the tone level.

Some of the 1000-c.p.s. tone is coupled to the VOX circuit so that when the transmitter is keyed the VOX circuit triggers the relay to switch the transceiver to transmit. The relay stays in this position for a length of time that is determined by the setting of the VOX DELAY control, located inside the cabinet.

Receiving

The frequency relationships in receiving are just the reverse of that for transmitting. A signal in the amateur-band frequency is amplified in V_{10} and then mixed with the heterodyne oscillator signal in the first receiver mixer, V_{11}, where it is converted to the 8.395–8.895-Mc. range. For example, a 14-Mc. signal would be combined with 22.895 Mc. from the heterodyne oscillator to give an 8.895-Mc. signal.

Leaving the first mixer, the signal is fed through a bandpass filter, which rejects all but the 8-Mc. difference frequencies, into the second mixer, V_{12A}, where it is mixed with the output from the 5 to 5.5-Mc. l.m.o. to give the necessary 3.395-Mc. output. Crystal filter FL_1 is next in line and sets the i.f. bandwidth at 2.1 kc. wide. After amplification in V_3 and V_4, the signal is converted to audio in the product detector, V_{13C}, and amplified in two stages of audio, V_{14A} and V_{14B}. There is a separate PHONE VOLUME control inside the cabinet to adjust the headphone level independently of speaker volume. The speaker is automatically disconnected when headphones are plugged into the panel PHONE jack.

A negative a.g.c. bias is developed from part of the i.f. signal and applied to the control grid of the r.f. amplifier, V_{10}, the first receiver mixer, V_{11}, and the i.f. amplifiers, V_3 and V_4. In addition to this voltage, a negative-d.c. voltage from the arm of the R.F. GAIN control can manually adjust the gain of these stages. The a.g.c. is designed with fast-attack, slow-release characteristics.

Included in the SB-100 package is a 100-kc. crystal controlled calibrator, V_{17B}. When the FUNCTION switch is placed in the CALibrate position, output from the oscillator is coupled to the input of the receiver and can be used for dial calibration checks.

Construction, Alignment and Other Notes

After a few hours of work on the SB-100 kit, it becomes obvious that the complete job of constructing the kit will not become drudgery. Components are gobbled up at a fast rate by the

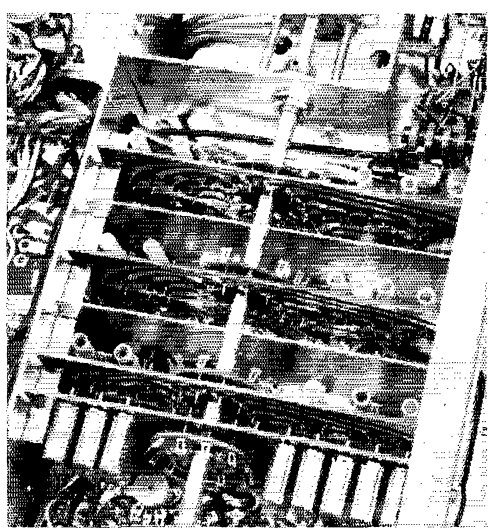


Fig. 3—A close-up view of the unique switch-board, coil, crystal and bandswitch assembly. The switch wafers, coils and crystals are all soldered directly to their circuit boards. The boards are arranged in proper order and slid into the appropriate slots. The bandswitch shaft is then inserted through the switch wafers all the way down through the various boards. Some interboard electrical connections are made, and the job is done!

circuit boards, which make up the majority of the set (see the photographs). The circuit boards are attached to the chassis and interconnected by the wiring harness. A particularly ingenious and time-saving method for band-switch construction is used in the SB-100. The band-switch wafers are soldered to circuit boards along with their associated coils, crystals and components. The circuit boards are then stacked in slots along a straight line in the chassis (See Fig. 3). The band-switch control shaft is inserted down through the lined-up circuit boards to complete the job.

The kit includes some little "extras" that aid in building the kit . . . wrenches, masking tape, allen wrenches, nut starters and the like, to name a few. Heath has also included a 4-color booklet, "Kit Builders Guide," which contains important information on tools, soldering and guides to good kit assembly.

A kit-builder's "thank you" goes to Heath for their excellent 150-page SB-100 instruction manual. It goes into great detail and includes helpful technical information, charts, diagrams and drawings to aid in construction, alignment, and trouble-shooting of the kit. In addition to the usual step-by-step constructional dope, there are sections on testing, alignment, installation, noise suppression for mobile use, a troubleshooting chart, voltage and resistance tables, chassis photographs, circuit board X-ray views and schematics.

Speaking of alignment, Heath engineers have come up with a scheme for transmitter and receiver alignment of the SB-100 that requires the use of only a vacuum-tube voltmeter, dummy load, and a receiver capable of receiving WWV — if this isn't available, a broadcast (b.c.) receiver will do.

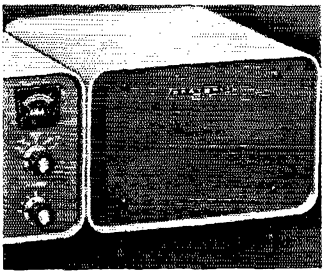
The SB-100 color and styling matches that of the other Heath SB-series of equipment — light gray cabinet, green crackle panel with satin-chrome knobs.

Heath supplies a name plate with a serial number for each piece of equipment. The plate is backed with pressure-sensitive tape and is easily attached.

— *W1CUT*

Heath SB-100 S.S.B. Transceiver

Height: 6⅝ inches
Width: 14⅞ inches
Depth: 13⅜ inches
Weight: 17½ pounds
Power Requirements: 700 to 850 volts d.c. at 250 ma., 300 volts d.c. at 150 ma., -115 volts d.c. at 10 ma., and 12 volts a.c. or d.c. at 4.76 amps.
Price Class: $360.00
Manufacturer: Heath Company, Benton Harbor, Michigan.



The Heathkit SB-600 Communications Speaker

If you are a stickler for matching cabinets in your shack, then you will need an SB-600 speaker/cabinet to go with your SB-100 or, for that matter, with any of the Heath SB-series of amateur radio equipment.

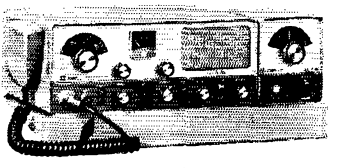
After installing the 8-ohm 6 × 9-inch oval speaker into the cabinet, there is still plenty of room to include the Heath HP-23 power supply, which is the a.c. power supply designed to power the SB-series of equipment. Holes are provided in the cabinet bottom to match up with holes in the power supply, so installation of the p.s. takes only a matter of minutes. Of course, the cabinet colors and styling match that of the SB-equipment.

— *W1CUT*

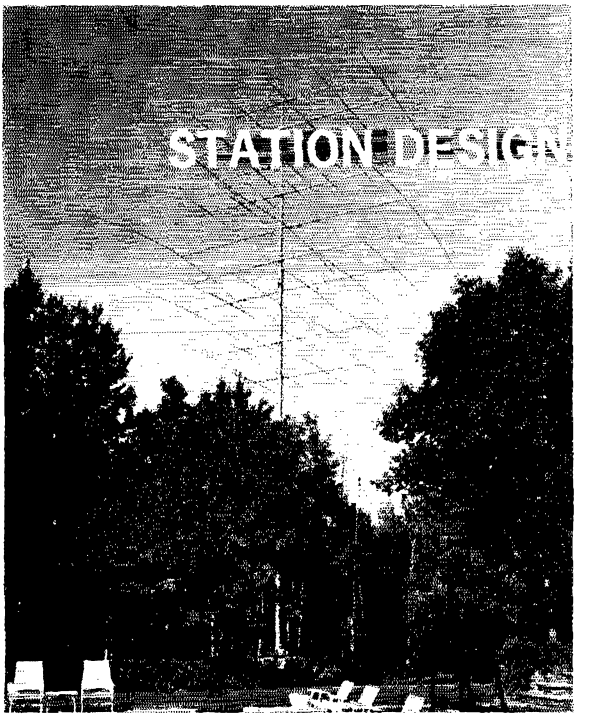
Heath SB-600 Speaker and Cabinet

Height: 6½ inches
Width: 10 inches
Depth: 10½ inches
Weight: 5 pounds
Price Class: $18.00
Manufacturer: Heath Company, Benton Harbor, Michigan

Next Month



Knight-Kit
TR-106 Transmitter, V-107 v.f.o.



Antenna at K2HLB.

FOR DX

Part I— Antenna Topics and Siting

BY PAUL D. ROCKWELL,* W3AFM

Most of what has been written on the subject of optimum station design for DX has been on one aspect at a time. This article assembles various aspects, in the system-approach sense, and is specifically addressed to optimum design for c.w. DX. However, most of the ideas apply also to 'phone operation. Antennas and propagation will be discussed in respects believed to be not generally appreciated. Most of the topics are already familiar to top DXers, but one or more should be useful or interesting to nearly any serious DX operator.

The writer expresses his appreciation for many helpful comments and suggestions in voluminous correspondence with top DXers. It was heartwarming to receive so much cheerful encouragement, advice and many contributions. Only one sharp criticism was received: that DX is 90% operator, 10% equipment. Maybe so — but look at Table 1. The successful DX-contest performers who bring up this point usually have several of the following: (a) a full gallon; (b) a tower over 65-feet high; (c) a boom over 30-feet long; (d) a quiet location; (e) a hilltop site.

Antenna Topics

Firstly, horizontal is by far the preferable polarization. The problem with vertical polarization is primarily with ground losses. Broadcast stations customarily use 120 buried radials to overcome these losses. Such an installation is impractical for amateurs. Radiation efficiency is probably less than 20% for an installation employing say, four radials. G. H. Brown, in *PIRE*, June, 1937 says that for quarter-wave antennas with 0.4λ radials, efficiencies are:

2 radials	12.4%
15 radials	46.2%
60 radials	64.0%
113 radials	88.0%

Furthermore, the vertical radiation pattern is characterized in practical locations by a null at the low angles. The low-angle radiation of a ground-mounted vertical quarter-wave, often shown for perfect earth as being good right down to 0° elevation, actually has a null there.[1,2] Vertically polarized antennas are more susceptible to QRNN (man-made electrical noise) than horizontally polarized.

With horizontal polarization, the antenna is balanced with respect to ground, and ground losses are customarily only a few percent.

Under certain circumstances, a vertical ground-plane can be advantageous, i.e., (a) for a salt-water reflection-zone, (b) for its set-up convenience on DXpeditions,[3] or (c) for construc-

* 5800 Hillburne Way, Chevy Chase, Md. 20015.

[1] Jordan, "Electromagnetic Waves and Radiating Systems," Prentice-Hall, 1950.

[2] Anderson, "Antenna Behavior over Real Earth," *QST* June, 1965.

tional and economic advantages on bands lower in frequency than 14 Mc.[4] Even in such cases, the vertical loses important advantages of (1) gain, receive and transmit, and (2) receiving effective S/N, including rejection of QRM from undesired directions.

Another topic which deserves mention is the question of gain quotations on Yagi antennas. Manufacturers have stated these gains in ways which may be confusing. One manufacturer, for example, chooses to relate the gain of a horizontally-polarized antenna-array at optimum height above ground, to a half-wave dipole in free space. In this way he gives himself 6-db. of ground-reflection gain. His quotation should be correspondingly discounted. The practical basis of comparison is to a half-wave dipole, same height and foreground. Almost all manufacturers, when they do not state that the gain is related to a half-wave dipole, are relating their gains to an isotropic radiator. This raises the gain by 2.2-db. as compared to gain over a half-wave dipole. If the manufacturer has assumed that the reference isotropic radiator is in free space, whereas his array is at optimum height above a perfectly reflecting ground, then his quotation should be discounted by 8.2 db.

The most helpful relation in evaluating gain in a Yagi antenna is the formula:

$$Gain = 10\frac{L}{\lambda}$$

where L is length of the boom in the same units as the operating wavelength, λ. Here the gain is that of the Yagi over a half-wave dipole, broadside, at the same height and foreground, expressed as a factor.[5,6] In db.

$$Gain\ (db) = 10log_{10}\frac{10L}{\lambda}$$

This rule is good for optimized designs with element spacings up to approximately 0.2λ maximum. It says some designs are carrying more elements than they need, and may be delivering less-than-optimum performance on that account.

The rule becomes less accurate as the boom length goes below a half wavelength. Fig. 1 is a useful guide. It is taken, and somewhat shaded, from another reference.[6]

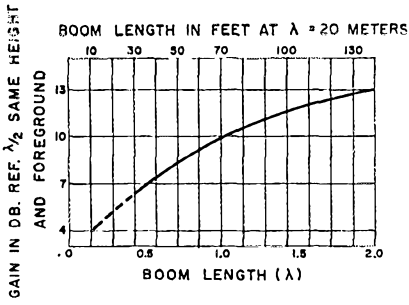


Fig. 1

For quads, use Fig. 1 plus 2 db.; but only at the quad's optimum-design boom-length. The quad may be considered, for estimating gain patterns, as two vertically-stacked Yagis. The vertical spacing, however, is less than optimum: so 2 db. is a better approximation than the 3 db. which would apply in principle for phased arrays. Quad power-gain does not increase linearly with boom length, as is substantially the case with Yagis. Also, quads are more susceptible to side lobes of polarization orthogonal to that of the antenna's nominal polarization. Since h.f. signals arrive with random polarization, this means side responses may be expected to be, relative to Yagis, a problem.[7]

Measurements of antenna gain are tricky. Usual complications are (a) ground reflections, (b) impedance matching, (c) near-field effects, (d) reflections and absorptions from nearby objects, (e) calibration of measuring detector and attenuators, and (f) polarization effects. When scaling is attempted, further complications are incurred. The subject is treated professionally.[8] The same material is published as *IEEE Standards No.* 149 (Revision of 48 IRE 2S2). January, 1965, and is available from IEEE Headquarters, 345 East 47 Street, New York, N. Y. 10017.

[3] *With respect to DXpeditioning, Gus (W4BPD) has found it satisfactory to put a 14AVQ atop the tallest pole he can find, often 40–50 feet. He uses 4 guys. Two of these are insulated at 40-meter quarter-wave points, the other two at 20-meter quarter-wave points. A hole is dug, guy anchors set, and the antenna/pole "walked" up with the aid of pike poles.*

[4] From W3BMX, "At W5KZA I had a pair of phased ground-planes on 7 Mc., quarter-wave spacing and 90° phasing which could be reversed, flipping the cardioid pattern 180°. Each GP was 20 feet above ground at the base and had 12 radials. *Front-to-back ratio* was consistently 20 db. on the nose and the gain about 3 db. Many fellows thought I was kidding when I worked JAs, VS1s, VS6s, DUs, etc., at 9–10 A.M. during the winter months. I was quite impressed with the antenna. It does pick up noise, however; so in a noisy QTH it would not be worthwhile. Its broad radiation characteristics and flat s.w.r. (within 1.5:1) over entire 7-Mc. band were useful and nice to operate."

[5] Simon and Biggi, "Un Nouveau Type d'Arien," *L'Onde Electrique*, Nov., 1954.

[6] Ehrenspeck and Poehler, "Maximum Gain from Yagi Antennas," *IRE PGAP*, Oct., 1959.

[7] Orr, *Quad Antennas*, Radio Publications, Wilton, Conn., 1959.

[8] "IEEE Test Procedures for Antennas," *IEEE Transactions on Antennas and Propagation*, Vol. AP-13, No. 3, May 1965, pp. 437–466.

W3AFM has worked 310 countries on 20 c.w. only, in the period 1962–1965, from a topographical depression beside a 4-lane highway in the middle of greater Washington, D. C. Looking levelly from the peak of his roof, he sees neighbors' basement windows on all sides. This is not a construction article. Rather, this series will present some new and stimulating ideas on subjects such as antennas, station apparatus configuration, most useful apportionment of dollar expenditures on various station components, etc.

From the foregoing, one might infer that Yagis and quads are all a ham should use. Because they can be rotated, this is not far from correct for 10 through 40 meters, where most DX is worked. Log-periodics are unattractive for hamming because of their low gain, high cost, and structural complications. For really high gain, up to, say 16 db., a rhombic can be a good dollar's worth, real-estate considerations permitting. Rhombics can be nested — that is, several can be stacked, with azimuths in various directions, on the same tract. Inter-couplings are less than commonly supposed.[9] Sloping Vs are of course inferior performers.[10]

Siting

The matter of good siting has been appreciated by amateurs for many years. Recent work [11] has made the criteria more clear. For the long hauls, the higher the antenna, the better. Try for a radiation angle ("take-off" angle) main lobe at 1° elevation. It is especially effective to locate an antenna of modest height on a cone-shaped hill on which the ground slopes downward in all directions for a thousand feet or so at an angle of, say, 20°. If you have such a fortunate forezone, 50 feet is a good height for your 20-meter antenna.

The formula for angle of maximum radiation (horizontal antennas, flat terrain) is

$$\alpha = arc\ sin\left(\frac{\lambda}{4h}\right)$$

where h is height (in same units as for wavelength, λ) of the antenna relative to the ground-reflection zone in the foreground. Required height for a given take-off angle is $\frac{\lambda}{4\ sin\ \alpha}$. For 1° at 20 meters, flat terrain, this is about 1000 feet![12] Hence, just figure the higher the better.

The ground-reflection (Fresnel) zone extends as an approximately elliptical area on the antenna forezone. The geometric ground-reflection point in this zone is at a distance $\frac{h}{tan\ \alpha}$ from the antenna. For 1° take-off angle, flat terrain, at 20 meters, this is about ten miles.

The near-end distance of the ground-reflection elliptical area [13] is given by

$$d_n = \frac{h}{tan\alpha}\left(3 - \frac{2\sqrt{2}}{cos\alpha}\right)$$

and the far edge by

$$d_f = \frac{h}{tan\alpha}\left(3 + \frac{2\sqrt{2}}{cos\alpha}\right)$$

or about 1.7 and 58 miles, respectively, for 1° take-off.

Ground reflections have been the subject of published material complete with diagrams.[14]

A consideration for sloping sites, in addition to the marked reduction of optimum antenna height as mentioned above, is the reduction in size of the ground-reflection area. For a 20° sloping forezone, the reflection area is about the size required for 20° take-off angle on flat terrain, or a maximum far edge of about ⅛ mile.

Incidentally, ground losses at h.f. for the grazing angles of interest, say 10° take-off angle, are almost never serious for horizontal polarization and are of the order of a few percent. Ideas of h.f.-site impairment by magnetic masses, etc., under the ground surface are superstitions.

Some conspicuous examples of well-sited stations are W3CRA, W4KFC, and W6AM. These stations have (in some directions) radio horizons at distances of 20–50 miles. Radio profiles are presented in Figure 2. Vertical angles are not significant on charts like these.

The advantage of a good site and/or a high antenna can be of the order of 10–20 db.[11] compared with modest suburban-neighborhood installations. It leads to situations where the "mortals down below" can't even hear traces of the other end of comfortably solid DX QSOs being conducted from the best sites. Incidentally, in progressive antenna changes at W3AFM, increments of only 2 db. in antenna gain have opened up, in each case, a new layer of workable central-Asian DX.

Examples of high antennas with long-boom Yagis, terrain essentially flat, are W5VA, W3MSK and W3PZW. They, too, conduct what seem to be one-sided DX QSOs.

A quiet location can make a telling difference. W2FZY, who seems to hear everything with a modest antenna, attributes his success largely to quietness of site. Some of the new appliances, notably mixers and bed heater-pads, can ruin DX reception in ordinary urban areas. Where there are only one or two such nuisances, they can be tracked down by auto and portable transistor radios. Their direction can be determined, within about 30°, by beam swinging. Once located, the problem can be corrected by (a) buying a new appliance and trading it for the offending one (b) offering an *LC* filter (such as Lafayette 99R4005), (c) both the above. W3AFM's worst offenders have been found within 400 feet. Lesser offenders have been located and corrected at distances up to 800 feet.

Trees and foliage are less of a problem in h.f. communications than generally imagined. The attenuation varies from a small fraction of a db. for horizontal polarization to 3 db. for vertical polarization. The values apply to 30 Mc through

[9] Viezbicke, Interactions between Nested Rhombic Antennas," *NBS Report 6773*, Sept. 12, 1961.

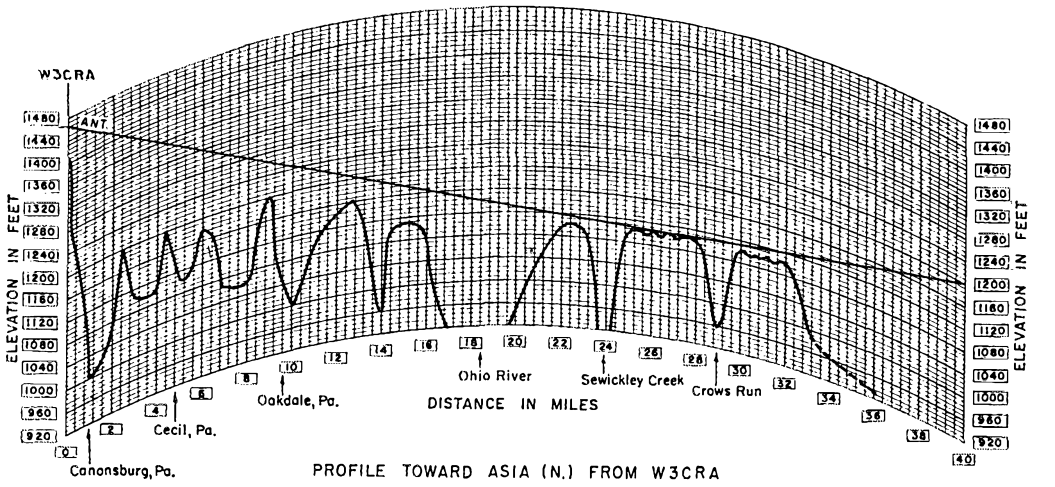
[10] King, "Performance of an Inclined Vee Aerial," *PIRE, Australia*, Sept. 1963.

[11] Utlaut, "Effect of Radiation Angles on HF Radio Signals," *Radio Propagation* NBS CRPL-D, Mar./Apr., 1961. This article is highly recommended. Try Supt. of Documents, US GPO, Washington, D. C. 20402, for a back issue at $1.

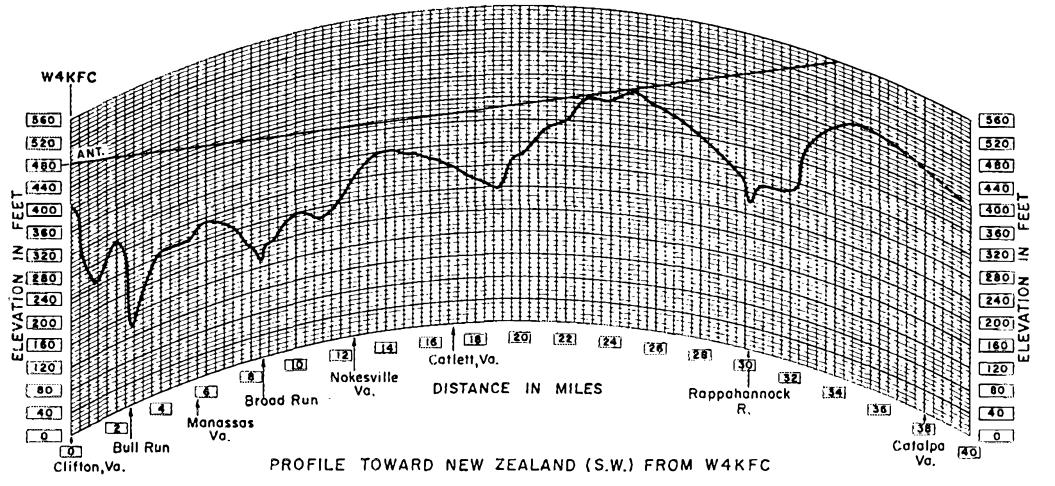
[12] For an approximation, double the takeoff angle for each halving of height. Thus, at 14 Mc., 500 feet give 2°; 250 feet, 4°; 62 feet 16°, etc. To find the effective ground-reflection zone distance and elevation relative to antenna mast height, plot a profile such as Fig. 2.

[13] Plane earth. For spherical-earth ray studies, see Norton and Omberg, *PIRE*, Jan., 1947.

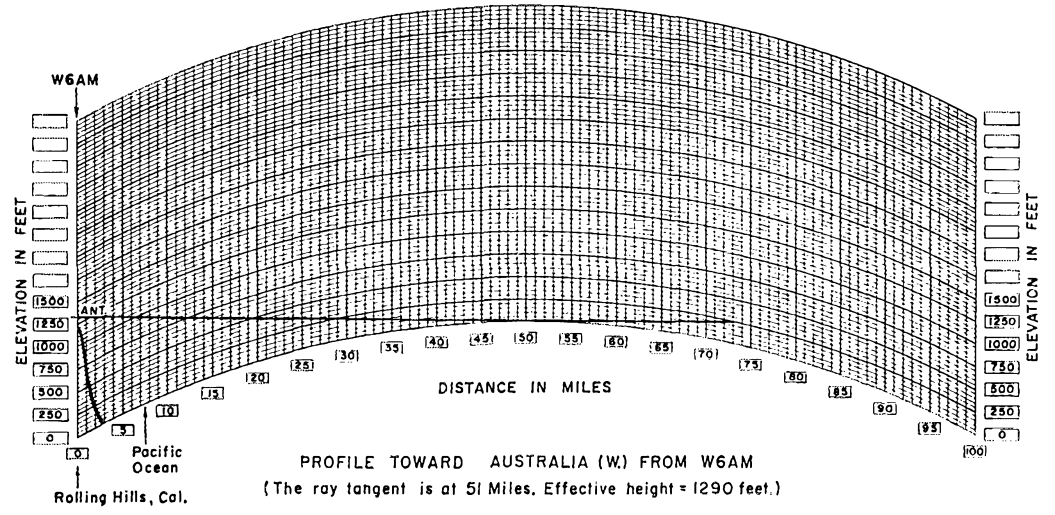
[14] Bailey, Bateman and Kirby, "Radio Transmission in the Lower Atmosphere," *PIRE*, October 1955, p. 1226.



PROFILE TOWARD ASIA (N.) FROM W3CRA



PROFILE TOWARD NEW ZEALAND (S.W.) FROM W4KFC



PROFILE TOWARD AUSTRALIA (W.) FROM W6AM

(The ray tangent is at 51 Miles. Effective height = 1290 feet.)

Fig. 2

Table I

Antennas at DX Contest-Oriented Stations (20 meters)

Calls	*Height (ft.)*	*Boom (ft.)*	*Notes*
W1BPW	38	24	TH6DX
K1DIR	70	16	3-el
W1JYH	60	17	3-el
WB2APG	65	24	3-el Mosley TA-36
W2BOK	10	16	3-el
W2EXH	75	32	4-el
K2GXI	70	50	5-el
WA2SFP	106/42	2 × 46	2 × 6 el. Big Bertha
W2VJN	80	26	4-el
W3BES	52	14	3-el
W3GRF	103	45	5-el On quiet hill
W3LOE	65	30	4-el
W3MSK	110	72	7-el 4-1000
W3MSR	90	47	5-el 813s
W3PZW	82	48	5-el Atop 250 foot hill, 4-400s
W3WJD	71	12	3-el Quad, on gentle hill
W4ANE	100	36	4-el Telrex
W4BVV	120	48	5-el Rural, flat terrain, 4-1000
W4KFC	80	22	3-el Elegant site. Hilltop
W4KXV	100	38	4-el Hill. Long slope except SE
K4LIQ	40	8	2-el quad
WA4NGO	71	81	7-el
W4NJF	55	31	4-el Hy-Gain 204B
W4RLS	74	36	4-el Hilltop
K4TSL	75	—	4-el
K4TWF	122	50	3-el
W4ZRZ	81	42	4-el
W5LGG	55	24	3-el Wide-spaced
W6HX	70	55	5-el
W6ITA	85	56	5-el
K6OHJ	52	24	3-el Atop 700 foot hill, S.F. Bay
W6ONZ	76	24	3-el
W6RW	66	50	5-el Hilltop at 1370 feet
W6SAI	72	—	3-el
WA6SBO	72	46	5-el
W6UED	80	50	5-el
W7VGQ	150	24	3-el
WA8AJI	73	20	3-el
W8FGX	70	40 (?)	4-el Atop hill
W8HIR	85	26	3-el
W8JSU	47	26	3-el
W9ERU	62	24	Hy-Gain 20/40
W9EWC	65	49	5-el
W9GIL	60	18	3-el
W0DCA	100	36	4-el Telrex. Hilltop
W0TYQ	80	36	4-el

moderately-thick trees as encountered in temperate zones. Attenuation through a brick wall is 2 to 5 db at 30 Mc.[15,16]

For plotting profiles of your site, excellent contour maps, 7½′ × 7½′, (i.e. 7½ minutes of latitude by 7½ minutes of longitude) may be had for almost any part of the U. S. A. at 30¢ each. Detail is such that individual houses may often be identified. For explicit ordering information contact: Map Information Service, Geological Survey, Washington, D. C. 20242. QST

(Part II of this series will appear in an early issue.)

[15] Bullington, "Radio Propagation Fundamentals," *B.S.T.J.*, May, 1957.

[16] Saxton and Lane, "VHF and UHF Reception, Effects of Trees and Other Obstacles," *Wireless World*, May, 1955.

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 *and your zip code*. Your promptness will help you, the postal service and us. Thanks.

Privilege— or Right?

Some Plain Talk About Our Regulations

BY WILLIAM S. GRENFELL,* W4GF

THE international radio regulations, Geneva 1959, define the Amateur Radio Service, allocate frequency bands to it, and specify certain requirements for the operation of amateur stations. In agreeing to abide by these regulations, the participating countries recognize the rights of the various internationally recognized radio services to certain allocated portions of the radio spectrum. In general, the allocations are fairly responsibly observed by most countries. While there must be a constant vigilance against intruders, the right of the amateur service to its allocations is properly observed by most countries in the bands which are exclusively amateur on a world-wide basis.

In bands where the primary service is amateur in one region of the world and some other service has the primary allocation of the band in one or both of the other world regions, the international regulations state that the basic principle is the equality of right to operate. The regulations add, "Accordingly, the stations of each service in one Region or sub-Region must operate so as not to cause harmful interference to services in the other Regions or sub-Regions."[1] Unfortunately this right to operate sometimes turns out to be rather meaningless as a practical matter, for example, the sharing of the 7100 to 7300 kilocycles band by the amateur service in the Americas and the broadcasting service in the rest of the world. The amateur station with a dipole antenna and a kilowatt power limit just cannot compete with the broadcast stations' many kilowatts and high-gain antennas.

In a band which is shared with several services in all world areas, such as the 3500 to 4000 kilocycle band, the international regulations provide that the primary sharing services have equal rights. In the Americas, this band is shared with Fixed and Mobile Services and the top 100 kilocycles is shared with Broadcasting stations located outside the American region. Since the United States (and Canada — *Ed.*) has assigned the band to the amateur service for many years, United States (and VE) amateurs have at least equal right to operate in the band compared with fixed, mobile and broadcast stations.

The international regulations limit amateur international communications to personal and technical remarks by the station operators, and by third persons only when there is an agreement for amateur third-party communications between the countries concerned. Also, each country has agreed to require a code test of all amateurs using the high frequencies and to verify the qualifications of any person operating the apparatus of an amateur station.[2]

Summarizing the international status of the amateur, operation is a privilege which he must earn by qualification and, while he has the right to expect freedom from interference from stations of other radio services in exclusive amateur bands, he does not have the right to say anything he chooses nor can he provide unlimited communications for others.

Domestic Regulation

So much for international privileges or rights. Nationally, the Communications Act, which was adopted by Congress in 1934, created the Federal Communications Commission and specified, mostly in general terms, its duties and responsibilities for the regulation of wire and radio communications. It is this Act, frequently amended by Congress over the intervening years since 1934, which forms the foundation of the Commission's rules and regulations governing the various radio services, including the Amateur Radio Service. It is under the Authority of this Act that the Commission licenses amateur operators and stations.

So far as concerns the right to apply for an amateur license, the Act contains no restrictions except that it specifies only a citizen or national of the United States is eligible for the issuance of a license. The Commission is, however, required by the Act to determine whether the public interest convenience and necessity will be served by granting the license applied for.[3]

One of the first sections[4] of the Act relating to radio specifies that it is a purpose of the Act ". . . . to maintain the control of the United States over all the channels of interstate and foreign radio transmission; and to provide for the use of such channels, but not the ownership thereof, by persons for limited periods of time, under licenses granted by Federal authority, and no such license shall be construed to create any right, beyond the terms, conditions, and periods of the license." In other words, even though you have qualified for an amateur license, possession of that license does not give you any right to operate as you please during the license period, or do you have an inalienable right to renew that license at the end of the license period.

Renewals

The Act requires that persons may not operate radio transmission apparatus without a license for the purpose,[5] and authorizes the Commission to prescribe station operator qualifications and classes, and to issue operator licenses to such citizens as it finds qualified.[6] Since it makes no distinction be-

* Chief, Rules and Legal Branch, Amateur and Citizens Division, FCC. [This address was delivered at the 1966 ARRL National Convention in Boston.]

[1] Geneva 1959, Article 3, Section I, paragraph 5.

[2] Geneva 1959, Article 41.

[3] Sections 303(L)(1), 309(a) of the Communications Act of 1934.

[4] Section 301 of the Act.

[5] Section 301 of the Act.

[6] Section 303(L)(1) of the Act.

tween a renewal and the original issue of an operator license, the Act does not, therefore, *require* that the Commission exempt the renewal applicant from the code and written examinations which are required for original qualification for the license. Thus, if it would beconsidered desirable and necessary, the Commission could propose and adopt rules which would require every licensee to take and pass a new examination before his license could be renewed. Think of that the next time you fill out your application for renewal when you check the "yes-or-no" box which asks whether you qualify for renewal. How many of you take the trouble to find out what the present renewal requirements are? Can you still send and receive code at the speed required for your class of license? Have you operated a station during the last year of your license term? What would happen if you were required to take today's examination?

If, in spite of what I have just said, you still think you have an unlimited right to your license, take a good close look at it. Carefully read the fine print on the back. You will find that there are a number of conditions and limitations imposed under authority of the Act,[7] one of which states: "This license shall not vest in the licensee any right to operate the station nor any right in the use of authorized frequencies beyond the term hereof, nor in any other manner than authorized herein."

For certain acts, failure to comply with certain requirements and other specific situations, the Commission may suspend an amateur operator license[8] and revoke an amateur station license.[9] However, before such action can be taken, the Commission must notify the licensee of its intent and provide the licensee with the opportunity for a hearing on the matter. While a hearing is automatic, unless waived, in the case of proposed revocation of a station license, the licensee must request it in the case of proposed suspension of an operator license. Thus, a licensee has a right to have a hearing if the Commission proposes to take his license away from him during the period for which it was issued.

As you all know, the Commission's Amateur Radio Service rules spell out the power, frequency and emission privileges which may be earned by passing the appropriate class of amateur operator examinatio. What these privileges should be and what qualifications should be required for them is a large subject in itself which I will not discuss at this time.[10]

In the foregoing discourse I have presented what I consider to be the important basic national and international laws and regulations which can be said to convey a privilege or right to the radio amateur. I hope you get the message which I derive from my experience with them — namely, that amateur radio operation is a privilege which must be earned originally and for which a license should continue to be qualified as long as he expects to enjoy the privilege of amateur radiocommunications. QST

[7] Sections 304, 309(h) of the Act.

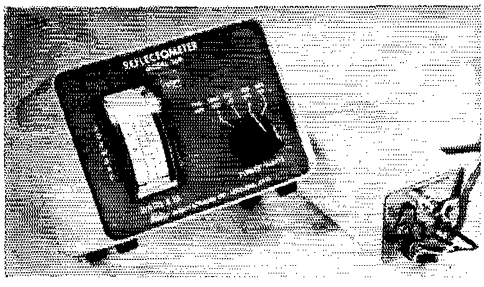
[8] Communications Act of 1934, Section 303(m); FCC Rules, Part 97 Sections 97.141 and 97.143.

[9] The Act, Section 312; FCC Rules Section 97.139.

[10] Notice of Proposed Rule Making, Docket 15928.

• New Apparatus

Waters Reflectometer

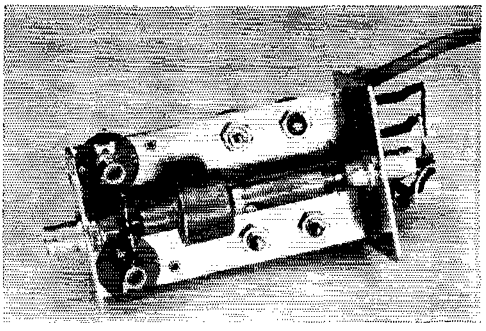


A NEW addition to the Waters line of amateur accessories is their Model 369 directional wattmeter. Patterned after the Bruene design,[1] the Waters' reflectometer has one unique feature not found in other circuits, a dual meter. One pointer indicates forward power in the transmission line while the other indicates reflected power. This serves as a constant monitor of the antenna system. The indicator and directional coupler are two separate units, allowing the coupler to be inserted in the antenna line remotely from the indicator. A multiconductor cable is provided for this purpose. An interior view of the coupler is shown in the photograph below. Contained within the large diameter portion of the coaxial section is the toroidal coil that is the "heart" of the reflectometer.

A four-position switch on the indicator unit selects one set of full-scale readings from a choice of four: 1000 watts forward and 200 watts reflected, 1000 watts forward and 20 watts reflected, 200 watts forward and 200 watts reflected or 200 watts forward and 20 watts reflected. Although the scales are calibrated in watts, the s.w.r. can be determined readily from a conversion chart furnished with the reflectometer.

Model 369 is designed for use with 50-ohm coaxial cable in the frequency range of 3 to 30 Mc. Accuracy of the power readings is rated at plus or minus 10 percent of full scale for 52-ohm lines. The unit tested in the ARRL laboratory was well within this rating. The indicator measures 5½ × 3¾ × 4¼ inches and the coupler, 4 × 2 × 2½ inches. Price class of the reflectometer is $115 and the manufacturer is Waters Manufacturing, Inc., Wayland, Massachusetts.

— *W1ICP*



[1] Bruene, "An Inside Picture of Directional Wattmeters," *QST*, April, 1959.

1966 VE/W Contest Announcement

September 24-26

The Montreal Amateur Radio Club invites all W and VE amateurs to participate in the 1966 VE/W Contest. This year the contest period will run from 2300 GMT Saturday, September 24 to 0200 GMT Monday, September 26.

The overall winner of the contest receives a handsome trophy, and a certificate goes to the high scorer in each ARRL section.

How about more phone activity this year. It is suggested that phone stations look for each other near the following frequencies: 3810, 7210, 14,280, 21,400 and 28,600 kc. The highest phone only and c.w. only scores will be listed in the results.

All entrants are requested to follow the log format shown below. MARC regrets that preprinted log forms are not available from the club or ARRL. Come on, VEs and Ws, let's have more activity and more logs this year.

Rules

1) *Eligibility:* The contest is open to all amateurs located in the ARRL sections listed on page 6 of this *QST*. Multiple operator stations may enter, however their scores will be listed separately and will not be eligible for awards.

2) *Contest period:* All contacts must be made during the period from 2300 GMT Sept. 24 to 0200 GMT Sept. 26. Only 20 hours total operating time may be used in this period, however. Times on and off the air must be shown in the log. Time spent listening counts as operating time.

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

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

5) *Scoring:* Count two points for each completed exchange. Incomplete contacts do not count. For final score: VE/VOs multiply: total points × ARRL sections × power multiplier.

W/Ks multiply: total points × Canadian areas × power multiplier × 20 (The factor of 20 has been arrived at by multiplying the ratio of U.S. sections/Canadian areas by the ratio of U.S. logs/VE logs received for the last two contests.

6) *Power multiplier:* All stations using power inputs of 200 watts or less during the entire contest use 1.5; all others use 1.

7) *Canadian Geographical Areas:*

	Prefix	*Abbreviation*
Newfoundland and Labrador	VO1, VO2	NFLD, LAB
Prince Edward Island	VE1	PEI
Nova Scotia	VE1	NS
New Brunswick	VE1	NB
Quebec	VE2	QUE
Ontario	VE3	ONT
Manitoba	VE4	MAN
Saskatchewan	VE5	SASK
Alberta	VE6	ALTA
British Columbia	VE7	BC
Vancouver Island and Queen Charlotte Islands	VE7	VQC
Yukon	VE8	YU
Northwest Territories	VE8	NWT

8) *Reporting:* Follow the sample log shown below. Log forms are not available from MARC or ARRL. Single operator stations may not have assistance from any other person during the contest.

9) *Awards:* The overall contest winner wins a handsome trophy. In addition the winner in each ARRL section receives a certificate. Awards to Canadian winners will be to the section leaders. The top phone only score and top c.w. only score will be listed separately. The section certificate will go to the highest score.

10) *Deadline:* All logs must be postmarked no later than midnight, November 7, to be eligible for awards. Please make sure that your call and section is printed on each page and on the top left hand corner of your envelope. Logs cannot be returned. Mail logs to R. A. Eberts, VE2AE, 1535 St. Croix Blvd., St. Laurent 9, Quebec, Canada.

VE/W CONTEST LOG 1966

Call....W4SVJ.... *C.W. or Phone*....C.W..... *ARRL Section*....GA.....
Power Input....150 W....

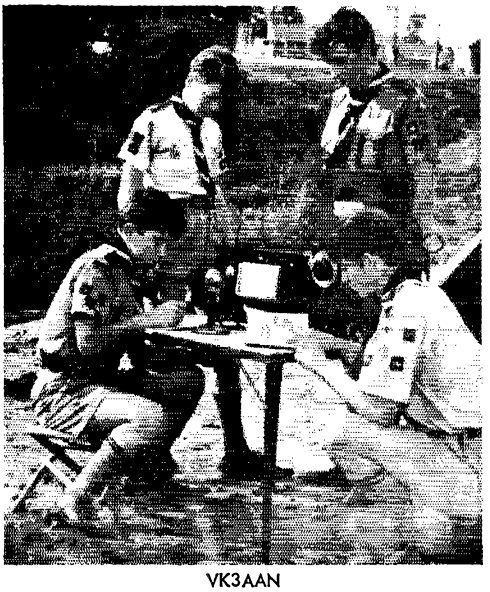
Freq. Mc.	*Times On/Off GMT*	*Time of QSO*	*Sent (1 Point)*				*Received (1 Point)*				*New Sec. Wkd.*
			Nr.	*Station*	*RST*	*Section*	*Nr.*	*Station*	*RST*	*Section*	
14.050	on 2300	2300	1	W4SVJ	579	Ga.	1	VE2NE	579	Que	1
"	"	2302	2	"	589	"	2	VO1CA	589	Nfld.	2
"	"	2308	3	"	569	"	1	VE8MA	559	NWT	3
"	off 2313	2312	4	"	559	"	1	VE7AIC	549	VQC	4

Total Operating time: 13 min. Bands used: 14 Mc. Sec. 4 Points 8

Claimed score: 4 QSOs × 2 (points per contact) × 4 (different sections worked × 1.5 (power multiplier) × 20 (ratio of U.S./Canadian sections by logs received during last two contests) + 960 points.

I hereby state that my station was operated strictly in accordance with the rules of the contest and governmental regulations, and I agree that the decision of the contest committee of the Montreal Amateur Radio Club, Inc. shall be final in all cases of dispute.

Signature..... Call.....



VK3AAN

Jamboree On The Air

BY EDWARD A. GRIBI, JR.,* WB6IZF

TIRED of DX pileups? Bored with always being QRU? Looking for a project that can really demonstrate the fun and excitement of amateur radio to a highly impressionable group? Then run, do not walk, to your nearest Scouter (Den Mother, Scoutmaster, Explorer Advisor, Scout Executive or what-have-you) and volunteer your station so that local boys may participate in the ninth worldwide Jamboree-On-the-Air, October 22–23, 1966.

The Jamboree is an annual event organized by the Boy Scouts World Bureau with participation by the Scouting Associations in their respective countries. The Jamboree lets Scouts talk to other young men in the next town or another country to learn about the other's activities, families, homes and ideas. The Jamboree also introduces the boys to the mysteries of amateur radio. Though there are several dozen amateur radio stations operated more or less regularly by Scouting groups in various parts of the world, the success of the event really depends on the cooperation of dedicated radio amateurs normally not connected with Scouting.

The rules of the Jamboree are very simple because it is *not* a contest. The event starts at 0001 GMT October 22 and ends at 2359 GMT on the 23rd. Any authorized frequencies or modes may be used; call or answer "CQ Jamboree" on phone or "CQ JAM" on c.w. There are no prizes given, but the World Scout Bureau issues participation certificates to all stations who report as explained below.

History

The Jamboree grew out of the hard fact that comparatively few scouts can attend the great national and world Jamborees. Ham radio seemed like a marvelous medium to bring home the meaning of World Brotherhood. Few stations operated in the first Jamboree organized by G3BHK, in May 1958, but by 1960 over 1000 stations in 47 countries took part. The 8th Jamboree a year ago drew 2000 or more stations from at least 70 countries, with participation by perhaps 50,000 individual boys!

The two strongest participants in 1965 were Australia and Canada with over 400 active stations in each, including VKØGW in Antarctica. In Canada a number of stations were operated from weekend camps. Many groups were active locally on v.h.f.

All across South Africa 150 well organized stations took part. In East London, ZS2OP and ZS2OF made a tour of troop meetings before Jamboree with portable transceivers and thereby generated a lot of enthusiasm.

Over 100 stations took part in Great Britain. G3PAW set some sort of record by having six troops and one girl guide company as his guests! A Norwegian Explorer Post Station LA5UJ, operated from a cave on Karmay Island. SM7XA operated marine mobile off the Swedish coast.

The Jamboree generated many new classes in code and theory, and probably some of 1965's station operators were 1964's spectators. It was

LA5CH/A

*229 Vivian Street, King City, California 93930

not entirely a one-way street, however — one ham in Colombia was visited by a patrol of eight Scouts, which had increased to ten on departure with the addition of the ham's two sons!

Stateside Activity Low

One of the recurrent comments from DX stations was that they had difficulty contacting U.S. stations or that U.S. stations were not aware of the Jamboree. About 130 stations reported, certainly a very low percentage of the U.S. amateur population.

K3WQW, club station of Explorer Post 555, Coplay, Pennsylvania, kept two complete stations on the air for the full 48 hours, operated by ten licensed Explorers. One was portable on a mountain top with everything including a 2.5 k.w. generator hauled the last mile afoot. K9AOM operated portable at a camporee west of Indianaoplis and, incidentally, was one of the few Jamboree stations heard on the west coast. K2BFW at national headquarters of the B.S.A. was in operation for 22 hours.

The Next One

Plans are well under way for the 9th Jamboree on the Air October 22–23. Here is a good project for your radio club or your individual station. Start out by contacting anybody you know in the movement locally or look for a local council listing in the telephone book under Boy Scouts. If your Scouting contacts have a somewhat blank look explain the Jamboree to them and suggest they refer to appropriate articles in *Boys' Life* or *Scouting*. Then you can arrange operating times and visiting hours. A pre-Jamboree visit to your station or a talk to the group will eliminate unnecessary questions during the Jamboree. Advance publicity will also help here. During the Jamboree remember that the objective is to let Scouts talk to Scouts; don't worry if they get involved in a long discussion of fire-by-friction while you're missing a DX contact.

K2BFW, the B.S.A. station, will be on the air around these frequencies: c.w. — 3,560; 7,050 and 14,050 kc.; phone — 3,950; 7,290; 14,300 and 21,300 kc.

VE3WSB, at the headquarters of the World Scout Bureau, will be on these frequencies: c.w. — 3,510; 7,020 and 14,020 kc.; phone — 3,790; 3,805; 7,190; 7,290; 14,130; 14,310; 21,195; 21,350; 28,490 and 28,510 kc.

Americans should report participation as amateurs, s.w.l.s or Scout on-lookers and should send QSL or s.w.l. cards to K2BFW, Boy Scouts of America, New Brunswick, N.J. 08903.

Canadians and overseas amateurs not knowing the address of the movement in their own country may send similar reports to VE3WSB, Boy Scouts World Bureau, 77 Metcalfe Street, Ottawa 4, Ontario.

One final note — there are no Boy Scouts in UA-land, but last year K3WQW reported hearing several Russian stations calling "CQ JAM." The excitement is catching! QST

HB9CM

GB3SP

EI4Q

Rhode Island's K1TPK needs little introduction to serious VHF'ers. Manly's beams are 4 over 4 side-spaced homebrew on 6 with 11 elements in the middle on two, (without any ill effects from the unconventional arrangement). The rig in the right foreground is the 6-meter exciter. On the upper right is the 4-400A final, both homebrew. The 2-meter equipment, not shown, consists of a completely homebrew 200-watt supply, 100-watt modulator and a final with 826s.

June V.H.F. QSO PARTY Results

THE dates, June 11–12, 1966; reports 366, 6-meter conditions in particular — OUTSTANDING!

There is an old Greek proverb that goes "Before you can score you must first have a goal." Investigating a number of goals (other than the obvious one of having a great time) reveals aspects of the June QSO Party.

The top ten scorers: (single operator) WA2FGK K3IPM K1WHS K1TPK K1JIX K4QPJ/4 K9DZK VE3BPR W0EYE and K9QCB; (multioperator) W3CCX/3 W2PEZ/2 WA2BAH/1 W2UFT WB2FKJ/2 WA8BCA K1YLU/1 W2GKR/2 K6BPC and W1MEH.

Section award leaders, using 6-meters alone: WA1ABU K11GY/5 K1TOL K2MUB K3UHU K4HOI WA4STJ K5IVB WA5NFC K8VEX WA8OXC W0BMN K0ITF VE1AI VE4MA/5 and VE4RE.

Sections leaders using four or more bands: W1ALE K1JIX WA2FGK K2YCO K3IPM W6AJF W6GDO WB6KAP W7TYR W0EYE and VE3BPR.

The chart herein showing high multipliers per band is similar to the one used in the annual DX Competition report and has proved to be a popular feature in that annual affair. If you find this an interesting and useful addition to these reports please let us know!

Elsewhere in this issue are the rules for the September 10–11 affair. If you haven't requested your log forms as yet get with it — drop a note to the Headquarters and be prepared.

Section award leaders are reminded that certificate awards are scheduled for September 15 mailing.

Soapbox

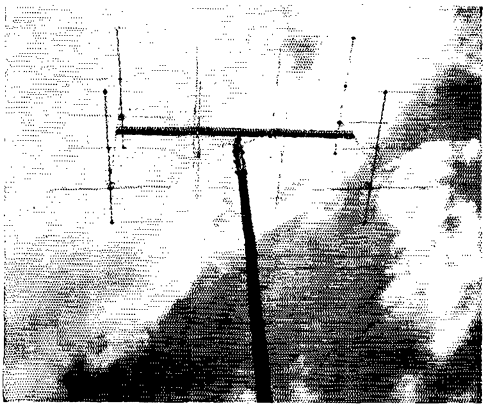
"With little activity here in Sussex County, the frequent band openings and good ground-wave conditions helped the score a lot." — *K3CNH*. "In the 'might have been' department. . . . I was told later that W1MEH came back to me *twice*." — *W3HB*. "The c.w. activity at the low end was the best ever and, at last, the N. J. and N. Y. stations are learning that the Maryland and Virginia operators *do* get on c.w. My thanks to them." — *W3LUL*. "I'm surprised and delighted at the amount of interest exhibited by those individuals who spent many hours on cold mountain tops in trying to make a success of the June party. They succeeded in adding enjoyment to my own participation and to that of others in the Md.-D.C. section." — *K3FPE*. "The Aero Amateur Radio Club crew had a grand time up on the hill at Jacksonville, Maryland, although it was one of the coldest nights we have ever spent with the temperature dropping to 45 degrees." — *W3PGA/3*. "My first contest and I had a ball!" — *WN2VUA*. "Stations should announce their location when calling CQ contest so beams can be turned to the proper direction in time to respond to weak signals." — *WA2KND*. "Activity very light. The contest didn't receive enough *QST* exposure. Let's have more publicity for the next one." — *WA2FAR/2*. (My face is red, I goofed! Please check page 66 of this issue for the September rules. — *W1YYM*). "While installing a permanent club station, we entered the VHF QSO Party and things went very well. We were surprised to work Ontario, Vermont and even Western Mass. using the Communicator. Look for our new club call WA2VMB shortly." — *K2ZRX/2*. "Two improved markedly for us Sunday at 10 a.m. local time when we corrected a phasing problem on the 8/8 array! Good tropo. on the weekend." — *K3IKK/3*. "Not one single portable worked or heard properly identified." — *W3BWU*. "Gratifying to have the SSBers respond to my c.w. and ancient modulation. DX was good though local activity poor." — *WA9FIH*. "Got a late start but worked two new states." — *K9DMW*. "A fine contest here in the midwest with lots of activity and conditions on the upswing." — *W9BRN*. "90% of the stations worked were over 100 miles away for 27 sections in only 89 contacts." — *WA9PBW*. "Conditions and participation were far better than indicated by our log." — *K4EJQ*. "Groundwave and scatter was good, especially on 2 meters. Considerable sporadic-E, mostly into the Northeast. I had considerable difficulty in reaching the top of Black Mountain with my car pulling a camper trailer. I required assistance from a wrecker, tore a hole in my gas tank (losing a full tank of gas), lost the car's manual clutch plus several other troubles which will go unmentioned. However, I plan to be back here in September but without a camper trailer and with *at least* one other operator!" — *K4QPJ/4*. "A wonderful contest with perfect weather and no equipment failures. Highlights included 3 new states on 2 meters plus my first Michigan 220 Mc. contact, with W8PT. A thrill on Sunday afternoon to have WA2BAH/1 answer my CQ." — *K8ZES*. "Thanks to the mountain-top groups that helped make the contest an interesting one. As an indication to the value

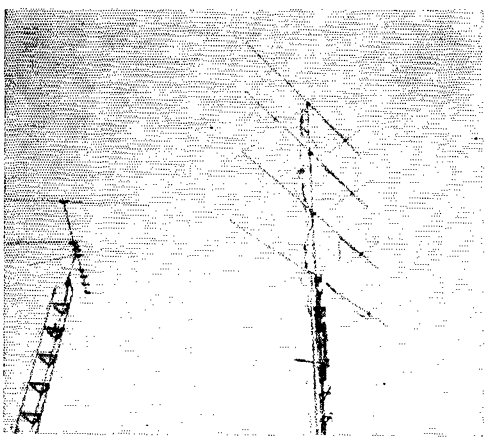
* Assistant Communications Manager, ARRL.

Six Meters Comes Through!

COMPILED BY ELLEN WHITE,* W1YYM

of c.w. operations on two meters, half of the 18 sections I worked were via c.w. and they would have been unreadable on phone." — *W8QOH*. "It is amazing how many stations that you normally hear disappear when the contests come and also those who *only* appear at contest time." — *WA2ZPD*. "Two sessions of skip helped build the multipliers and I made my first Virginia and Oklahoma contacts." — *WA2JWO/2*. "For the next one I'll have my amplifier finished and a better antenna installation." — *WA2IPC*. "C.w. and sideband activity (on scatter and groundwave) accounted for most of the hard-to-get sections." — *K2MUB*. "Nice opening on 6." — *W2IPEZ/2*. "Next year we hope to be on top of Stissing Mt. instead of under it" — *WB2WFV/2*. "Heard VE2SH and K1OYB on 2 meter c.w. W8NSH had good signals and W8WEN was 579 when his beam was pointed this way." — *WA2-JAM*. "Equipment for 220 and 432 will be ready for the September affair." — *K1WHS*. "S.s.b. was used on 6 mostly and found to be very good. Two-meter c.w. was great for long-haul contacts." — *W1HNF*. "Good to be back after four years of apartment living without antennas!" — *K1FFE*. "Exciting to work W3CCX, W1UUQ and G3BVU/W1. Courteous well-mannered operators made the contest very enjoyable." — *W1ASZ/1*. "My only gripes are the stations that call 'CQ contest' 20 times and then give their call once. Pleased to be able to hand out some Maine contacts." — *K1OYB*. "Flooded with QSL requests for first Vermont for many." — *K1RYT/1*. "No good openings noted. S.s.b. on 6 is ever increasing." — *K6BPC*. "Fair 50-Mc. trop-scatter was experienced and we worked K7ICW (Nevada), W7CNK (Washington) and W6GDO (Sacramento). No east-west band openings into San Diego. 432 was dead for the first four hours until we found the break in the coax!" — *W6NLO/6*. "Had to quit early Sunday because of the heat." — *WB6CSD/6*. "Our most outstanding accomplishment this time was working both Arizona and Nevada on 50-144-220-432 Mc., with K7RKH and K7RKH/7. A special meteor scatter schedule was set up with K7AUO/7 in Oregon but his KW produced just a few letters and pings and vice-versa on 144 Mc., no QSO. — *K7ICW*. "Conditions couldn't have been worse." — *W6BYC/6*. "Our 432 Mc. effort netted all 9 sections. Most interesting was the strength of the W6NLO/6 group on Mt. Tecate, about 100 yards from the Mexican border." — *W6GD/6*. "My last contact, with W9BRN on 144 Mc., made the contest for me as Indiana was a new state, bringing my standing to 22 states, 7 call areas and my best DX at 1000 miles." — *K4MHS*. "Bands were excellent though we were plagued by typical Mt. top luck. We did work Ohio and Alabama with 8 watts output." — *K4GWY/4*. "We worked more New Jersey, MDC and E. Pa. stations than in our own section,





Top to bottom we find the antennas of: WA5AUA of South Texas who found conditions poor in his area; VE3-ASO's homebrew 2-meter array of four beams, each ten elements on 13-foot booms, phased with foam twin-lead and fed with RG/17U. On the bottom is K1JIX's home-made 60-foot steel tower with a six-foot-square wooden platform at the top, with four 13-element yagis for 432 stacked vertically up the middle of a 12-foot box of four 10-element yagis for 144 Mc.

DIVISION LEADERS

Single Operato		*Multioperator*
K3IPM	Atlantic	W3CCX/3
K9DZK	Central	K9EWG/9
KØFKJ	Dakota	.....
W4WZC	Delta	WA4VNP/4
K4QPJ/4	Great Lakes	WA8BCA
WA2FGK	Hudson	W2PEZ/2
WAØHKP	Midwest	.....
K1WHS	New England	WA2BAH/1
K7BBO/7	Northwestern	K7AUO/7
W6GDO	Pacific	W6GD/6
K4SUM	Roanoke	K4GWY/4
WØEYE	Rocky Mt.	W5CFJ/5
K4WHW	Southeastern	WA4QPL/4
WA6JLC/6	Southwestern	K6BPC/6
W5WAX	West Gulf	WA5OMG
VE3BPR	Canadian	VE2SH/2

Virginia!" — *K4SUM*. "We operated from the top of Bull Run Mountain altitude about 1300 feet, located 50 miles west of Washington, D. C. Excellent groundwave on both 6 and 2 plus good sporadic-E on 6. Hope to have 432 going next time." — *K4LHR/4*. "With the exception of two weak W6 stations, whom I could not raise, and the few others I worked, nothing else was heard on 6 meters. I'm located at an elevation of 10,000 feet surrounded by 13-14,000 foot ridges to the west, north and east, about 5 miles away. Expect to be on two and six in September." — *K0ADG*. "Our club members enjoyed this chance to operate the contest as a group. The weather was perfect and band conditions kept our interest alerted. We managed to work all of the New England states on six meters and even encountered some QRM pile-ups on two meters during an opening into Illinois. We were gratified to work a total of 28 sections." — *WA4QPL*. "Carted everything up to the 7300 foot level of the San Gabriel mountains and set up at a wide spot in the road. Everybody and his brother stopped by before the contest was over. Those who didn't stop almost drove off the road trying to see what was going on." — *WA9DHK/6*. "Sporadic-E was very good to the New England area. This was the only area open during the entire contest except for a brief opening to VE4 and VE5 Sunday about 1500 GMT. I really enjoyed working the pile-ups." — *W5WAX*. "Spotty sporadic-*E* made this contest worthwhile. Murphy prevented two-meter activity and no signals were heard on 432. Still no competition down here in So. Texas to speak of. We'll keep on trying." — *K1IGY/5*. "In *this* part of Southern Texas conditions were DEAD. The few I worked were in and out. All this after nearly a year of detailing, building and erecting 4 phased beams on both 6 and 2." — *WA5AUA*. "We all had a wonderful time. Band conditions were very good with temperature inversion the last couple of hours of the contest." — *VE2BZH/2*. "Our location on Covey Hills, Quebec, is about 30 miles due south of Montreal and is ¼ mile from the New York state border." — *VE2SH/2*. "Location was 43 miles north of the border and two miles inside the Saskatchewan border, or 217 miles west of Winnipeg. Next year I'll pitch the tent on the border with one antenna on VE4 and the other on VE5. Then you pay your money and take your choice, hi!" — *VE4MA/5*.

SCORES

In the following tabulation, scores are listed by ARRL Divisions and Sections. Unless otherwise noted, the top scorer in each section receives a certificate award. Columns indicate the final score, the number of contacts, the section multiplier, and the bands used. A represents 50 Mc.; B, 144 Mc.; C, 220 Mc.; D, 420 Mc.; and E, 1296 Mc. or higher. Multiple-operator stations are shown at the end of each section tabulation. An asterisk denotes a Novice Award Winner. A double asterisk denotes a Headquarters staff member, ineligible for an award.

ATLANTIC DIVISION

Delaware

K3UHU 1976-104-19-A
W3CGV 1750- 65-25-ABCD
K3CHN 704- 44-16-A
K3NYG 45- 9- 5-A

Eastern Pennsylvania

K3IPM 30,000-474-60-ABCD
K3MTK/3 6727-217-31-AB
K3YFD 3144-131-24-AB
K3HNP 2070- 90-23-A
WA3BWF 1860-124-15-A
W3ARW 960- 41-20-BCD
WA3BKP 756- 63-12-A
W3MMW 494- 34-13 BD
W3LCW 190- 35-14-AB
WA3BGN 128- 16- 8-A
W3CCX/3 (26 oprs.) 63,240-839-68-ABCDE
WA3EJH (K3QGX, WA3s BJR EJH) 8000-250-32-AB
W3JMP/3 (4 oprs.) 3975-159-25-A
K3YGH (W3s FDH GFN JUX) 3422-113-29-ABC
W3PZC/3 (W3s GCR GKW TEC) 1484-106-14-AB
W3AZR (5 oprs.) 870- 58-15-A

Md.-D.C.

K3FPE 2240-140-16-AB
K3JUK/3 (WA3DFN, opr.) 1648-103-16-AB
K3VRS 912- 57-16-AB
W3LUL 828- 59-14-B
K3OZQ (K3OKC, opr.) 708- 59-12-B
WA2DRK/3 588- 49-12-B
W3HB 513- 57- 9-AB
W3MSR 328- 41- 8-B
WN3ELA 160- 32- 5-B
W3PGA/3 (7 oprs.) 7308-261-28-AB
WN3EOQ/3 (WN3s EOP EOQ) 420- 60- 7-B
K3LUK/3 (K3s KWO ZSX, WA3AVI) 793- 60-13 ABC

Southern New Jersey

WB2NOK 5208-168-31-AB
W2HXF 1029- 49-21-AB
WN2VUA 552- 69- 8-B
WB2QLG 318- 53- 6-B
WN2UVB 230- 46- 5-B
WB2WXA 75- 25- 3-A
WB2SPJ 72- 12- 6-A
WB2VFX 45- 15- 3-B
WB2MNM 18- 6- 3-A
WB2RVX (W2PJC, WB2RVX) 2337-123-19-AB
WB2JEP (WB2s JEP TOE) 238- 34- 7-B

Western New York

K2YCO 6802-158-38-ABCD
W2UTH 5032-135-37-ABD
K2LGJ 3406-116-28-ABD
WA2TEY 3213-119-27-AB
W2EFO 2116- 92-23-AB
K2DUR 2016-112-18-AB
WA2SOO 1836-102-18-AB
WA2KND 1092- 77-14-ABD
W2DJL/2 868- 62-14-A
W2ROA 737- 67-11-B
W2VCI 371- 53- 7-B
W2WGL 280- 28-10-B
WA2FAR 2 168- 24- 7-A
WA2WEB 2 (13 oprs.) 15,850-301-50-ABCD
W2OW (20 oprs.) 9160-218-43-ABD
W2MAU/2 (11 oprs.) 4470-144-30-ABCD
W2RTG/2 (6 oprs.) 2921-127-23-AB
K2ERQ (12 oprs.) 2220-110-20-ABD
K2ZRX/2 (8 oprs.) 1764- 98-18-AB
W2ZJ (7 oprs.) 1530-102-15-AB
K2ZOC/2 (9 oprs.) 990- 66-15-AB

Western Pennsylvania

W3BWH 2730-130-21-AB
WA3BBJ 1484-106-14-A
WA3CIA 513- 57- 9-A
W3DJM 231- 33- 7-A
K3HKK/3 (8 oprs.) 13,590-302-45-AB
K3JRO 3 (5 oprs.) 9306-282-33-AB

CENTRAL DIVISION

Illinois

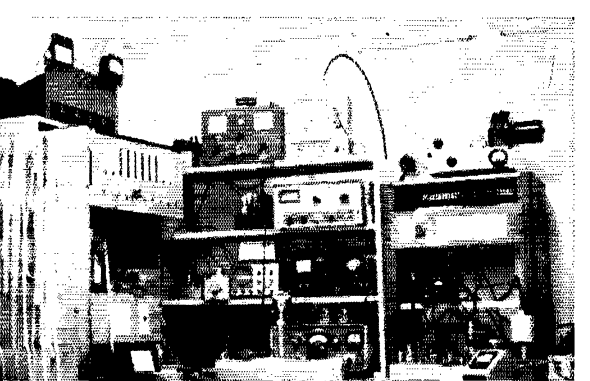
WA9OUF 5742-174-33-AB
K9RVG 2820-235-12-B
WA9JKT 1845-123-15-AB
WA9FIH 1360- 85-16-AB
WA9FYB 804- 67-12-AB
K9DMW 664- 83- 8-B
W9AA (WA9MBZ, opr.) 272- 68- 4-B
WN9RNQ 265- 53- 5-B
WA9PDF 165- 55- 3-B
WN9RSN 120- 4- 3-B
WA9NAH 93- 31- 3-B
W9AXT 42- 14- 3-B
W9YOW 11- 11- 1-B
WA9RGV (WA9s QXY RGV) 2142-102-21-AB
K9HGX (5 oprs.) 636- 53-12-AB
WA9MSD (WA9s MSD SFU) 155- 31- 7-AB

Indiana

K9DZK 9158-241-38-AB
K9QCB 7480-218-34-ABCD
W9JHL 3400-136-25-A
W9BRN (K9MRI, W9BRN) 1246- 87-14-BD

Wisconsin

WA9JFM 7168-256-38-AB
WA9PBW (K9LBQ, opr.) 2403- 89-27-A
W9GJJ/9 1496- 88-17-A
WA9EZU 72- 12- 6-A
W9TQ 10- 5- 2-B
K9EWG/9 (7 oprs.) 2138-106-23-AB



K1IGY/5 did all right in the sections department on 6 and wound up leading So. Texas. Dick runs a kw. s.s.b. with 6 elements up 60 feet. He thinks his digital clock may be of additional interest; it is the 19 x 10 inch aluminum panel with vertical columns in the upper left hand quadrant of the picture. It was designed to provide time information for satellite trackings and is also used for regular time for logging, accurate to within .001 sec. of WWV!

DAKOTA DIVISION

Minnesota

WA0CQG 1159- 61-19-AB

South Dakota

K0FKJ 1701- 81-21-AB

DELTA DIVISION

Arkansas

WA5NFC 735- 49-15-A
WA5NOB/5 (K5BOE, WA5s LLX NOB) 4154-134-31-A

Louisiana

WA5DXA 935- 85-11-AB
WA5JVL 182- 26- 7-A

Tennessee

W4WZC 3248-116-28-AB
K4EJQ 624- 52-12-AB
WA4UCE (WA4CKP, opr.) 518- 37-14-A
W4SGI 44- 11- 4-AB
WA4VNP/4 (10 oprs.) 6102-226-27-AB

GREAT LAKES DIVISION

Kentucky

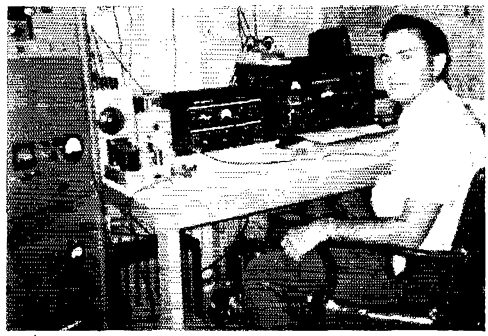
K4QPJ/4 9804-258-38-AB
WA4SIQ 1782- 99-18-AB
WN8TYF/4 5- 5- 1-B
WA8IEK/4 (5 oprs.) 1717-101-17-AB

Michigan

K8VEX 2898-126-23-A
W8PT 1488- 86-16-ABCD
W8OOR 1292- 76-17-AB
W8CVQ 682- 60-11-ABD
WA8PWZ 546- 39-14-A
W8NSH (7 oprs.) 11,322-306-37-AB
W8WOG/8 (5 oprs.) 10,015-287-35-AB
K8JZP/8 (K8s DVR, JZP, WA8EID) 510- 51-10-AB

Ohio

WA8OXC 7245-207-35-A
WA8NJA 3537-131-27-AB
W8WEN 2178-121-18-B
W8QOH 2106-117-18-B
W8JHN 1712-107-16-AB
K8ZES 1148- 81-14-BC
WA8KCX 1134- 81-14-AB
WN88JL 188- 47- 4-B
K8WVZ 132- 22- 5-A
WN8TYF 33- 11- 3-B
WA8RWZ 24- 12- 2-A
WA8JXM 16- 8- 2-B
W8FAZ 5- 4- 1-BD
WA8BCA (13 oprs.) 22,883-467-49-AB
W8CCI (7 oprs.) 18,124-394-46-AB
WA8PUY (6 oprs.) 3630-165-22-AB
W8VNU 2752-172-16-AB
WA8PNR (6 oprs.) 2002-143-14-AB
W8EDU (W8s AJR AZA) 825- 55-15-AB



WØEYE's 6-meter total, tops in the nation, is a real eye-opener. Don's first-class log presentation includes 38 sections on 50 Mc. Station equipment for this band includes 4X250B's at 750 watts input, 75A-3 plus converter and a 6-element array

HUDSON DIVISION

Eastern New York

K2GXJ 2800- 92-28-ABC
WA2JWO/2 2460-123-20-AB
WA2ZPD 774- 86- 9-B
K2ARO 450- 45-10-B
WA2USG 272- 34- 8-B
W2UFT (4 oprs.) 33,972-570-57-ABCD
WB2FKJ/2 (14 oprs.) 30,008-439-62-ABCDE
WB2WPV/2 (4 oprs.) 1026- 57-18-AB
WA2DNR (W2KZN, WB2s OIM UUQ) 952- 68-14-AB

Minimum Number of Sections	(Calls in bold-face type represent single-operator section leaders.) 20	10	2	2	1
Band(Mc.)	50	144	220	420	1296
WA1ABU	24				
W1ALE	20	10	5	4	
W1ASZ/1*		12			
K1BZM/1*	25	15			
K1FFE		13			
K1GYT	24				
W1HIL		11			
W1HNF	21	11			
W1HPM*	25	12			
K1IGY/5	23				
W1IPJ/1*	27	12	4	3	
K1JIX	24	12	6	7	
K1KKK/1*	20				
W1LUA/1*	30	15	4		
W1MEH*	24	19	8		
K1OYB		14			
K1RYT/1*	35	19			
K1TOL	30				
K1YON			9		1
W1OOP		10	6	7	
K1TPK	27	14			
W1UWX/1*	20	12			
W1WHL	21		4		
K1WHS	29	16			
K1YLU/1*	22	13	9		
K2ARO		10			
WA2BAH/1*	34	19	13	4	
WA2CMG*			3	4	
WA2DRK/3		12			
WA2FGK	30	19	3	3	2
WB2FKJ/2*	23	20	11	6	
W2GKR/2*	21	15	7	5	
K2GXJ		16	6		
WA2JAM		19			
K2LGJ		12		2	
W2MAU/2*		16	3		

Minimum Number of Sections	(Calls in bold-face type represent single-operator section leaders.) 20	10	2	2	1
Band(Mc.)	50	144	220	420	1296
W2MFF/2*		11			
K2MUB	35				
WB2NOK	20	11			
WB2OGD/2*		10			
W2OW*	32	10			1
W2PEZ/2*	33	19	7	5	
W2ROA		11			
WA2SAY			5		
WA2SLY		13			
WA2TEY	23				
WB2TRD	21				
W2UFT	27	20	7	3	
W2UTH	32				
WA2WEB/2*	21	20	6	3	
W2WGL		10			
K2YCO	21		4	5	
WA2YHS*		13			
W2ZDR*		11	6		
W3ARW		13	5	2	
W3CCX/3*	30	20	9	8	1
W3CGV				2	
WA3EJH*		13			
K3HKK/3*	27	18			
K3HNP	23				
K3IPM	36	13	8	3	
W3JMP/3*	25				
K3JRO/3*	26				
W3LUL		14			
W3MMV		10		3	
K3MTK/3	23				
W3PGA/3*		11			
K3OZQ		12			
K3YFD		10			
K3YGH*		12			
WA4BNX/4*		10			
K4FJW/4*	28				

Minimum Number of Sections	(Calls in bold-face type represent single-operator section leaders.) 20	10	2	2	1
Band(Mc.)	50	144	220	420	1296
K4GWY/4*	29		2	2	
W4HJZ	21				
K4LHB/4*	25	12	2		
WA4JZH/4*	20	10			
WA4MMO*	25				
W4PAR/4*	33				
K4QPJ/4	28	10			
WA4QPL/4*	25				
WA4SHA/4*		10			
K4SUM		10			
WA4VNP/4*	23				
K4WHW	20				
W4WZC	24				
WA5NOB/5*	31				
W5UJF/5*	25				
W5WAX	25				
W6AJF			3	4	1
K6BPC*			5	6	4
WB6CDF/6*			5	3	
W6GD/6*			9	4	
W6GDO		10	4	7	1
W6HPH				3	1
K6IBY/6*			4	5	1
WB6KAP			3	4	
K6KLY				4	
W6NLO/6*			5	5	1
W6NLZ			2		4
K6OKC*		11	4	8	2
W6SD/6*			5		2
K7AUO/7*			2	3	1
K7ICW			3	2	
W7TYR			2	2	
K7ZIR			2	2	1
W7ZSL/7*					1
WA8BCA*	35	14			
W8CCI*	37				

Minimum Number of Sections	(Calls in bold-face type represent single-operator section leaders.) 20	10	2	2	1
Band(Mc.)	50	144	220	420	1296
W8CVQ				2	
W8NSH*	25	12			
WA8OXC	35				
W8PT				3	
W8QOH		18			
K8VEX	23				
W8WEN		18			
W8WOG/8*	29				
K8ZES		13			
K9DZK	33				
K9WEG/9*	20				
WA9JFM	20				
W9JHL	25				
WA9OUU	28				
WA9PBW	27				
K9QCB	27				
K9RVG		12			
WAØBED	26				
WØEYE	38				
KØFKJ	20				
WAØHKP	31				
VE2SH/2*	27	13	5	2	
VE3AIB			2	2	
VE3ASO		11			
VE3BGA	25				
VE3BPR	29	13		3	
VE3BZH/2*		10			
VE3DSE				2	
VEDWL		11			
VE3EZC				3	
VE3SAU*	24	13			
VE3ZZZ*	29	11	3	2	
VE4MA/5	24				
VE4RE	28				

* Multi-operator station

Prominent multioperator stations: left, a comfortable perspective of K1MTJ and WA2ORQ at the 2-meter position of WA2BAH/1, top scorer in New England; center, the crew of K1YLU/1 turning in a fine 4-band 22-K performance atop Mt. Wachusett in W. Mass.; right, the 6-meter station of W8NSH with K8s WEX UDJ BGZ ZKM and WA8PHK.

N.Y.C.-L.I.

K2MUB 3780-108-35-A
WB2TRD 3700-148-25-AB
WB2QLP 1804- 82-22-AB
W8ZRY/2 1672- 88-19-A
WA2SLY 1612-124-13-B
WB2MZE 1456-104-14-AB
WA2SAY 722- 30-19-ABC
WB2TBW 700- 70-10-AB
WN2TXJ* 630- 70- 9-B
W2KXG 495- 55- 9-B
WN2UFH 392- 56- 7-B
WA2ONO 344- 43- 8-B
WB2MEO 306- 34- 9-B
WA2IPC 116- 29- 4-B
WN2TWU 34- 17- 2-B
W2ZSD 16- 4- 4-B
WA2YHS (WA2s YDB YHS, WB2IQM) 8401-271-31-AB
WB2OGD/2 (WB2s LUU OGD) 1404-117-12-AB

Northern New Jersey

WA2FGK (K2LNS, opr.) 31,374-480-63-ABCD
WA2JAM 2508-132-19-B
WA2ZNH 1545-103-15-A
WA2IDH 1290- 86-15-AB
W5NFJ/2 6- 3- 2-A
W2PEZ/2 (14 oprs.) 53,690-774-65-ABCDE
W2GKR/2 (5 oprs.) 22,128-428-48-ABCD
W2ZDR (14 oprs.) 10,530-327-30-ABC
W2MFF/2 (8 oprs.) 5040-210-24-AB
K2DEL (6 oprs.) 3306-174-19-AB
WA2CMG (K2YVE, WA2CMG) 1968- 78-24-ABC

MIDWEST DIVISION

Kansas

KØITF 720- 45-16-A
WØFII 372- 31-12-A

Missouri

WAØHKP 6084-176-36-ABD
WAØBED 4446-171-26-A

Nebraska

WØBMN 420- 35-12-A

NEW ENGLAND DIVISION

Connecticut

K1WHS 16,155-359-45-AB
W1WHL 2842- 92-20-ABC
W1HNF 1760- 55-32-AB
K1YON 1680- 49-24-ABCE
W1AW (W1BGD, opr.)** 1633- 71-23-AB
W1HDQ** 1450- 58-25-AB
WA1CYU 217- 31- 7-B
WA1GIS 189- 27- 2-B
W1ADW 55- 11- 5-B
W1HDQ/1** 48- 12- 4-A
W1BGD** 21- 7- 3-B
WA1FJF 8- 8- 1-B
W1MEH (K1s LOM MFQ, W1MEH) 21,930-417-51-ABC
W1LUA/1 (7 oprs.) 17,395-349-49-ABC
K1KKK/1 (4 oprs.) 3096-129-24-AB

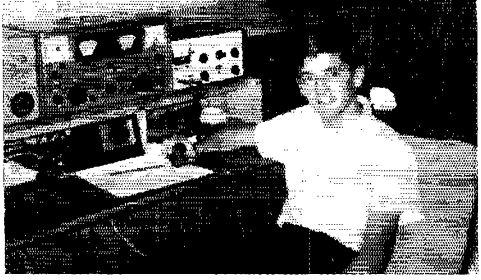
Eastern Massachusetts

WA1ABU 2472-103-24-A
W1OOP 2139- 70-23-BCD
W1HIL 1260- 63-20-AB
W1JSM 1232- 88-14-B
K1FFE 1040- 80-13-B
WA1DPX 348- 29-12-A
K1ZTP 330- 11- 3-A
WA1FCD 222- 37- 6-AB
W1ZS8 108- 27- 4-B
W1CTR/1 76- 19- 4-B
WA1DYU 14- 7- 2-A
W1CTR 8- 4- 2-A
WA1ETC 8- 4- 2-A
W1IPJ/1 (11 oprs.) 16,146-329-46-ABCD
WA1DPU (WA1s BME DPU) 1513- 89-17-A
WA2BAH/1 (9 oprs.) 41,440-555-70-ABCD
K1YLU/1 (7 oprs.) 22,494-469-46-ABCD
K1BZM/1 (7 oprs.) 7560-189-40-AB
W1UWX/1 (W1s EZD UWZ) 1544-142-32-AB

NORTHWESTERN DIVISION

Oregon

W7TYR 504- 54- 8-ABCD
K7ZIK 448- 54- 7-BCDE
W7ADR 115- 23- 5-A
W7JRI 8- 8- 1-B
K7AUO/7 (13 oprs.) 3840-175-20-ABCDE
W7ICS/7 (6 oprs.) 385- 75- 5-ABC
W7LNG (K7HSJ, W7LNG) 24- 8- 3-AB



13-year-old WN2TXJ lead NLI Novices with 70 exchanges in 9 sections.

Maine

K1TOL 6060-202-30-A
K1OYB 1792- 62-28-ABC
W1ASZ/1 (4 oprs.) 3600-144-25-AB

New Hampshire

W1ALE 6630-155-39-ABCD
W1DAT 198- 33- 6-B
W1HPM (5 oprs.) 9583-259-37-AB

Rhode Island

K1TPK 15,334-374-41-AB
W1POP 364- 52- 7-B

Vermont

K1GYT 3406-131-26-AB
K1TZD/1 308- 22-14-AB
K1RYT/1 (4 oprs.) 16,524-306-54-AB

Western Massachusetts

K1JIX (W2BVU, opr.) 13,720-260-49-ABCD
K1ULZ 252- 42- 6-B
W5NWG/1 120- 20- 6-B
W1UCB 96- 15- 6-ABC

Washington

K7BBO/7 1755-117-15-AB
K7NVU 960- 60-16-A
W7ZSL/7 (K7s CAL WTG, W7ZSL) 2222-193-11-ABE

PACIFIC DIVISION

East Bay

WB6CSD/6 1551-141-11-AB

Nevada

K7ICW 760- 38-19-ABCD

Sacramento Valley

W6GDO 6440-154-35-ABCDE
WA6CXB 172- 43- 4-B
W6TEE/6 30- 15- 2-AB
W6HBU (8 oprs.) 729- 81- 9-AB

San Francisco

W6AJF 918- 33-17-ABCDE
WA6JUV 28- 14- 2-B
W6BYC/6 18- 6- 3-B

San Joaquin Valley

WR6NFT 605- 55-11-AB
K6UJG 456- 38-12-ABC
W6BWK/6 (5 oprs.) 1150-115-10-AB

Santa Clara Valley

WB6KAP 2952-112-24-ABCD
K6KLY 1620- 78-18-ABD
WB6KBZ/6 786-131- 6-B
W6GD/6 (10 oprs.) 5440-129-34-ABDE
K6SLQ/6 (4 oprs.) 4446-211-19-ABCD

ROANOKE DIVISION

North Carolina

W4HJZ 1920- 80-24-AB
W4EPV 1156- 68-17-A
K4MHS 833- 49-17-AB
WA4UJI 700- 50-14-AB
K4YYJ 176- 21- 8-BD
W4PAR/4 (5 oprs.) 7844-207-37-ABCD
WA4SHA/4 (4 oprs.) 5278-203-26-AB
WA4MMO (WA4s GOS MMO) 3828-132-29-AB
WA4BNX/4 (WA4s BNX VGC YIU) 3770-145-26-AB
W4GG/4 (4 oprs.) 284- 71- 4-AB

South Carolina

K4GWY/4 (6 oprs.) 10,720-250-40-ABCD

Virginia

K4SUM 4209-178-23-ABD
WA4YXK 850- 85-10-A
K6HPR/4 26- 13- 2-B
K4LHB/4 (K3LNZ, K4LHB) 10,608-269-39-ABC
WA4JZH/4 (4 oprs.) 5520-184-30-AB
K4FJW/4 (K4FJW, W4SZP, WA4WYP) 2912-104-28-A
WA4ZGW/4 (4 oprs.) 1062- 59-18-A
WA4TRC/4 (WA4s DPT TRC YBV) 636- 53-12-AB
WØKGO/4 (W8HBN, WØKGO) 52- 12- 4-AC

West Virginia

WA8JFA 1188- 66-18-AB
WA8KYY 1122- 66-17-AB
WA8JCC 1105- 65-17-AB
K8WVP 936- 52-18-AB

ROCKY MOUNTAIN DIVISION

Colorado

WØEYF 7560-174-42-ABCDE
WØAJY 1162- 83-14-A
WAØLVM 1027- 79-13-AB
WØISL 405- 43- 9-ABD
WØHEP 270- 45- 6-AB
WB2LMK/0 144- 36- 4-A
KØDPN/0 108- 27- 4-A
WØWYX 74- 37- 2-AB

WA5LPK/Ø 52- 26- 2-AB
WAØNEJ 46- 23- 2-AB
KØEZH 32- 32- 1-B
WØHEM 30- 15- 2-AB
WAØJRP 28- 14- 2-AB
WØSIN 16- 15- 1-B
KØADG 18- 6- 3-A
WAØINI 8- 4- 2-A
WAØJDD/Ø 4- 4- 1-A

New Mexico

W5CK 407- 37-11-AB
W5IXS/5 290- 29-10-AB
W5UFJ/5 (4 oprs.)
4611-149-29-ABD
W5HDE (4 oprs.)
1617- 75-21-ABD

SOUTHEASTERN DIVISION

Alabama

K4WHW 3197-139-23-AB
WB4ALW
1343- 79-17-A
KL7EBB/4
544- 32-17-AB
W4YRM 473- 43-11-AB
K4TUT 420- 42-10-A
WA4PHF 288- 32- 9-AB
K4ZAJ 39- 11- 3-BD
WA4GNG (WA4S GNG GNK) 960- 64-15-A

Eastern Florida

WA4STJ 923- 71-13-A

Georgia

K4HQI 312- 24-13-A
WA4QPL/4 (7 oprs.)
4284-153-28-AB

Western Florida

WA4NRP 175- 25- 7-AB

SOUTHWESTERN DIVISION

Arizona

K7EBW 68- 17- 4-AB
W7GNP/7 (K7ZWI, W7GNP) 40- 40- 1-A

Los Angeles

W6NLZ 464- 19-16-ABCE
W6QCV 459- 51- 9-AB
WA9DKH/6
300- 60- 5-A
WB6KGK/6
100- 25- 4-B

WB6FRP 92- 23- 4-B
WB6GHB/6 5- 5- 1-B
WB6KIL 4- 2- 2-B
W6SD/6 (7 oprs.)
3504-176-16-ABCE

Orange

W6HPH 210- 16- 7-BDE
WB6PHO 155- 31- 5-AB
WB6CGM 140- 28- 5-A
K6IBY/6 (6 oprs.)
8180-356-21-ABCDE
WB6CDF/6 (8 oprs.)
3834-196-18-ABCD

San Diego

WB6JLC/6
624- 78- 8-AB
W6NLO/6 (9 oprs.)
11,097-379-27-ABCDE

Santa Barbara

W8IDH8/6 385- 35-11-AB
K6BPC (10 oprs.)
20,130-571-33-ABCDE
K6OKC (multiopr.)
13,423-378-31-ABCDE

WEST GULF DIVISION

Northern Texas

K5IVB 1638- 91-18-A
WA5JAF 1410- 94-15-A
WA5OMG (WA5S GUY OMG) 1530- 85-18-A

Oklahoma

W5WAX 7470-249-30-AB
WA5CXB 96- 12- 8-AB

Southern Texas

K1IGY/5 1794- 78-23-A
WA5AUA 329- 47- 7-AB

CANADIAN DIVISION

Manitoba

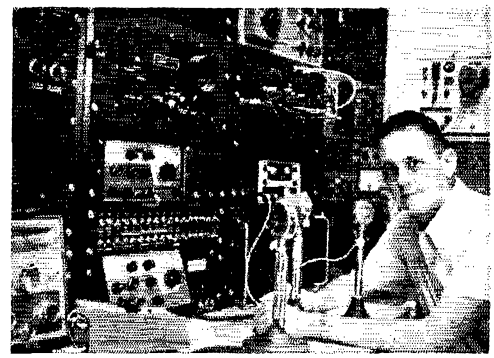
VE4RE 2072- 74-28-A

Maritime

VE1AI 288- 36- 8-A

Ontario

VE3BPR 8510-179-46-ABCD
VE3DWL
6690-223-30-AB
VE3BGA 5880-210-28-AB
VE3ASO 3003-273-11-B
VE3AIB 2576-104-23-ABCD
VE3EZC 1140-106-10-BD



W6GDO's suggestion from Sac. Valley to all multiband single operator stations: "Always leave a receiver with a panadaptor on six meters." Jay says it pays off in spotting band openings when you're on another band. He comments that the 50 Mc. opening was crazy with him hearing WØEYE strength 9 for about an hour while a station 100 miles away couldn't hear WØEYE. Conclusion: he guesses he had some very small, extremely stationary, ionized clouds!

VE3DRX 744- 62-12-AB
VE3DSE 567- 59- 9-BD
VE3CIU 450- 45-10-A
VE3DSQ 450- 75- 6-AB
VE3CSO 324- 54- 6-B
VE3CDX 200- 20-10-B
VE3CIT 120- 20- 6-AB
VE3DNR 110- 55- 2-B
VE3FXN 44- 11- 4-A
VE3GAG 37- 37- 1-B
VE3ZZZ (VE3s ABG BQN) 9058-192-45-ABCD
VE3SAU (9 oprs.)
8806-238-37-AB

Quebec

VE2BMQ 1292- 65-19-ABD
VE2AQA 390- 39-10-AB
VE2SH/2 (5 oprs.)
12,502-254-47-ABCD
VE2BZH/2 (7 oprs.)
4756-164-29-AB

Saskatchewan

VE4MA/5
2112- 88-24-A

September 1941

. . . The war draws a little closer. In a lengthy editorial, K.B. Warner discusses certain impending developments seriously affecting the radio amateur. The FCC is about to borrow considerable chunks of the 75-80 meter band, to be returned to us when the emergency no longer exists. This will be done in stages, as the requirements of the military dictate. The purpose is, of course to provide additional frequencies for the vastly augmented program of aircraft pilot training. It is a contribution to the war effort by the radio amateur.

. . . Along these lines, George Grammer, W1DF has a piece in which he points out the advantages of handling traffic on 160 and gives many helpful suggestions on getting the rig to perk up there. Diagrams and charts illustrate the article.

. . . Clinton DeSoto has a fine description of the National Model Airplane meet with emphasis on the role played by radio. These gas-powered jobs do about everything that a manned plane does, including spot landing, spins, loops, cross-country flights to a predetermined destination and return, etc. It's a great sport.

. . . U.h.f. converters using the new 9001-2-3 miniature tubes are described by George Grammer, W1DF. Taking advantage of the capabilities of these new tube, he comes up with what looks like a pretty straight-forward outfit. Works good, too.

. . . Continuing his discussion of five-meter wave paths, Milvin S. Wilson, W1DEI, goes into trophosperic refraction, etc. It is pretty comprehensive article and is a must for all u.h.f. men.

. . . An interesting development is taking place in Florida, called "Ham Haven." This is to be a place where hams and their families can go and enjoy a nice picnic, swimming, fishing and, of course do a little hamming.

. . . A band-edge spotting electron coupled oscillator using a 117L7GT tube is described. Its output is at 50, 100 or 1000 kc. depending on which *LC* combinations are switched into the circuit. By checking against WWV, excellent performance is obtained.

. . . Ev Battey, W1UE, who should know, discusses the secrets of good sending. Everyone who ever worked him knows that his is the sweetest "fist" to appear in many a moon. He goes into this matter pretty thoroughly. This is the real dope.

. . . Don Mix, W1TS has some words and advice concerning antennas for domestic work. A number of radiation patterns for various configurations are shown and discussed.

. . . Byron Goodman, W1JPE (now W1DX) and Hal Bubb, W1JTD describe a novel way to "halve" the frequency of a crystal oscillator, so a fellow can get on 160, using an 80-meter crystal. This works. — *W1ANA*

September V.H.F. QSO Party

September 10-11

"Sq contest" on the v.h.f. bands the weekend of September 10-11 will mark another popular ARRL V.H.F. QSO Party. This contest which gets under way at 2 p.m. (1400) your local standard (*not* daylight) time Saturday, September 10, and runs through 10 p.m. Sunday, September 11, is open to all amateurs in the ARRL field organization who can work 50 Mc. or above. For purposes of the contest Yukon-N.W.T. (VE8) will count as a separate multiplier. Contacts count only when the contest is in progress at both ends of the QSO.

Just exchange ARRL section (see page 6, this *QST*) and count one point for completed exchanges on either 50 or 144 Mc.; two points for contacts on 220 or 420 Mc.; and three points for contacts on higher bands. The sum of these points multiplied by the number of different ARRL Sections worked per band gives you your final score. Therefore, it pays to contact the same stations on different bands to increase both contact points and multiplier. **Portables are urged to sign properly to avoid possible disqualifications.**

Reports must include your call, section, times in GMT, call and section of station worked. You're urged to do your logging in GMT (leave the operating clock on GMT for this purpose), a natural when working across time zones and a veritable necessity when cross checking is in progress at Headquarters. Postmark deadline is Oct. 4, 1966.

Rules

1) The contest starts at 2:00 P.M. Local Standard Time, Saturday, Sept. 10, and ends at 10:00 P.M. Local Standard Time, Sunday, Sept. 11. All claimed contacts must fall within this period and must be on authorized amateur frequencies above 50 Mc., using permitted modes of operation. Contacts between stations in different time zones can be counted only when the contest period is in progress in both of the time zones concerned.

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

3) Fixed-, portable- or mobile-station operation *under one call*, from one location only, is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOT).

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

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

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

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

5) A contact *per band* may be counted for each station worked. Ex.: W2BLV (S.N.J.) works K1CRQ (Conn.) on 50, 144 and 220 Mc. for complete exchanges. This gives W2BLV 4 points (1 — 1 — 2) and also 3 section-multiplier credits. (If W2BLV contacts other Conn. stations on these bands, they do not add to his section multiplier but they do pay off in additional contact points.)

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

7) Awards: A certificate will be awarded to the high-scoring single-operator station in each ARRL section. In addition, the high-scoring multi-operator station will receive a certificate in each section from which three or more valid multiple-operator entries are received. Certificates will also be given to top Novice in each section where three or more such licensees submit logs. Award Committee decisions will be final. QST

SUMMARY OF CONTACTS, V.H.F. QSO PARTY

STATION W1AW ARRL SECTION CONN

Freq. Band (Mc.)	GMT Date Time	Station Worked	Section	Record of new Sections for each band: 50	144	220	420	other 1215	Contact Points
50	1901	W1MEH	CONN.	1					1
	1905	WA2BAH/2	ENY	2					1
	1915	W1MHL/1	N.H.	3					1
	1920	W1YDS	CONN						1
144	2000	W2GKR	NNJ		1				1
	2005	W1MHL/1	NH		2				1
420	2200	W1YDS	CONN			1			2
1215	2300	W1HDQ	" "					1	3

(Enter below on last sheet used)

Band	Contacts	Points	Mult.
50 Mc.	4	4	3
144 Mc.	2	2	2
220 Mc.			
420 Mc.	1	2	1
Other 1215 Mc.	1	3	1
TOTALS	8	11	7

Check one: ☐ Single operator ☑ Multiple operator

Calls of operators having a share in above work: W1s QIS WPR, K1QNF

Power input:

Transmitter:

Receiver:

Antenna:

CLAIMED SCORE: 11 (Points) × 7 (Mult.) = 77 FINAL SCORE

I hereby state that I have abided by the rules specified for this contest and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.

Signature Call Address

Sample log and summary form giving an example of how to score. You can obtain these log forms free by writing to ARRL Communications Dept., 225 Main Street, Newington, Conn. 06111.

QST for

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* WINJM

Diagnosis and Prescription for ARPSC

If we consider the active amateur radio operator as the life blood of ARPSC (as he most certainly is) and his on-the-air activities the circulation of that blood, then we have a pretty good formula for ARPSC success -- good blood and plenty of circulation. Before arriving at a basis for treatment of a patient, a good doctor must diagnose the difficulties. In order to do this, it is most helpful to have an intimate familiarity with the anatomy of the patient.

We think the local ARPSC officials such as ECs and ROs, are familiar with certain parts of the anatomy, such as a finger or a toe, and SECs and state ROs with a larger part such as an arm or a leg, and we here at headquarters are familiar with the entire skeletal and protoplasmic structure. But as the familiarity with parts spreads to more general familiarity, it is natural that the decrease in close association with the smaller parts results in less familiarity with each of them. In other words, the SEC is less familiar with the local ARPSC situation than is the local EC, and the headquarters (even us ARPSC specialists) is less familiar with the section or state situation than is the SEC.

So actually, we need each other to make a fully rounded organization.

Our diagnosis of ARPSC's illness is that it suffers from pernicious anemia aggravated by improper circulation. We prescribe a transfusion of new blood and correction of circulatory difficulties by adherence to a rigid schedule of regular activities. The former commodity is rather difficult to obtain, but if we had more good procurers it would be forthcoming. The latter is straightforward and easy enough but its success depends on the cooperation of the patient.

We wouldn't want to give you the impression that ARPSC is mortally or even seriously ill. The symptoms are strictly curable. Neither should we take the attitude that there is *nothing* wrong, because this also is far from the truth. But there is nothing wrong that a continuous flow of new blood and ideas and activities won't cure.

So let's get on it, shall we? The active fall season is coming up. The SET comes in October and we have big plans for all three ARPSC divisions (AREC, RACES and NTS) this year. Even now, we are in the middle of the hurricane season. Later will come blizzards and ice storms and tornadoes and floods and fires. No use hoping these things won't happen, because we know they will, and we know also that we amateurs will be needed to help out with emergency communications problems. Join your AREC or RACES units, or get active in NTS, or both, or all three. *Now* is the time! -- *W1NJM.*

* National Emergency Coordinator.

The Cincinnati Chapter of the American National Red Cross presented 15-year service awards to these two gentlemen on June 7. WA8FGN (left) and 10 other members of the Queen City Emergency Net were cited for their providing emergency communication for the Red Cross in time of disaster.

Hurricane Alma

The hurricane season opened officially when Alma was born, early in June. She ripped her way through the western part of Cuba and continued in a northerly course, aiming straight for Florida. By early afternoon on June 8, Key West was feeling the full effects of Alma's winds and rain; later that day, Fort Myers got a taste of her fury as well. She continued working her way up the western Florida coast, hitting Apalachicola at about noon, June 9. From there, Alma headed out into the Atlantic to plague ships and dump rain up and down the coast, from Georgia to Maine.

The Florida ARPSC crew took the whole operation in stride; after all, they've had plenty of practice with hurricanes. W4IYT, E. Fla. SEC, established a Condition One (monitor radio and TV for latest reports on the storm) at 1300z on June 8, followed by a Condition Two (standby for net operation) at 1700z.

W4SMK, Lee County EC, alerted his crew a day before Alma struck Ft. Myers. K4RQY reported to the local c.d. headquarters while W4TUB was standing by to relay any information to W4SMK who was participating in Net Charlie. K4FQU provided liaison with the Red Cross and handled six messages, while WA4LFZ and WA4HDH provided the necessary relaying to the traffic nets. WA4LBM set up a station and operated from the local radio station's transmitter site, providing their news department with

weather and general hurricane information. W4SMK paid a special compliment to the teenage ops who could hold up all day and night and still holler for more.

W4MLE and W4IYT requested that Net Delta (QFEN) be activated at 2200z, but only a few stations showed up. K4BSS started out as NCS, but abruptly QRT when his antenna came crashing down. W4JGD took the reigns until 2330z when activity increased along with the traffic.

In Tallahassee, W4DKT operated the station at the weather bureau, receiving reports on barometric pressure, wind speeds, etc., for use by the meteorologists. The amateur station located at the State Civil Defense Center was operated by K4YPI and K4HCT, maintaining contact with the c.d. headquarters in Jacksonville and with scattered county c.d. organizations all over the state. Long haul communications were provided for Red Cross Headquarters by W4GAA, W4JGD, WA4EOQ and W4MLE.

The entire operation was pretty much routine stuff for the well trained Florida boys, traffic was light and the nets operated at no where near full capacity. Don't despair, men, the hurricane season is young.

Don Stromsted, WB6BWB, is the SEC for the Sacramento Valley Section. Don is a brand new SEC, having been handed the reigns in March of this year. Attention all hams in the Sacramento Valley Section. If you want to join the AREC but don't know who your EC is, send your application to Don.

Diary of the AREC

On April 26, WB2NYM was instrumental in supplying a special serum for a stricken French woman on advice received from F7AS. W2APF was consulted and finally located a supply of the serum which was shipped by air and arrived in France on April 27. Also participating was DJ6PL. Thanks are due many amateurs who helped keep the channel open during this operation.

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At 0700, April 27, Red Cross headquarters in Monroe County, Mich., called EC W8NDM and asked if it would be possible for the AREC to provide communications for various groups working in the area flooded the previous night. The flood was a result of strong winds blowing across Lake Erie. WA8MTX, the communications center located at the Red Cross building, was activated and took control of the net that operated on 6 meters. Mobile units were stationed all along the shoreline in Monroe County. While the 6-meter net was primary, a 160-meter link was established between WA8MTX and Toledo, Ohio. Two-meter f.m. circuits were used by RACES operators and a direct telephone line was used between c.d. headquarters and Red Cross headquarters.

The AREC crew handled command traffic for Red Cross during the evacuation, feeding and housing of flood victims. Heavy rain and high winds hampered the operation on April 27, making the evacuation, much of which was carried out by the use of boats, very difficult.

The next morning, a complete survey of the disaster area was made by Red Cross officials, with AREC members again providing transportation and communication between the survey team and headquarters.

The only real problem that the crew had was when 6 meters opened up, but most of the stations kept the frequency clear so the AREC net could continue its operation. Twenty-eight amateurs were known to have participated in this operation. — *W8NDM, EC Monroe County, Mich.*

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On May 28, a six-year-old boy became lost in the rugged mountainous area 50 miles west of Las Vegas, Nev. The child's parents, along with friends, looked for the boy, but couldn't find him. The family then called the sheriff's office and Nellis AFB for assistance. Volunteers were asked for, and a search headquarters was set up in Lee Canyon, where the child was believed to be, and communications links were established. The communications facilities were found to be insufficient, so a call was sent out for amateurs to lend a hand. WA7ERR, WA7BAV and WA0EAC operated from Nellis, handling many hundreds of requests for supplies and personnel information.

Amateurs with mobile and portable units set up secondary command posts at several locations to handle traffic for Nellis, Lake Mead Navy Base, the Nevada National Guard, Marine Corps, Clark County Sheriff's office and other searching groups.

After two weeks of futile searching, the operation was suspended after medical authorities advised that it was almost impossible for anyone to survive the high daytime temperatures and the nearly freezing temperatures at night for so long a time without adequate food and shelter.

The amateurs taking part in this operation exceeded all expectations in their efforts to provide the parties involved with communications. Forty-five amateurs were known to have participated. — *W7PBV, SCM Nevada.*

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Forty-four SECs reported for May, representing 17,934 AREC members. This is four more SEC reports but 600 less AREC members than last year. We are nearing the half way mark for 1966 and yet there are still several sections for which there are no reports recorded. Several others have only one or two. How's about it fellows, let's get those reports in! Those sections heard from this month were: Conn., E. Mass., N.Y.C.-L.I., N.N.J., S.N.J., W.N.Y., E. Pa., W. Pa., Del., Ala., E. Fla., Ga., N.C., Ark., La., Miss., N. Mex., Okla., S. Tex., E. Bay, Los A., Orange, S. F., Sac V., Hawaii, Mont., Nev., Ore., Utah, Wash., Wyo., Mich., Ohio, Colo., Kans., Mo., N. Dak., S. Dak., Que., Ont., Man., Sask., Alta., B.C.

RACES News

Just as a foreword to the Simulated Emergency Test (Oct. 8–9, this year) we would like to mention that all RACES radio officers are invited to participate in the same status as AREC ECs. To that end, we are endeavoring to obtain mailing lists of ROs from OCD regional offices so that copies of the SET Bulletin can be sent to those who are not also EC's. Meanwhile, any RACES radio officer who wishes to be sure he receives a copy of this bulletin is invited to let us know his name and address. We will be glad to send it.

We are proceeding cautiously with the implementation of the ARRL Board of Director's order to include RACES as a part of ARPSC. This is a first step. The ARPSC slide collection is being studied to determine how it should be changed. Correspondence and personal contact is being conducted with government officials to explore the extent to which the change can be implemented. We hope in the near future to be able to show some concrete results.

So how about more material for this subhead?

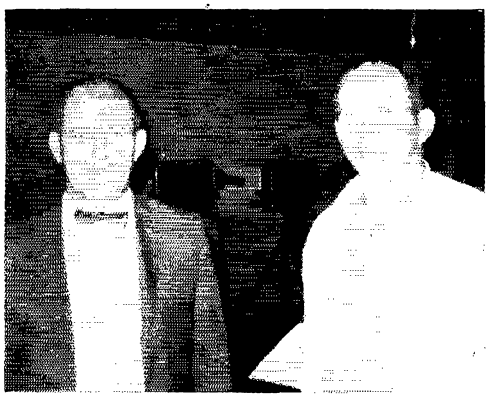
National Traffic System

Tucked away in an obscure corner of the League's new *Public Service Manual*, in the part about NTS, is a subheading entitled "Membership." This was inserted into CD-24 before it became a part of the PSM, in the hope that it would answer (in advance) the many questions we receive from time to time on "How can my net join NTS?" Alas, the question keeps coming up just the same.

Perhaps the explanation in the PSM isn't clear. We would rather think, however, that it just hasn't been read by certain people. Those who read this section of the PSM are usually already NTSers and are familiar with its provisions.

The question is, when is a net an NTS net and when isn't it? Well, being an NTS net is not a matter of applying and being accepted. It's nothing so formal as that. It's more a state of mind, so to speak. That is, if your net performs a specific function in NTS as described in the PSM, then it's an NTS net. If it doesn't, it isn't. That's the simplest answer to the question.

When NTS was first formed, its principal function was to connect all existing ARRL Section nets together into a system to facilitate and expedite transfer of traffic from one Section to another. Previsously, this had been done by the ARRL Trunk Lines, which later became, in effect, regional nets. When some of the League-sponsored trunk lines began to falter, several independent lines sprung up to take up the slack and keep the traffic moving. These "lines" weren't really lines at all and became widespread spot frequency nets with indeterminate and changing coverage, many of them overlapping or duplicating each other. The result was, quite naturally, hodge podge. So, as a result of general dissatisfaction on the part of the traffic-handling



The men behind the scenes in the Delaware Section are Roy Belair, W3IYE, SCM and John Penrod, K3NYG, SEC. Both men have been working very hard toward one end; a strong ARPSC organization in Delaware. (Photo by W1BGD).

fraternity, NTS was formed to bind the Section nets together in a systematic and organized way.

In the original concept, NTS consisted only of the new regional and area nets; but it was soon realized that since it was being set up to serve Section nets, the System should certainly include them. However, the Section nets were already there, for the most part. The regional and area nets had to be created.

Why all the history? Well, simply because it points out what we were leading up to — that NTS nets at Region and Area level were created, not adopted. We tried adopting one of the trunk lines to serve as a Region net, but it didn't work out. This is pretty generally the story with NTS — nets are *set up* to perform an NTS function, and generally speaking perform *only* that function. This is a pretty strict procedure at Region and Area level. At Section level, because Section nets existed before NTS was formed, and because the purpose is not exactly the same, there is more latitude.

How much more? A good question. Where do we draw the line? Our current crop of net registrations brings the question to the fore. If a net claims to be a NTS net, how do we tell if it is *really* an NTS net? And come to think of it, what *is* a real NTS net at Section level?

The answer to the "how?" question is, we don't. Not for sure. If there is reasonable doubt about it, we take the net's word for it. It's conceivable, even probable, that there are nets registered as NTS nets in the directory which do not perform an NTS function at all. A close examination of four parts of the registration card determine whether or not the net shall receive the asterisk indicating its NTS status. First is whether or not it *claims* to be an NTS net. If so, then we look at the liaisons indicated. If this doesn't tell us anything, we consult the coverage data. If this still is inconclusive, we try to get some help from the name. Then we make up our minds. We hope we are usually right; no doubt we are sometimes wrong, one way or another. We do try to give every net the benefit of any doubt.

As to the "what?" question: an NTS net is one which performs an NTS function. There *are* no nets which can perform the functions of Region and Area nets except those which have been set up for this purpose. One does not set up a net to cover several states, invite everyone to participate, operate according to procedure set up strictly at the convenience of the "members," then expect to be taken into NTS. So let's keep this discussion at Section level, because the chances of a net of widespread coverage being able to serve as a Region or Area NTS net are next to nil.

Note that Section "level" does not necessarily restrict to section *coverage*. A net may cover more than one Section but still qualify as a NTS Section net. Some of them, in fact, do. An example might be the Winnemac Section Net, with coverage of the states of Winnemac, Centralia and Westminster. It sends a nightly representative to TEN, and TEN routes its Winnemac traffic via this net, so it's eligible to NTS status. The fact that it has inter-liaison arrangements with adjacent Sections can possibly cause some short-circuiting of the Region net and may even be deplored, but it is still a NTS net.

Now if the same net were named something like the "Three State Net" and operated in addition to NTS Section nets in the three states, its eligibility to NTS status would be seriously questioned. On the other hand, if this "Three State Net" were the *only* net in these three sections and had recognition of all three SCMs as *their* common NTS Section net, its status would be unquestioned.

There can be any number of similar examples. This office does not and cannot conduct a fullscale investigation of each net which says it is part of NTS. We take their word for it, for the most part — unless registration data make it plain that there is something "fishy" about the claim.

So don't ask *us* if your net is an NTS net. Take a look at the functions of NTS nets in the PSM and ask *yourself*. Whether or not you are NTS depends on how much you *want* to be. — *W1NJM*.

June Report:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation (%)*
1RN	.59	409	.289	6.9	85.5
2RN	.51	325	.696	5.4	96.8
3RN	.60	473	.373	7.9	98.3
4RN	.56	540	.345	9.6	91.6
RN5	.60	840	.334	14.0	94.6
RN6	.60	1380	.925	23.0	100
RN7	.29	408	.514	14.1	60.4[1]
8RN	.60	361	.262	6.0	87.4
9RN	.30	514	.810	17.1	100[1]
TEN	.60	835	.729	13.9	64.3
ECN	.28	133	.206	4.7	66.7[1]
TWN	.25	409	.469	8.4	60.0[1]
EAN	.30	1325	.954	44.2	92.8
CAN	.30	1405	1.021	46.6	100
PAN	.30	1466	1.045	48.9	94.4
Sections[2]	1993	11,810		5.9	
TCC Eastern	120[3]	612			
TCC Central	90[3]	632			
Summary	2661	23,817	PAN	8.6	RN6/9RN/CAN
Records	1866	19,944	.991	15.9	100

[1] Representation based on one or less sessions per day.

[2] Section/Local nets reporting (69): NJN NJ6&2 NJEPTN (N.J.); KTN KYN (Ky.); QIN BEN (Ind.); WPA PTTN ETEPTN (Pa.); EMNN (E. Mass.); WSBN WIN (Wis.); OZK (Ark.); CPN (Conn.); Wolverine, Mich 6 mtr (Mich.); FMTN QFN WFPN GN (Fla.); NTTN (Tex.); ILN (Ill.); VN VSBNE VSBNL VSN (Va.); MEPN MTN (Man.); OQN (Ont.-Que.); TSSBN ETPN TN TPN (Tenn.); AENB AEND AENH AENM AENO AENR AENT (Ala.); SCCWE SCCWL (S.C.); NCN SCN (Cal.); BN OSSBN (Ohio); WSN (Wash.); VTNH (Vt.-N.H.); GSN (Ga.); Iowa 75; PHD MOTTN (Mo.); MDDS MDD (Md.-D.C.-Del.); GBN (Ont.); NCNE NCNL THEN SSBN (N.C.); BUN (Utah); NYCLIVHF NLS (N.Y.C.-L.I.); MJN MISN (Minn.); LAN (La.); Alta SSB; PTN (Me.); RISTN (R.I.).

[3] TCC functions not counted as net sessions.

June was another record breaking month in all departments except Average. We are pleased to note the high number of reports from Section and Local nets, and would like to again urge all NTS nets to continue to report each

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc)

FULL TIME

3550	7100	50,000
3875	20,640	145,350

PART TIME

7250	14,225	21,400
14,050	21,050	28,100

Full time frequencies are for use 24 hours per day but only for emergency and traffic calling purposes. No transmissions for *any* purpose (except calling for emergency help) the first minutes of each hour.

Part time frequencies are for traffic calling and general amateur use except in an FCC-requested or FCC-declared emergency, at which times they become *full time* frequencies.

This is a voluntary amateur program, designed to show what we can do without FCC regulation. Its success will require us all to work together. Any amateur wishing to assist is invited to use ARRL notification cards to be sent to stations not observing the rules.

month. Out of report forms? Send us a message or postal card and some will be on the way PDQ.

Representation on the Region nets seems to have taken a drop this month, with only 6 nets reporting 90% or better. Summer QRN, vacations, gardens, YLs, etc. seem to be taking the ham out of the shack and adding a few gray hairs to the heads of the managers. Just remember, there are only 116 more days 'til Christmas.

All appears to be quiet on 1RN and 2RN, since neither manager had anything to say. Perhaps no news is good news? K3MVO comments that 3RN fell off a little this month; hope it's not a trend. Silent W4SHJ just keeps 4RN rolling along. K5IBZ notes that just about all sections covered by RN5 are running in low gear, but a few bright spots are the increased representation from Miss. and Tex. RN6 starveth not, thanks to the traffic coming in for and from homesick GIs in Viet Nam. K7JHA passes out kudos to K7IWD who continues to provide the backbone of NCS and QNB assignments. With the coming of summer conditions, the relay to KL7 had to be shifted to forty meters. W8CHT and 8RN seem to be having a problem with lack of traffic, but things should improve with the coming of fall. W9QLW shipped 9RN certificates to WA4VCN and WB4AIN. Carty isn't looking forward to fall since many of his stalwarts will be heading for college. WØLGG reports that TEN is really suffering from summertime weather. The farmers are tending their fields and the younger members have other things in mind besides traffic. K7NHL has issued another fine edition of TWN TWX. It seems that most of the TWN boys went to the Rocky Mountain Division convention. K1WJD has been arranging to have stations who are not normally EAN NCS take over for the regulars who are on vacation. So far, this system has been working well and the newer fellows are getting a taste of what it's like to be on the other end of the NCS sheet. One more month for CAN and they will have made it two years in a row of perfect representation. W9DYG plans to attend the Great Lakes Division convention in October and will be looking for any of the CAN crew that can make it. WB6JUH submits his last report as PAN manager. The Navy is providing John with an all expense paid trip to the South Pacific and back and he just couldn't refuse. The new manager will be W6VNQ.

Transcontinental Corps: The Eastern Area's performance is about the same as last June, but traffic is up a bit. W3EML has been filling a few skeds temporarily vacated by vacationing regulars. TCC certificates have been issued to K1ZND and WA2UPC. W4ZJY is still having trouble getting reports, but still hopes things will straighten out once he gets settled again. By the way, disregard the mailing address for W4ZJY/9 in last month's issue. It's been changed again.

June report:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	120	85.8	1622	612
Central	90	73.3	1422	632
Summary	210	80.0	3044	1244

TCC Roster: Eastern Area (W3EML, Dir.) — *W1s* BGD EFW NJM, K1ZND, *W2s* GVH SEI, *WA2s* BLV UFI UPC, *WB2s* AEJ DXM, *W3s* EML NEM, *K3s* FHR MVO, W4DVT, *W8s* CHT IBB RYP, *K8s* KMQ NJW QKY, WA8VFJ, WØOHJ. Central Area (W4ZJY/9, Dir.) — W4OGG, WA4WWT, W5GHP, K9DHN, *W9s* CXY DYG HRY ZYK, *WA9s* BWY IZR, *KØs* AEM GSY, WAØIAW, *WØs* INH HXB/4.

Net reports:

Net	*Sessions*	*Check-ins*	*Traffic*
HBN	30	434	663
7290	44	1413	903
Mike Farad	26	444	597
North American SSB		651	779

Strays

QST

Feedback

The Miller 8901 transformer and 8903 assembly specified in W4GEB's article in August *QST* ("The Simple Super-9") have been superceded by revised versions which are identified by a "B" suffix. Electrically, the 8903 and 8903-B are the same, but the lead arrangement used for the 8903-B differs from that shown in Fig. 1 in the article.

The 8901-B transformer differs sufficiently from the 8901 to make it unsuitable for use at T_2 and T_3 in the circuit. Write to the J. W. Miller Co., att. W. R. Courtney, 5917 S. Main St., Los Angeles 3, Calif., for suggestions for a substitute; at this writing a number of types are being tried experimentally to find the one most suitable.

Canadian members who would like to participate in the Intruder Watch program should contact Steve Chisholm, VE2ZM/VE3ATU, 142 Sherbrooke St., Beaconsfield, Quebec. Those VEs who had already enlisted in the ARRL Intruder Watch are now reporting to Steve.

This is the Little German Band of State College, Pennsylvania and it is probably one of the few amateur bands where the playing of music is not only allowed, but is encouraged! Band membership contains a high percentage of radio amateurs and even includes two QST authors. Ham members include K3BRH, K3KMO K3LVA, W3MLN, W3NUO, K3PML, W3SUC, W3TYL, W3ZUH, W4UWA, WØIOZ, DL4EG, DL4NR, DL4WA, DL4WE, and DJØHZ. The band's motto when translated is "We are cheap, loud and very reliable." If you are interested in one of their records, write K3KMO.

Hamfest Calendar

To commemorate the 50th anniversary of its founding, the South Jersey Radio Association is holding a banquet on Saturday, September 10, at the Ivy Stone Inn, Route 130, Pennsauken (near Camden), New Jersey. Nationally prominent speakers are planned from industry, government and military as well as amateur radio. All hams and their XYLs are invited. Choice of roast beef or lobster, $7.50. Contact Charles H. Jenkins, W2VX, Box 316, Haddonfield, N. J. 08033

California — The annual convention of the Western Single Side-Band Association, Inc., will be held at the Edgewater Inn Marina Hotel, 6400 E. Pacific Coast Hy., Long Beach, California on September 30 through October 2. For information write WSSBA, 4756 Collis Avenue, Los Angeles, California 90032.

Connecticut — The Tri-City Radio Club, Inc., 19th annual hamfest will be held on October 1, 1966, at the Crocker House Hotel, State Street, New London, Conn. Tickets are $5.99 each which includes a steak dinner and registration. Activities include technical talks, swap and shop table, and visits to local military activities. Registration and information available from General Chairman Robert York Chapman, W1QV, 28 South Road, Groton, Conn. 06340.

Georgia — The Griffin annual ham picnic will be held September 10 at Dundee Lake.

Illinois — The Peoria Area ARC Hamfest will be held Sunday, Sept. 18 at Exposition Gardens (the same place as last year), located on the northwest edge of Peoria, Ill. An all-weather site, lunch will be available along with a free swap section, parking contest and cartoons for the kiddies. Free coffee and donuts at 9:00 A.M. CDT. Registration is $1.50 advance, $2.00 at the gate. Write Ferrel Lytle, W9DHE, 119 Stonegate Road, Peoria, Ill. 61614.

Indiana — There will be an s.s.b. dinner the night of October 8 just before the Hoosier Hills Hamfest.

Kansas — The Wichita ARC, the Air Capital ARC and the Tec-ni-chat will sponsor a hamfest on Sunday October 2 at the Osage Park Recreation Area, 31st St. S. and Bonn, Wichita, Kansas. Talk-in on 3.920, 145.350 and 146.91 (f.m.) Mc. Activities will start at 9:00 A.M. but there will be some activities Saturday night and at 7:00 A.M. breakfast Sunday morning.

Michigan — The V.H.F. Hamfest will be held in East Tawas, Michigan on October 8 and 9. For information write W8AMS or W8DVN. Dinner will be held at the Holland Hotel on the 8th at 7:30 P.M.

New Jersey — The SCARA will hold its annual outing and hamfest at Egg Harbor Lake, Egg Harbor City, Sunday August 28.

New York — The first annual banquet of the Central N. Y. Chapter of the QCWA will be held on Sept. 17 at Shrafft's Motor Inn and Restaurant, Binghamton, N. Y. The welcome hour and get together will commence at 5:00 P.M., dinner is at 6:00 P.M., and will be followed by several speakers. The business meeting will follow the dinner. Ladies are invited and plans are underway for entertaining the ladies during the business meeting. Election of 1967 Chapter officers heads the business meeting agenda. Tickets are $5.00 per person. For further information contact Bert E. Martin, K2LBB, 3646 Rath St., Endwell, N. Y. 13760. Overnight reservations are available at Shrafft's.

Ohio — The 29th Annual Stag Hamfest sponsored by The Greater Cincinnati ARA will be held on Sunday, Sept. 25 at Stricker's Grove on Compton Road, Mt. Healthy, Cincinnati, Ohio.

Ohio — The Findlay Radio Club, W8FT, will hold its 24th annual hamfest, Sunday Sept. 11, at Riverside Park in northeast Findlay, Ohio. Excellent facilities are available at the refreshment counter or you can bring your own. Activities for the ladies. Swap and shop. Advance registration and information from C. E. Foltz, W8UN, 122 West Hobart, Findlay, Ohio.

Pennsylvania — The Uniontown ARC will hold its 17th Annual Gabfest on Saturday afternoon and evening of September 17. The Gabfest will be held at the Club grounds on Old Pittsburgh Road, just 2 miles north of Uniontown, Pa. For more information write Joseph M. Sofranko, 438 Braddock Ave., Uniontown, Pa. 15401.

Pennsylvania — The A.W.A. Historical Radio Meet will take place at the Franklin Institute, Philadelphia, Pa. Sept. 24 and 25. Two full days of programming for the old-time amateur, radio historian and collector. Outstanding speakers include Paul Godley and Clarence Tuska. Nationwide meet of Wireless Museum curators including representatives from Smithsonian and ARRL. Huge exhibit of old gear with talks, demonstrations and auction. Write

(*Continued on page 150*)

ONTARIO PROVINCE CONVENTION

Niagara Falls **September 16–17**

The Ontario Province ARRL Convention will be held at the Sheraton Brock Hotel, Niagara Falls, on Friday and Saturday, September 16 and 17, under the sponsorship of the Niagara Peninsula Amateur Radio Club. Activities will get under way Friday evening with registration at 6:00 P.M., followed by an informal evening of light refreshments and exhibits.

Registration and exhibits will open at 9:00 A.M. Saturday. An ARRL forum is planned, as well as AREC, v.h.f. and Radio Society of Ontario meetings; a laser demonstration; technical talks; and YL activities. The convention banquet will start at 7:30 P.M., to be followed by a guest speaker and entertainment. A dutch-treat breakfast will wind up the convention Sunday morning.

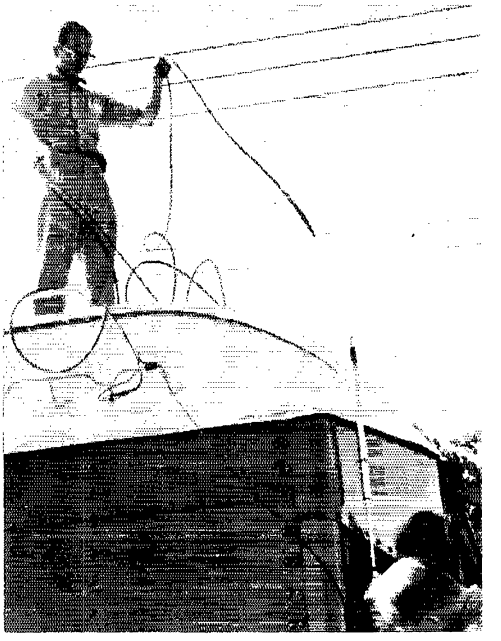
Those seeking hotel accommodations should write the Sheraton Brock Hotel, 1685 Falls Street, Niagara Falls. Advance pre-registration, until September 10, (including banquet) is $8.00 for OMs, $6.00 for YLs and XYLs; $10.00 and $8.00, respectively, at the door. Registration, without banquet, will be $3.50. Friday evening get-together, with light refreshments, will cost $1.00. Registration and requests for more information should be sent to D. G. Hall, VE3TB, P. O. Box 692, St. Catharines, Ontario. QST

COMING A.R.R.L. CONVENTIONS

September 16–17 — Ontario Province, Niagara Falls
October 15–16 — Hudson Division, Tarrytown, New York
October 21–22 — Great Lakes Division, Muskegon, Michigan
January 21–22, 1967 — Florida State, Miami
April 22–23, 1967 — New England Division, Swampscott, Massachusetts
July 1–3, 1967 — ARRL National, Montreal, Quebec

Prospective convention sponsors are urged to check with ARRL Hq. to avoid possible date conflicts.

A BUSY WEEKEND



K9JYX (top) sees about the installation of an antenna on the circus train before it leaves Baraboo, Wis., for Milwaukee.

Milwaukee Amateurs Participate in Three Different Activities over the July 4 Holiday

OVER the July 4 weekend, the Milwaukee Radio Amateurs Club and the Milwaukee Amateur Radio Emergency Corps put in a lot of time and work supplying radio communications for three separate events. The schedule included a steam-locomotive-drawn circus train trip from Baraboo, Wis., to Milwaukee, two projects connected with the National Safe Boating Week, and a mammoth old-time circus parade in downtown Milwaukee, complete with draft horses and elephants. To say that local amateurs were out in force is an understatement. Space will not permit unfolding the multitudinous details of all three operations as reported by Jack Doyle, W9GPI and EC Bob Goldstein, K9KJT, but let's do the best we can.

Circus Train

Activities commenced in Baraboo Wis., on July 1 when the train, equipped with a two-meter rig operated by K9JYX, took off for Milwaukee. First contact was made with K9ZPP/mobile (operated by SEC K9ZPP and WA9MRG). Relay was made from the mobile to W9GPI, operating on 75 meters from his home near Milwaukee. From this point, telephone contact was maintained with officials in the city.

After the train had moved east of Madison, W9ROM took over contact. Never one to pass up an opportunity for publicity, EC K9KJT parked his car, along with that of W9ATK, at the unloading area in Milwaukee, set up loudspeaker horns, instructed K9JYX/train mobile to make descriptive transmissions of the train's progress, and soon gathered an interested crowd of listeners. Communications were assisted throughout the trip by stations both in the area and as far away as Kalamazoo, Mich.

At the other end of the line, K9PSX stands by with his walkie-talkie at the staging area.

National Safe Boating Week Demonstrations

On July 4, while the circus and other events were taking place and there was no special need for communications for those events, the Milwaukee AREC along with Navy MARS provided communications for the National Safe Boating Week demonstration in Milwaukee Harbor and River. Two main events were served.

The first event was an underwater fire fighting demonstration put on by the Milwaukee County Sheriff's Department and the Milwaukee Fire Department. Amateur radio frequencies were used on 6 and 2 meters, the former for internal communications between the participants and the latter for emergency purposes. Navy MARS supplied the 6-meter gear, along with public address and mobile power facilities. A base station was set up at Juneau Park for emergency purposes, contact established with the AREC base station at the police department. Six meters was used for communication between the fire boat and four private patrol boats; the latter were being used to keep the area clear for the demonstration. The demonstration was a complete success, largely because of amateur-provided communications facilities.

The second event, the Water Parade, used identical communications equipment and frequencies with the base station aboard a 20-foot yacht leading the parade. Other boats with communicators aboard were visually identified with pennants. Two such were private police boats and four other boats were linearly spaced throughout the parade. Water was rough and the ability to communicate was a definite asset.

Circus Parade

Possibly the biggest event of the weekend was the giant parade staged on July 5. Units were installed in cars and various parade vehicles spaced throughout the parade and were instrumental in providing some vitally needed communications during the parade, which lasted from 2 P.M. well into the late afternoon. About 30 units in all were used.

Some interesting incidents are recorded in K9KJT's report. Chronologically, they went something like this:

11:38 A.M.: A 5-year-old boy was reported lost by Unit 3 (W9YYW and W9WVL). He was found by a police squad and reunited with his mother at 12:05 P.M.

1:45 P.M.: Unit 10 (W9PST and K9BTG) reported a lost 5-year-old girl. Her mother arrived and picked her up at 2 P.M.

2:01 P.M.: Unit 3 reported late arrivals of some of the parade elements. They were directed to the staging area.

2:41 P.M.: A 12-year-old girl was reported lost at Unit 11 (WA9MME and W9LPF). Her parents picked her up at 4:15 P.M.

3:03 P.M.: Unit 4 at the reviewing stand (K9KJT, W9ATK and W9KYT) reported a Roman Chariot went out of control and the horse plunged into the crowd, injuring the driver and shaking up some of the spectators, three of whom were taken to the hospital for a check. The Chariot was repaired and was back in the parade ten minutes later.

3:05 P.M.: Unit 2 (WA9IEF and WA9JVR) reported a fallen llama, but the animal regained its feet and was back in the parade ten minutes later.

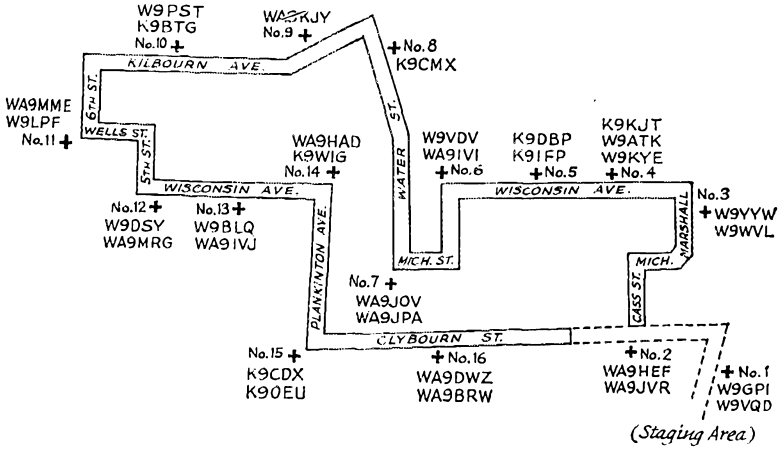
3:50 P.M.: Unit 10 reported two more lost children, a boy 10 and a girl 7, brother and sister. Their parents came for them within a half hour.

4:15 P.M.: Unit 3 reported a lost 7-year-old boy. His ten-year-old brother picked him up at 4:57. Unit 11 reported a lost 5-year-old girl. Her mother had inquired at Unit 12 (W9DSY and WA9MRG) and was directed to Unit 11 where she picked up her daughter at 4:59.

4:20 P.M.: Another lost child, an 8-year-old girl, was reported by Unit 10; her parents got her 20 minutes later.

4:40 P.M.: Worried parents reported to Unit 10 that their 11-year-old girl was lost. They were sent to the Youth Aid Bureau where they were advised that the girl was safe in a police cruiser on its way to police headquarters.

All in all, an interesting afternoon. If you haven't tried parade communicating, we strongly recommend it for a worth while public service and emergency exercise. Kudos to the Milwaukee gang for an outstanding record of performance over the long July 4 weekend. — *WINJM.*



The parade route in downtown Milwaukee. The crosses indicate the position of stationary units. It takes quite a few of them, plus some mobiles and pack portables, to do a proper job. Most units had two operators, as can be seen.

Happenings of the Month

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)

An election is about to be held in each of the above-mentioned divisions to choose both a director and a vice-director for the 1967–1968 terms. These elections constitute an important part of the machinery of self-government of ARRL. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. The election procedures are specified in the By-Laws. A copy of the Articles of Association and By-Laws will be mailed to any member upon request.

Nomination is by petition, which must reach the Headquarters by noon of September 20. Nominating petitions are hereby solicited. Ten or more Full Members of the League residing in any one of the above-named divisions may join in nominating any eligible Full Member residing in that division as a candidate for director therefrom, or as a candidate for vice-director therefrom. No person may simultaneously be a candidate for both offices; if petitions are received naming the same candidate for both offices, his nomination will be deemed for director only and his nomination for vice-director will be void. Inasmuch as all the powers of the director are transferred to the vice-director in the event of the director's resignation or death or inability to perform his duties, it is of as great importance to name a candidate for vice-director as it is 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 1967–1968 term.
(Name Call City 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 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 20th day of September, 1966. 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 20 only one eligible candidate has been nominated, he will be declared elected.

Present directors and vice-directors for these divisions are: *Central:* Philip E. Haller, W9HPG and Edmond A. Metzger, W9PRN. *Hudson:* Harry J. Dannals, W2TUK and Stan Zak, K2SJO. *New*

Dr. Glenn L. Musser, president of HRB Singer, presents the February Cover Plaque Award to Joel Balogh, K3CFA, while Atlantic Division Director (and ARRL Vice President) Gilbert L. Crossley, W3YA, looks on. K3CFA, a physicist for HRB Singer, had previously won the plaque for April 1964. The February article by OM Balogh, "Improving your Receiver with a Frame-Grid R.F. Pentode," was voted best of the issue by the League directors.

New Orleans adopted June 19–25 as Amateur Radio Week. At the presentation of the proclamation (from left) were W5BUK, president of the Westside Amateur Radio Club; WA5KJC, vice president and WA5CST, president, Greater New Orleans Amateur Radio Club, and Dennis Lacey, executive secretary to the Mayor of New Orleans.

England: Robert York Chapman, W1QV, and Bigelow Green, W1EAE. *Northwestern:* Robert B. Thurston, W7PGY and R. Rex Roberts, W7CPY. *Roanoke:* P. Lanier Anderson, Jr., W4MWH, and Joseph F. Abernethy, W4AKC. *Rocky Mountain:* Carl L. Smith, W0BWJ, and John H. Sampson, Jr., W7OCX. *Southwestern:* Howard F. Shepherd, Jr., W6QJW and John F. Martin, W6ECP. *West Gulf:* Roemer O. Best, W5QKF and Ray K. Bryan, W5UYQ.

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

For the Board of Directors:

July 1, 1966

JOHN HUNTOON
Secretary

RACES NOW PERMANENT

The Federal Communications Commission on July 13, adopted the changes in its rules for the Radio Amateur Civil Emergency Service which it had proposed in Docket 16420 released on January 13, 1966.

The changes simply make RACES a permanent phase of amateur activity. A comparison of old and new text appears on page 41 of *QST* for March, 1966. The new rules took effect on August 22.

NATIONAL AMATEUR RADIO WEEK

In early March Representative F. Bradley Morse of Massachusetts introduced a resolution, H.J. 865, into the house, seeking a proclamation by the President of National Amateur Radio Week beginning April 17. The measure was requested by Boston-area amateurs through Pat Volpe, W1LEL, to coincide with the ARRL National Convention at the end of that week. More recently, the New Orleans gang through John Uhl, WA5CST, has raised the interest of Congressman Hale Boggs of Louisiana in the measure, and he has offered to have the date changed to some other date, the need for the original having passed. As we write in late July, Congress is still in session. The chances seem small at this point, with Congressional elections in the offing, that Congress will get around to matters of this type before adjournment. If not, the bill will die, and the matter will have to be reintroduced into the new Congress.

Meanwhile, proclamations of Amateur Radio Week continue to reach headquarters from states and cities all over the land. In addition to those mentioned in photo captions, Governor John J. McKiethen of Louisiana proclaimed the week of June 19–25 in a fine statement lauding the assistance of amateurs during Hurricane Betsy a year ago, praising the amateur contribution to international good will and applauding its preparation for future emergencies through Field Day Exercises.

NEW NOVICE QUESTIONS

The Federal Communications Commission has announced the addition of eight questions for study by those seeking the Novice Class license issued by the Commission. These questions supplement those listed in the Novice chapter of the *Radio Amateur's License Manual.* The answers are those of the League staff.

1. *How are amateur signals propagated over great distances?*

Radio signals in the high frequency (h.f.) portion of the radio spectrum are bent back toward earth by layers of ionized air, the ionosphere, up to 250 miles above the globe. The signals then return to earth a great distance away. The process is known as "skip"; the skip distance varies with the frequency of the radio signal and the height and density of the ionized cloud, which in turn varies with the time of day, the time of year and the year's position in the 11-year sunspot cycle.

2. *International radiocommunications by way of amateur stations are subject to what restriction(s)?*

Amateur Radio in Tennessee was declared by Governor Frank G. Clement for June 20 through June 26. At the signing: W4PRY, ARRL assistant director; W4TVJ, president, Radio Amateur Transmitting Society; W4WHN ARRL vice director; W4KAT, ARRL assistant director; K4FZJ, past president, Mid-South VHF Association; WA4RGQ, president, Maury Amateur Radio Club; K4BEZ, president, Humboldt Amateur Radio Club, and K4RKM, president, Nashville Amateur Radio Club.

Article 41 of the Radio Regulations, Geneva, 1959, prohibits communications between amateurs in different countries if one of the countries objects to such communications. It limits international communications by amateurs to messages of a technical nature relating to tests and to remarks of a personal nature for which, by reason of their unimportance, recourse to the public telecommunications service is not justified. It prohibits international communications on behalf of third parties; that is, on behalf of anyone other than the licensed amateurs who are in communication with one another. (The latter provision can be modified by special agreement between countries, and the U.S. has arrangements with 20 countries. The list appears in the *License Manual* and in frequent issues of *QST* — page 79 in the current issue.)

3. *What is the basic usage of a capacitor?*

The capacitor's basic usage is to store electrical energy at one time and release it later, in accordance with the design of a particular circuit to accomplish a particular aim. It is also used to block the flow of direct current while permitting the effective flow of alternating current through the circuit of which the capacitor is a part.

4. *For what reasons are height limitations placed on antenna structures for amateur stations?*

The Commission's rules for the amateur service contain regulations on antenna height so as to prevent amateur antennas from becoming a hazard to air navigation.

5. *What methods are available for determining whether the transmitter output frequency is within the authorized frequency band?*

The frequency of the transmitted signal can be measured by a frequency meter, a calibrated wave-meter or a receiver of known accuracy. Comparison of these instruments with standard-frequency broadcasts of the National Bureau of Standards (WWV, WWVH, WWVB, etc.) should be made frequently.

6. *What is the most likely defect of a tube which has proper heater voltage at the socket but which fails to warm up?*

The heater is "open" (i.e., broken) so that it no longer provides a complete path for the heater current.

7. *What precaution(s) can be taken to reduce the possibility of shock hazard in electrical equipment?*

Precautions include use of equipment enclosures which prevent contact with any circuits or wiring carrying power; use of chassis ground within an equipment which in turn is connected to an external ground (e.g., a water pipe) in common with other equipments being used at the same time; use of transformer power supplies in preference to "A.c./d.c." types; use of polarized, three-conductor wiring for connection to the regular commercial power sources, including use of the neutral wire; placing antenna wires and feedlines so that there is no possibility of contact with power lines; use of adequately-rated components and wiring to minimize the possibility of breakdown which might cause dangerous voltages to appear at unexpected points; use of bleeder resistors across large capacitors (e.g., in power supplies) to discharge any voltage remaining when the equipment is turned off; use of interlock switches which disable power supplies as equipment enclosures are opened.

8. *The plate voltage in the final stage of an amateur transmitter is normally measured between what points in the circuit?*

When Tulsa, Oklahoma, threw a gigantic International Petroleum Exhibition to nail down its claim as Oil Capitol of the World, the local amateurs were right there. Forming the Tulsa Council of Amateur Radio Clubs as a coordinating body, the amateurs produced the station shown inside and out in these two photographs, operating under The Electron Benders, Inc. club call W5OK. The show was open 129 hours in ten days, manned by 150 amateurs and 50 hostesses. Nearly 3,000 contacts were logged and 61 countries were reached. Some 500 formal messages were filed by visitors.

The sign in the background seems appropriate to a Lions convention, but it is the acronym of Rotarians of Amateur Radio which held a meeting in Denver on June 12 as part of the Rotary International Convention. WØIC was chairman as ROAR members adopted a resolution commending their founder W9JKC for his efforts on behalf of ROAR. An exhibition station under the call WØRI handled several hundred messages during the convention, under the direction of WØECN. Some of the ROAR members posed for this picture: W7PHO, W8RPX, WA1CDW, WØMHN, WØUJS, K7KUS, and K4AXH.

The plate voltage is normally measured between the B-plus connection and the cathode(s) of the final amplifier tube(s). Where no cathode resistor is in use, it may be more convenient to measure plate voltage across the output filter capacitor of the high voltage supply.

MINUTES OF EXECUTIVE COMMITTEE MEETING
No. 311
July 23, 1966

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Shoreham Motor Hotel in Hartford, Conn., at 9:50 A.M., July 23, 1966. Present: President Robert W. Denniston, WØNWX, in the Chair; First Vice President Wayland M. Groves, W5NW; Directors Charles G. Compton, WØBUO, Gilbert L. Crossley, W3YA, and Noel B. Eaton, VE3CJ; and General Manager John Huntoon, W1LVQ. Also present were Communications Manager F. E. Handy, W1BDI, General Counsel R. M. Booth, jr., W3PS and Assistant General Manager Richard L. Baldwin, W1IKE. (Absent, because of the airline strike: Director Carl L. Smith, WØBWJ.)

The General Manager reported that the cost of attendance of a public relations expert at Committee and Board meetings would be $100 per day; there was no disposition to request such attendance at future meetings.

The Secretary reported that the Board had rejected by mail vote a proposal to hold the 1967 meeting in New Orleans, largely because of the additional cost. In discussing travel expenses, the Committee requested the General Manager to remind directors of the established policies for reimbursement in conformity with IRS rules.

On motion of Mr. Crossley, after discussion, unanimously VOTED that, because of the confusion concerning "which call to sign" when visiting another amateur station, the General Counsel is requested to take the necessary action with the Federal Communications Commission to clarify the interpretation of the pertinent rules.

On motion of Mr. Groves, affiliation was unanimously GRANTED to the following societies:

Alexandria Radio Club — Alexandria, Virginia
Amateur Radio Club of Jackson County, Mo. — Kansas City, Missouri
Huguenot High School Amateur Radio Club — Richmond, Virginia
Independence Radio Amateur Club — Independence, Kansas
Mepham High School Amateur Radio Club — Bellmore, New York
The Midwest Amateur Radio Club, Inc. — Chicago, Ill.
Mt. Scott Amateur Radio Club — Portland, Oregon
Nassau Amateur Radio Association — Plainview, New York
Steubenville Area Amateur Radio Club — Steubenville, Ohio

On motion of Mr. Crossley, unanimously VOTED to grant approval for the holding of a New England Division Convention at Swampscott, Mass., on April 22–23, 1967.

On motion of Mr. Compton, after discussion, unanimously VOTED that the Secretary determine, by a mail vote of directors, the intent of the Board in amending By-Law 3 to provide a 30-day grace period — specifically to determine whether the By-Law provision is to be applied retroactively.

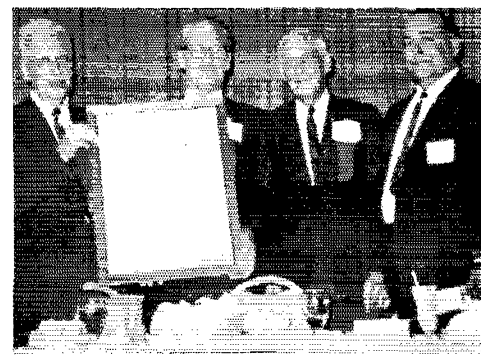
On motion of Mr. Groves, after discussion, unanimously VOTED that, at the recommendation of the Communications Manager, the Board-established travel-reimbursement provisions for certain officials in the National Traffic System may include not more than three Area Staff personnel.

During the course of its meeting the Committee discussed, without formal action, representation of the League at the IFRB frequency-allocations seminar in Geneva, specialized publications, QSL Bureaus, the upcoming membership campaign, and plans for the 1967 National Convention and World's Fair amateur station in Montreal. (The evening previous, the Committee had heard extensive reports on the Region I conference at Opatija.)

There being no further business, the Committee adjourned at 5:55 P.M.

JOHN HUNTOON
Secretary

QST



A beautifully engrossed copy of the resolution adopted by the Board of Directors commending the League's co-founder, first secretary and first editor-publisher of QST, Clarence D. Tuska, (left) was presented to him at the West Gulf Division Convention by ARRL First Vice President Wayland M. Groves, while Dr. R. O. Best, W5QKF, ARRL Director from the West Gulf Division and Toastmaster Thomas H. Grimmett, K5JKN look on. The resolution was lettered for his old boss by Harry Hick, who first did a cover drawing for Editor Tuska in 1916.

I.A.R.U. News

INTERNATIONAL AMATEUR RADIO UNION

GERMANY — U. S. RECIPROCITY

For many years, visiting U.S. amateurs have been granted operating permission in Germany, on a courtesy basis. We are pleased to report that a reciprocal operating agreement between the Federal Republic of Germany and the United States became effective June 30, thus enabling DJ/DL amateurs to apply for operating permission in the U.S. as well.

In Germany, interested amateurs should apply at the local post office as to where one must write to make license application. Each applicant will then be referred to the "Oberpostdirektion" for his area. A letter should then be sent to that address containing the following information:

1.) Name, address and birth date.
2.) Place of business, school or university.
3.) Affirmation that the applicant is acquainted with the "Bestimmungen über den Amateurfunk," the German regulations (available from the Oberpostdirektion). Unless one reads German, or unless he can enlist the aid of a German amateur, it may be difficult to understand this material.
4.) Affirmation that the applicant has an "Aufenthaltserlaubnis"; i.e., that he is registered in the city hall of the German community in which he lives, and that his passport is stamped to show permission to remain there.
5.) Occupation.
6.) Indication of the expected length of stay.

Applicants for German license must be at least 18 years of age, and must hold at least a Conditional Class license.

Those requiring assistance or more information may contact the Deutscher Amateur Radio Club, e.v., Besclerallee 10, 23-Kiel.

GB2BP was set up and manned for one day last September in High Wycombe, Bucks, England, in honor of Lord Baden-Powell, founder of the Scouting movement. Shown at the microphone is G2DRT.

APPLICATION PROCEDURE — FRANCE

As reported in July "IARU News," a reciprocal operating agreement between France and the United States went into effect on July 1. U.S. amateurs seeking French operating permission under the agreement must complete four copies of a "Notice of Particulars," including the following information:

1.) Name in full.
2.) Date and place of birth.
3.) Full names of mother and father.
4.) Present address.
5.) Previous residences for the past ten years, showing dates for each.
6.) Occupations for the past ten years (with dates).
7.) Location in France for which operating authorization is sought.
8.) Motor number of vehicle in which an amateur station is to be used.
9.) Period during which the station will be used (dates).

The applicant must certify that all information given is correct, signing each copy and indicating the date and place where he has done so. A single photocopy of the applicant's amateur license must be attached. The four information sheets, as well as the license copy, should be submitted in advance to the Minister of Posts and Telegraphs, 20 Avenue de Segur, Paris 7e, France. For additional information or advice, contact the Reseau des Emetteurs Francais, 60 Bd de Bercy, Paris 12.

NEW FP8 LICENSING RULES

It has been possible in the past for amateurs visiting St. Pierre and Miquelon to obtain FP8 calls on a courtesy basis for indefinite periods. We have been advised by Mr. Yvon Segineau (FP8CY), Chief of Telecommunications in St. Pierre, that each FP8 license will now be assigned for a set period of time, corresponding only to each applicant's stay. Hereafter, only those call signs assigned to amateurs recognized as permanent residents in the territory will be released to the *Callbook*.

Amateurs seeking permission in St. Pierre must henceforth apply at least one month in advance, indicating exact starting and ending dates of the contemplated visit; listing the place

DX OPERATING NEWS

(**Bold face** indicates changes since the most recent *QST* listing.)

United States Reciprocal Operating Agreements currently exist *only* with: Australia, Belgium, Bolivia, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, France, **Germany,** India, Israel, Luxembourg, Paraguay, Peru, Portugal, Sierra Leone and United Kingdom. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write headquarters for details concerning a particular place.

Third-Party Restrictions

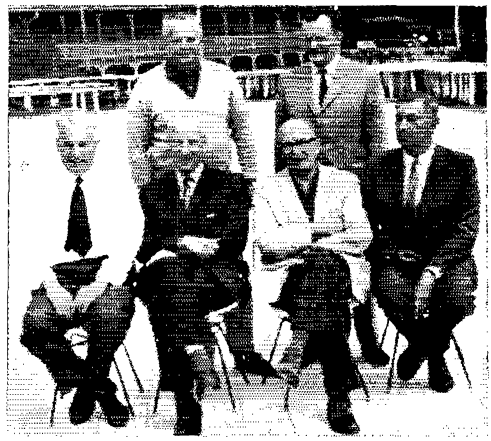
Messages and other communications — and then only if not important enough to justify use of the regular international communications facilities — may be handled by U. S. radio amateurs on behalf of third parties *only* with amateurs in the following countries: Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru and Venezuela. Permissible prefixes are: CE CM CO CP EL HC HH HI HK HP HR OA PY TI VE VO XE XP YN YS YV ZP and 4X. CANADIAN radio amateurs may handle these relatively unimportant third-party messages with amateurs in Bolivia, Chile, Costa Rica, El Salvador, Honduras, Mexico, Peru, U. S. and Venezuela. Permissible prefixes are: CE CP HR HK K OA TI W XE YS and YV.

DX Restrictions

United States amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the International Telecommunication Union under the provisions in Article 41 of the Geneva (1959) conference.

Cambodia, Indonesia (including West New Guinea), Thailand and Viet Nam[1] forbid radio communication between their amateur stations and amateur stations in other countries. U. S. amateurs should not work HS XU 3W8 or 8F. CANADIAN amateurs may not communicate with Cambodia, Indonesia, Laos, Thailand, Viet Nam and Jordan. Prefixes to be avoided are HS JY XU XW8 3W8 and 8F.

[1] K1YPE/XV5 has permission for international communications from U.S. and Vietnamese administrations and is authorized to handle third-party messages with U.S. amateurs.



Here is the Region I Executive Committee elected for a three-year term at the Region I IARU Conference in Opatija, Yugoslavia, May 23–28. Seated (l. to r.), are G2BVN (Vice Chairman), SM5ZD (Chairman), G6CL (Secretary), PAØDD (Treasurer); standing, members DL3NE and YU1AA.

where the station will be installed, if possible: and enclosing a copy of the applicant's license. Completed applications should be sent to the Chief, Telecommunications Service, Saint-Pierre, Iles Saint-Pierre et Miquelon. A fee of 500 Francs CFA (equal to approximately $2.00 U.S.) will be collected upon arrival in St. Pierre.

LA5LG SK

It is with deep regret that we note the passing, on July 11, of Mr. Per Gunderson, LA5LG, president of the Norsk Radio Relae Liga (NRRL), the Norwegian amateur society. A member of NRRL since 1956, LA5LG was licensed in 1958. He was elected to membership in the NRRL Council in 1959, and became president of the society in 1962. A man of great dedication and devotion to amateur radio, LA5LG will be missed by NRRL and by all who knew him.

(*Continued on page 152*)

This handsome booklet, published by the Deutscher Amateur Radio Club (DARC), is an introduction to amateur radio. Included is a description of amateur radio, what amateurs have accomplished, photos of a number of German stations and an invitation to persons interested in learning more to contact DARC.

Correspondence From Members-

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

"FREELOADERS"

¶ . . . It's about time you came out with the question! There is no doubt in our minds that ARRL should charge non-members for any service they might ask for. We do not believe you should expend our dues rendering services to non-members.

On many occasions when our club has asked for some service you willingly and promptly answered our question and/or sent us packages affixed with much postage — and you never did ask us for any expense money. That's fine for club members, and we thank you for it. But why spend members' money on those who do not think enough of us to join us? Cut it out! . . . — *Antonio P. Milone, K1OGA, Secretary, Middlesex Amateur Radio Club, West Roxbury, Massachusetts.*

¶ The League *should* charge a reasonable fee to non-members when they ask for technical advice and other services. Likewise the costs of DXCC and WAS participation ought to be shared by the non-members, too. Advantages of ARRL membership should be made clear to members and non-members alike. After all, why should we, the members, subsidize service to non-members? . . .

I believe sound fiscal policy requires such a step. In the long run, I believe such a policy would lead to increase of membership. — *L. H. Vydra, W3AAZ, Rockville, Maryland.*

¶ . . . ARRL has a duty to help all hams even if they aren't members. $5.00 is a lot of dough. Most Novices can't afford to join — we're lucky to be able to buy our stations, let alone ARRL membership. . . . — *Robert M. Hajdak, WN3FNT, Greenville, Pennsylvania.*

¶ . . . There is no excuse for non-membership in the League except lack of approval. Any eighth-grade student today can handle $5.00 per year by mowing two lawns. On this assumption, non-members should not be allowed to participate in costly League activities or get the benefit of technical consultation.

We can't lose members we don't have. Let's set a deadline of January, 1967, for cutting off all freeloaders who don't respond to a membership drive between then and now! — *D. L. Ormond, K3COO, Wilmington, Delaware.*

¶ . . . All amateurs should be members, if only for their legal protection. The League is the only source of information in my mind that would be recognized by authorities and I for one intend to support that organization. There are too many freeloaders in this world who benefit from the labors of the members of any organization . . . — *Paul J. Crowley, W8RBE, Akron, Ohio.*

¶ . . . If a person wants assistance (exclusive of those trying to become amateurs), he should be a member. I believe the League should send a polite refusal to those who are not members. Charging a fee has aspects of money grubbing. However, the fee could be equal to one year's dues and such people who pay the fee automatically could become members. — *Otis F. Bryan, Jr., W5OWT/6, San Pedro, California.*

¶ . . . I was taken by surprise, because a lot of the opinions expressed by the article, I agreed with fervently. Then I realized I was as guilty as anyone ever could be of using ARRL facilities without being a bona fide member!

I kept thinking of the situation I'd be in today if a few OOs hadn't given me help . . . just one example of how we non-members benefit from ARRL . . .

I thank you, gentlemen, for being so dedicated, and apologize for any imposition I may have rendered in the past . . . enclosed you'll find $5.00 that is long overdue . . . — *Ronald M. Thomas, K4TRJ, Jacksonville, Florida.*

¶ . . . I particularly agree with your comments on people who read other magazines and ask you for help. I read the third magazine (except for the editorials — if you can call them that) because a number of good authors write for it. They recently stated they can not help anyone having difficulty with their projects, because of the expense involved. In the same breath they criticized ARRL for its lack of service. Hi! . . . — *Arthur H. Reidel, Brooklyn, New York.*

¶ Make the freeloaders pay — we're no welfare agency! — *Terrence B. Norman, W1BQES, Akron, Ohio.*

¶ . . . Let's consider the possible reasons why amateurs may be reluctant to join ARRL. Although *QST* appears to be a fine magazine, keeping us informed of FCC happenings, regulations, contests, ARRL assistance, RACES, etc., the thing does get rather technical and becomes a little dry and hard to read at times. Perhaps my mentality and power of concentration are poor. It also lacks some of the benefits that other readers desire. There are not lots and lots of fun-type building projects, and all your advertisers seem reliable. (No sport or competition with reliable advertisers, you know.) The editorials don't degrade and embarrass anyone personally, or throw two-bit political garbage into the game. No gossip column so to speak. You don't carry adventure stories of the high seas or tropical islands — all typical ham subjects — and you don't solicit DXpedition funds so you can have a good time and gain prestige. Furthermore, your executives don't need big fat sports cars to bolster their egos or allow easily impressionable adolescents to insert themselves into fantasy images such as "Joe Ham" gleefully mobiling through the ancient ruins of Europe. You are too factual, and facts can sometimes be as readable as the Pauli Exclusion Principal or Supreme Court decisions.

Another aspect: Although ARRL apparently doesn't feel it profitable to sell *QST* on the newsstand — correct me if I'm wrong but I haven't seen it in years — other magazine publishers do. It might be interesting to compare circulation figures with the actual numbers of subscriptions of "The Other Two." You know, a lot of fellows simply can't afford the five bucks. It isn't really a question of ARRL membership at all. It's just that one subscription is enough. "The Other Two" do put out many pleasant, enjoyable and interesting articles and projects. In self defense I must quickly add that little men, big mouths and constant ridicule disgust me. Anyway, these fellows go down to the local radio store and buy an interesting issue on the subscription installment plan: 50¢ a month — and then only after they've thumbed through the issue to determine if they like the articles. Okay — so now they bring the thing home and read the prejudiced garbage put out by certain dissident elements who derive some kind of nutty kick from "big-wheeling" it. By the time this junk writing is read, can you blame some of these kids for being anti-ARRL? Why, they're so brainwashed they don't know what they want. Well, then I suppose there's two sides to every story and they have the right to theirs, huh? Fortunately or unfortunately, as the case may be, ARRL rebuttals are conspicuous by their absence. Sometimes I think I'd like to see you really zap 'em good, but then it's also commendable you don't have to stoop to the same level as the mutts snapping at your heels . . . — *Donald Marshall, K6RCO/2, Fort Monmouth, New Jersey.*

¶ The problem of freeloaders is serious. However, refusal to aid or to cooperate with non-members would serve to divide and weaken amateur radio.

How could we deny aid to a newcomer who wants to get his license? Should we alienate non-member amateurs and thus destroy the fraternity we are trying to build?

Regardless of the financial burden, we must carry out the responsibility of being a constructive force for all of amateur radio. — *Nickolaus Leggett, WB2UEQ, Somers, New York.*

¶ . . . I have been a member for the most part since 1934, and it never occurred to me that non-League members would cause such a drain on League finances and not be willing to pay the very small dues required.

As a business man, I suggest you charge non-League members on a cost-plus-basis, with a nice tidy profit put in there for everything done. This could be done simply by issuing a serial number with each League membership, as identification for paying members. I called on the League in the past on legal problems encountered in erecting towers and it has always been helpful to me, so I am glad to pay my dues, which I have been doing over a 25-year period . . . — *E. Quentin Johnson, WØPXII, Clayton, Missouri.*

¶ . . . I agree with what was said. However, I disagree completely with the *way* it was said. This is one of the poorest pieces of salesmanship I have seen in a long time. The whole article has the tone of complaint. How much better it would be to use the positive approach and sell these points properly — and we must admit these are terrific sales points if properly used.

We have only one thing to sell: League activity and League membership. Let us do it in the positive manner that all good salesmen use. — *Alden H. Davis, W5DPI, Borger, Texas.*

¶ In my 25 years membership in ARRL, I never felt as strongly against anything as I do about the ARRL using dues to help "freeloaders."

Unless an adequate explanation appears in a current issue of *QST*, I most certainly am not going to remain in an organization that uses members' dues to support non-paying freeloaders. If it was a charity, I could go along, but they can afford to pay far better than lots of paying members . . . — *Ralph S. Krebs, W3ESY, Allentown, Pennsylvania.*

¶ The ARRL is amateur radio. No functions or activities of the League, except administration and the election of officers, should be closed to non-members. Let it never become a club-type organization. If an increase in our annual dues is needed to support our helping non-members, I am for it. It seems to me that ceasing to help non-members would be a violation of the very code we advocate. — *Julian B. Kitchen, Jr., W1GPEC, Walnut Creek, California.*

QST — THE NEW LOOK

¶ The "Gimmicks and Gadgets" column is a good idea, providing it doesn't devolve into a forum for new one-transistor radio designs (or the ham equivalent). It will take great originality to think of good new projects each month.

If we must have "*QST* Classics," keep them in nice type as they have been recently . . . — *Richard Factor, W1ZIKL, New York, New York.*

¶ A note of appreciation on your two new columns. I especially like news highlights to glance over until you get a chance to settle down for complete dope. . . . Keep up the good work. — *Ferdinand N. Lambour, W3DCY, Nicktown, Pennsylvania.*

¶ Cheers for ARRL emblems on the front cover of July *QST*. Here is my vote for continued prominence of emblems on and in future issues. — *Philip D. Corey, W4BWF, Crozet, Virginia.*

¶ I compliment you on the fine articles added . . . "Gimmicks and Gadgets" is excellent. I am glad to see things I can build in a very short time.

"League Lines" is welcome since I usually do not have time to read through detailed articles. It lets me know very quickly what is happening in amateur radio. — *Jim Brinson, K4WOP, Birmingham, Alabama.*

¶ I am certainly glad to see some changes in *QST*; frankly, in my opinion, they are long overdue. There are still entirely too many pages occupied by teensy-weensy print and long lists of calls in several of the departments; significant operating news could be presented in article form and the other omitted. — *John U. Keating, M.D., W1QCQ, Elkhart, Indiana.*

BAD MANNERS

¶ It has been my understanding for many years that the fraternity of amateur radio has been just that — a fraternity of people interested in meeting and conversing with others having a common love for amateur radio. To the best of my knowledge amateur radio is in existence to offer assistance to

(Continued on page 152)

Air-Mass Conditions and the Bending of Ultra-High Frequency Waves

New Light on How 5-Meter Signals Are Transmitted Over Long Indirect Paths

By Ross A. Hull*

Since the establishment of consistent communication between Boston and West Hartford amateur stations last August, first reported in October, 1934 QST, the transmissions of 56-mc. DX stations have been regularly observed and the strength of special signals from W1XW at Blue Hill have been photographically recorded at West Hartford by Ross Hull. From the beginning of this program an effort was made to account for the apparent ability of supposedly quasi-optical waves to travel such unexpected distances with a consistency denying fresh conditions and to explain the fading and other effects that were previously strange to us on the ultra-high frequencies. The finding of some correlation between humidity conditions and signal behavior early in the program, as mentioned in December 1934 QST, led to more thorough investigation of the simultaneous weather and general meterological conditions. With the splendid cooperation of scientific groups at Harvard University and Massachusetts Institute of Technology, as well as other workers, Associate Editor Hull has been enabled to establish for the first time the direct relationship between air-mass phenomena in the lower atmosphere and the transmission of u.h.f. radio waves beyond the horizon. The substance of this article, is from a paper delivered by Hull at the recent Washington meeting of the U.R.S.I. and I.R.E. It is not unreasonable to expect that this result of amateur radio activity will open up new avenues, not only in radio communication, but also in meterological studies related to weather forecasting.—EDITOR

UNTIL recently the routine experimental work over short distances on the ultra-high frequencies did not reveal consistent performance calling for a modification of our first ideas concerning the propagation of very short waves. According to the accepted theories, the lower atmosphere should give us some bending by refraction; but this bending, together with the effects of diffraction and reflection, should allow ultra-high frequency signals to travel over paths extending only *slightly* beyond the line of sight. The extent of the bending, as computed by many workers, would be such that the ray should follow a trajectory having a radius of curvature 4 to 5 times that of the earth's radius.

Our first indication that something was amiss with this concept resulted from the exchange of strong signals[1] on 60 mc. between West Hartford and Boston over paths of approximately 100-mile length, requiring a much smaller equivalent radius of curvature (approximately 60 per cent. of the earth's radius). This extraordinary bending would not have been noteworthy had it occurred only on isolated "freak" occasions. When it served to give us daily communication with Boston over a period of months, and even enabled frequent contacts with more distant northerly stations and with stations in the New York area, it was apparent that some of the assumptions in the current theory were incomplete. Obviously, the whole problem was worth restudying.

The contours of Fig. 1 give us some idea of three of the paths and the amount of bending involved. Other longer paths, to be mentioned, are similar in that the same ridges of hills must be crossed.

* Associate Editor, QST.

[1] First reported in QST for October, 1934.

SUMMER TESTS

The most surprising effects observed during the first few days of communication between West Hartford and the Boston area were the extremely high signal level obtained on occasions, the pronounced diurnal change, resulting in low signal level around noon, and the marked fading, which would sometimes vary signals from R1 to R8 in, say, five minutes. Unquestionably we were experiencing something quite different from the extremely rapid and very slight variations reported by other workers. As the test period progressed, however, it became more and more conclusive that we were dealing with phenomena *by no means abnormal*. The recurrence of good transmitting conditions almost every evening caused us to attempt a much closer examination of the whole question. On August 20, Dr. C. F. Brooks of the Blue Hill Observatory provided the facilities of W1XW for special schedules each morning and night. Then, on August 25, W1HRX, at Middleton, Mass., erected a directive array and maintained morning and evening schedules. The observation of signals from these two stations, in particular, showed that communication could be maintained quite reliably. It is interesting to note that W1HRX, located some 13 miles farther than Blue Hill from West Hartford, and at an elevation approximately one-third that of Blue Hill, maintained a higher and more consistent signal level than the nearer station. We believe that the superior performance of W1HRX was due almost entirely to the gain made possible by his directive array.

During this test period with W1XW and W1HRX, and, for that matter, during the entire nine months of observation, a search was made each morning and evening for signals from any of the low-lying amateur stations in the Boston area. As we will presently show in chart form, signals from these stations were heard at frequent intervals. We soon found that conditions permitting reception of the low-altitude stations did not necessarily coincide with the highest signal peaks from the more elevated station, W1XW. This point is considered to be of some importance. A further observation at this time was that the very highest peaks of signal level were, almost invariably, a prelude to precipitation and a reversal of weather conditions. It was during these pre-storm periods that the best communication was had with such stations as W1XZ at Seabrook, New Hampshire, W1XH on Mt. Washington and W2CUZ, W2ACY and W2EKC and W2IS in Yonkers, New York, and Montclair, New Jersey. It was on one such occasion that the West Hartford signals were heard strongly by Mr. H. S. Shaw, W1FGA, operating portable equipment on Cadillac Mountain, 1000 feet above sea level and 282 miles from West Hartford. It also became notable at this time that the worst signal fluctuations occurred on hot days when the atmosphere was most turbulent and at certain periods during the passage of storm fronts.

As winter approached, the intervals of very high signals became more widely separated and more clearly defined. Further, the relation between the stormy periods and the rise of signals became much more noticeable.

WINTER CONDITIONS

During November and December, occasional recordings[2] were made of transmissions from W1XAV at Squantum, Mass., and of the tone signals from W1XW. These recordings showed a general trend towards high signals in the early hours of the morning and revealed many short periods of high level which would not have been noticed in the normal routine of morning and evening schedules. In January it was decided to explore the diurnal changes in transmission between Hartford and Boston and to attempt to define the particular weather conditions involved in the enormous changes in signal strength which occurred. Dr. Brooks of the Blue Hill Observatory responded immediately to the request for hourly tone signals day and night; and, because of his cooperation, it has been possible to make substantially unbroken recordings from early January to the present time.

When two months of recordings had been completed, the data were studied closely in conjunction with meteorological data supplied by the Blue Hill Observatory, the Meteorological Department of Massachusetts Institute of Technology and the U. S. Weather Bureau. As had already been observed, a relationship between storm conditions and strong signals was shown. As had been anticipated, this general relationship resolved itself more specifically into an intimate connection between periods of pronounced temperature inversion[3] in the lower atmosphere and periods of high signals. That is to say, a layer of warm air overrunning colder air, invariably accompanied good transmission periods. Since the conventional weather information contains no values for these temperature inversions, a study was undertaken of the meteorographic data made available by the Massachusetts Institute of Technology and the U. S. Weather Bureau as the outcome of their "Free Air" airplane flights. Extensive additional material was made available by Dr. Brooks covering the temperature differences (temperature lapse rates) between low-altitude meteorological stations in the vicinity of Boston and the summits of Blue Hill and Mount Washington. The study provided undeniable evidence of a close relationship between small lapse rates and high signals. The lapse rates shown by the airplane records provided particularly striking evidence of this correlation, notwithstanding the appreciable distance which sometimes separated the region in which the flight took place and the path over which the signal measurements were made.

While an attempt was made to isolate one particular layer in which the order of temperature inversion followed the signal level, the procedure proved futile. On one occasion, the steepest region of inversion would be, perhaps, between altitudes of 500 and 1000 meters. On other occasions, with a similar order of signal level prevailing, the steepest inversion would be found between 1000 and 2000 meters. In still other examples, the significant inversion would extend from the surface to 1000 meters. Generally speaking, *it appears that an extensive sub-normal lapse rate anywhere in the region between 500 and 2500 meters is accompanied by a high 60-mc. signal level over the path between West Hartford and Blue Hill.*

Having established a relationship between lapse rate in the lower atmosphere and signal level for the period during which hourly signal measurements were made, the next step was to view the entire period of observation in terms of the prevailing air masses. This study was made possible through the cooperation of Dr. H. C. Willett and Dr. Karl O. Lange of the Meteorological Department of the Massachusetts Institute of Technology.

The work was complicated by the fact that, during the warmer months, the identification of discrete air masses is not always possible. Nevertheless, the periods of highest signal level were found to be associated with an atmospheric structure involving a layer of moist, warm tropical air overrunning a shallow layer of dry, cold polar air. In the warmer period, this association was by no means infallible but it became apparent that signals dropped to their lowest levels during the existence of a homogeneous air mass having a temperature lapse rate approaching the normal. It became clear, also, that what are known as subsidence and nocturnal inversions forming in slowly moving air masses played a part in maintaining the higher and more consistent signals characteristic of the earlier summer period of this program.

With the approach of the colder weather and the accompanying simplification (for the weather man) of the process of segregating air masses, the general correlation became quite striking. From late October through the entire winter period, low signal levels invariably prevailed during the presence of fresh polar air. As this air mass became modified by subsidence and isolational heating, small increases in signal level could be seen. The well-defined high periods, however, occurred only upon the intermingling of air masses of different types, the signal increase being particularly marked on all occasions when a prevailing cold, dry polar air mass was overrun by warm, moist air from the tropical regions. In such cases the signal level would increase rapidly as the tropical air reached down to the lower elevations. As the level of marked inversion approached an estimated height of 1000 meters, the recorded signals appeared to reach their peak. As the inversion level proceeded still lower, signals from low-lying amateur stations were found to increase rapidly and often to surpass in strength the signals from the higher station W1XW. This atmospheric condition, of course, was almost invariably followed by precipitation. The signals dropped sharply

[2] A description of the photographic recorder appeared in the March, 1935, QST.

[3] In a "normal" atmosphere, the temperature of the air decreases steadily as the elevation above the earth is increased. This normal temperature gradient gives a drop in temperature (or lapse rate) of approximately 1 degree Fahrenheit for each 300 feet of elevation. When the temperature fails to drop as rapidly as this, a temperature inversion is said to exist. In some of the instances discussed, the temperature of the air actually increased 10 degrees centigrade in the first 1000 meters above ground.

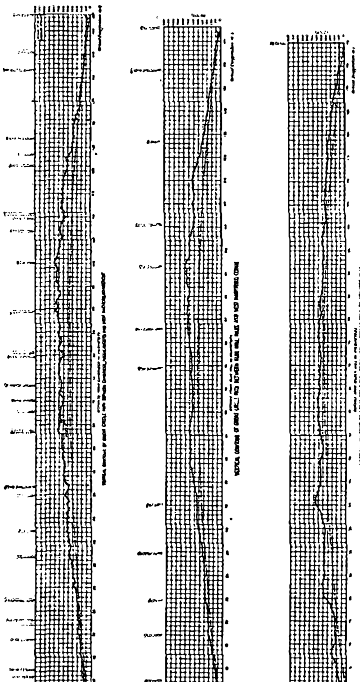


FIG. 1—VERTICAL CONTOURS OF THREE OF THE PATHS DISCUSSED IN THE TEXT

In plotting these contours, the scale used for elevations has been increased ten times and the scale used for the radius of the earth decreased ten times. In this way, irregularities of the contour are made more apparent. With this distortion, however, a straight line on the actual path remains a straight line on the contour drawing.

Path 1 (upper) is that between Cambridge, Mass., and West Hartford (98 miles) a path over which frequent schedules have been maintained with W1FQV located at Harvard University. The intervening ridge of hills is 1200 feet high. This, together with the low elevation of the Cambridge antenna, calls for an equivalent ray path having a radius of curvature approximately 62 per cent. of the earth's radius. This path resembles very closely those between Hartford and the majority of Boston amateur stations. It is also similar to the path between West Hartford and W1HRX at Middleton, Mass., except that in the latter case, the Boston area station is approximately 13 miles farther north and about 50 feet higher. This path represents an approximate curvature of 58 per cent. of the earth's radius.

Path 2 is that between West Hartford and the Blue Hill Observatory of Harvard University located near Milton, Mass. (93 miles). The most serious obstruction along this contour is a ridge of hills approximately 800 feet above sea level. The curved path joining the two stations and clearing the intervening terrain has a radius of curvature approximately 68 per cent. of the earth's radius. Notwithstanding this pronounced curvature, signals have been exchanged between the two points on 234 out of the 239 days on which transmissions were made.

Path 3 is that between West Hartford and Yonkers, New York (88 miles). Because the obstructing hills are near the West Hartford end, the ray clearing the major obstructions requires an equivalent radius of curvature of less than 50 per cent. of the earth's radius. This very pronounced curvature undoubtedly explains the inferior performance observed relative to the performance with Boston stations. It, nevertheless, represents an example of the extent to which ultra-high frequency waves can be bent under particular circumstances.

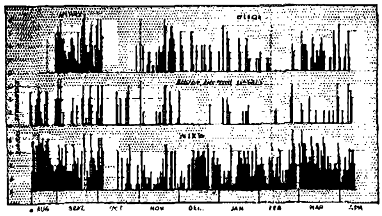


FIG. 2—PROVIDING A GENERAL PICTURE OF COMMUNICATION EFFECTIVENESS ON 60 MC. BETWEEN WEST HARTFORD AND THE BOSTON AREA

From the section at the upper left, we see that contact with W1HRX (111 miles) did not fail during the period of schedules. Numerous gaps are seen in the record of signals from W1FQV but most of them correspond to days on which no schedules were attempted. Signals from the Boston area amateur stations are seen to thin out appreciably during the colder months. The reliability of the more elevated station W1XW is obvious. Only five of the gaps represent days on which communication failed.

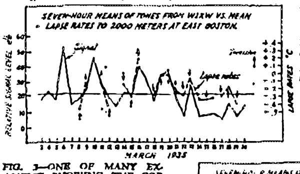


FIG. 3—ONE OF MANY EXAMPLES SHOWING THE CORRELATION BETWEEN SIGNAL STRENGTH AND TEMPERATURE LAPSE RATE

The gaps in the dotted curve result from a lack of meteorological data. Weather conditions often make it impossible for the meteorological airplane flights to be made.

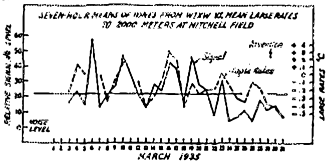


FIG. 4—SIGNAL LEVELS FOR THE SAME PERIOD AS FIG. 3 PLOTTED AGAINST LAPSE-RATES MEASURED AT MITCHELL FIELD (NEAR NEW YORK)

coincident with the complete inflow of the relatively homogeneous tropical air mass or, on the other hand, with its displacement by the outbreak of fresh continental polar air.

THE RECORDS

It would be well at this stage to examine some typical examples of these phenomena in graphical form. Fig. 2 shows the trends exhibited by various signals under observation during the period of the program. The order of publication of the Boston data from W1XW is seen. The actual reliability is even better than that indicated, since some of the smaller gaps represent days on which no schedules were attempted. The block at the upper left of this diagram shows the performance obtained during the period of morning and evening schedules with W1HRK. This period of communication was perhaps the most reliable sequence of all. The remainder of the upper curve illustrates the strength of signals from W1FQV at Harvard University and the occasions on which they were heard. This section is considerably misleading since unbroken daily schedules were not maintained. The center chart shows the periods at which low-lying amateur stations in the Boston area were heard at West Hartford. The thinning out of these signals during the winter months is apparent. The regularity with which low-lying stations were heard during the warmer months is considered to be the result of the prevalence at those times of very strong and low-lying temperature inversions caused chiefly by radiational phenomena and the effects of sea breezes. It is noted that these low-lying stations were heard, during the winter, only on occasions when the significant inversion was known to be at a very low elevation. The progress of the present season has, on the other hand, already provided us with good signals from the amateur stations on occasions when the major "air mass" inversion was at a high level but when it was accompanied by a secondary very low inversion of limited geographic dimensions. The higher signal levels obtained during the summer are considered to be related to the higher specific humidity prevailing during that season.

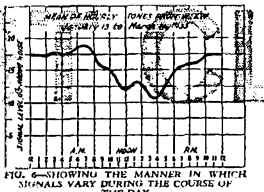


FIG. 6—SHOWING THE MANNER IN WHICH SIGNALS VARY DURING THE COURSE OF THE DAY

In this curve, the average level of the recorded signal is plotted for each hour.

Fig. 3 and Fig. 4 following it are examples selected from many graphical studies made in the attempt to correlate temperature lapse rates and signal levels. In the first example, the lapse rates, as measured in the M.I.T. meteorological airplane at Boston, are plotted against the mean signal values obtained during a period including three hours before and after the time of the flight. The arrows adjoining the various values of lapse rates represent the direction in which a correction would be applied in taking into account the influence of the prevailing humidity. It is of interest to note that in each case a consideration of water vapor content would improve the apparent correlation. Numerical treatment of actual atmospheric density gradients and refractive indexes has not been attempted at this stage chiefly because of the known irregularity of humidity measurements made under the conditions met with in "free air" ascensions.

Fig. 4 shows the result of an attempt to establish, for the same period, a correlation with the lapse rates measured at Mitchell Field (100 miles southward from West Hartford). This study, in conjunction with the example just discussed, provides an illustration of the wide geographic extent and similarity of many inversions during the winter period. Similar attempts to obtain the three-cornered relationship between signal levels and the lapse rates at Boston and Mitchell Field, for the summer periods, were rarely as successful. The Boston lapse rate, however, continued to exhibit a very close relationship with the signal level, as is indicated in the few examples given in

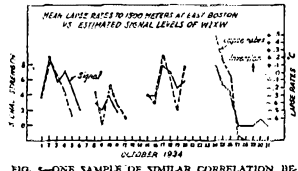


FIG. 5—ONE SAMPLE OF SIMILAR CORRELATION BETWEEN SIGNAL LEVEL AND LAPSE RATE DURING THE EARLIER PERIOD OF THE WORK

Both signal and meteorological data for the warmer months are, unfortunately, fragmentary.

Fig. 5. It is to be regretted that "free air" data, and, particularly, precise signal data for the early hours of the morning are unavailable for August and September.

Fig. 6 represents the mean signal level for the various hours of the day during January, February and March. This diurnal curve, it will be seen, happens to show a close resemblance to the known diurnal variations of lapse rate, surface temperature and surface humidity. Mr. Greenleaf W. Pickard, in an unpublished paper, indicates that this diurnal characteristic, as measured by him on more nearly direct paths, shows considerable change from month to month, particularly in respect to the "bumps" seen around noon.

Fig. 7 is a transcription of a section of the signal recordings during March. The various points of this curve represent the values of the hourly tone from W1XW. While these variations represent relatively tremendous changes in signal input, the logarithmic sensitivity characteristic of the super-regenerative receiver reduces the apparent swing and causes the signal to be audible even at the lowest point indicated on this recording. The extent of change in the receiver output could be stated as being approximately R1 to R8. The solid curve above represents the daily mean of the recorded tone levels. Below it is a dashed line connecting points representing the mean lapse rate between the surface and 2000 meters, measured at Mitchell Field. Coincident with the close vicinity of this dashed line represent the only available lapse rates, to the same elevation, taken at East Boston. Indicated below the signal recordings are the types of air masses prevailing over the path. In this example, the effect of the Polar Canadian air mass in holding signals at a low level can be seen. The influence of stratification resulting from the intermingling of two air masses of different types is also shown.

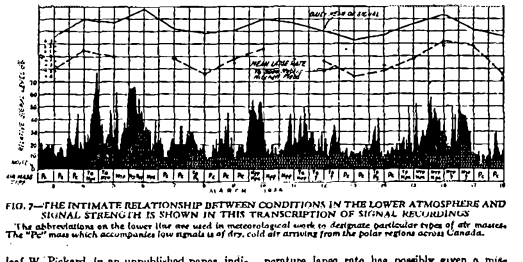


FIG. 7—THE INTIMATE RELATIONSHIP BETWEEN CONDITIONS IN THE LOWER ATMOSPHERE AND SIGNAL STRENGTH IS SHOWN IN THIS TRANSCRIPTION OF SIGNAL RECORDINGS

The abbreviations on the lower line are used in meteorological work to designate particular types of air masses. The "Pc" mass which accompanies low signals is of dry, cold air arriving from the polar regions across Canada.

CONCLUSIONS

This preliminary qualitative survey, over three particular indirect paths, shows that stratification of the lower atmosphere is very frequently responsible for an order of bending of ultra-high frequency waves considerably greater than that accounted for in analytical studies of atmospheric refraction. The assumption, in such studies, that the atmosphere is normally homogeneous, with a uniform water vapor gradient and a steady temperature lapse rate has possibly given a misleading result.

It is undoubtedly true that diffraction and reflection play a part in providing a sub-threshold but practically undetectable signal in the instances just discussed. It is extremely probable, though, that the dominant phenomena involved is that of refraction. Evidence tending to substantiate this probability is provided by the several instances during which a prevailing dry, cold and homogeneous polar air mass resulted in a complete absence of signals for periods of a day or more.

We cannot resist commenting on the several fallacious popular beliefs concerning the behavior of ultra-high frequency waves, particularly as to their freedom from fading and the limitation of their range to paths only slightly in excess of the optical range. On the contrary, it is evident that at distances far beyond the optical range, signals, even from low-powered transmitters, are prone to reach very high signal levels under certain atmospheric conditions and that fading of these "air wave" signals is not unlike that experienced with "sky wave" transmissions on the lower frequencies.

So striking is the relationship between signal level and the prevailing lapse rate that it is not illogical to visualize the future application of

[1] The mean water vapor content of the air at ground level at Boston is approximately 5.17 times greater in July than in February.

suitably located ultra-high frequency radio transmitters and recorders as an added tool for the meteorologist. Appropriate ultra-high frequency radio links, particularly if operated on a group of frequencies, possibly could serve to advance our knowledge of the continually changing structure of the lower atmosphere.

ACKNOWLEDGMENT

Without the suggestions, advice and cooperation of Dr. C. F. Brooks of the Blue Hill Observatory of Harvard University, these observations would not have been possible, while without the additional data made available by Mr. G. W. Pickard we would have been greatly handicapped. Thanks are due to Professor H. W. Kihlano at Fruit Laboratory, Harvard University, for his advice and his exploratory computations. Mr. Harner delvidge at Harvard University has been particularly generous in very practical assistance and Dr. H. C. Willett and Dr. Karl O. Lange of M.I.T. have given invaluable aid in reviewing the air mass data. Appreciation is also expressed to Mr. Arthur Bent of W1XW, and to Mr. Philip Towle of Blue Hill Observatory who not only maintained some 500 separate communication schedules from that station but aided greatly in the analysis of the meteorological data. Needless to say, the amateurs of the Boston and New York areas have cooperated in characteristic fashion in the work—while the staff at A.R.R.L. Headquarters and Mr. L. W. Webb of W1BRD have done their part throughout the program.

Air-Mass Bending

In the early 30's the communications world was still absorbed in exploiting ionospheric propagation in the h.f. region; aside from amateurs, hardly anybody was using v.h.f.-, then called "ultra-short waves." But hams had found that there were lots of intriguing things to do on the old "five-meter" band (see the "QST Classic" in July QST) — and being hams, were always on the alert for the unusual.

It was Ross Hull's keen interest in five-meter work that led him to make the long and detailed observations that resulted in the discovery recounted here — the bending of v.h.f. signals because of discontinuities in the vertical distribution of the refractive index in the atmosphere. It is of interest to note that in a bibliography in Radio Meteorology, *a new publication of the Bureau of Standards, the article here reproduced is the earliest one referenced that deals with this phenomenon.*

Strays

The first mention of the word "ham" in *QST* appeared in an article "Rottenest Luck Ever," by El Amateur, in November, 1916. The paragraph reads, "Say fellow 'Hams,' doesn't this beat 'em all? If any of you have ever heard of any worse luck than this I think we should all greatly enjoy reading it."

Hints and Kinks For the Experimenter

POTENTIOMETER REPLACEMENT

I recently purchased a potentiometer by mail and received one of the new type Clarostat controls which does not have the usual threaded mounting shank. Instead, it has tabs that require the drilling of two mounting holes. Not wishing to go to all this trouble, I removed, from the old potentiometer, the threaded shank and the part to which it was fastened and slipped the salvaged parts over the shaft of the new control, as shown in Fig. 1. The two tabs were then bent over to secure the assembly. As a result, I was able to replace the old potentiometer with the new type without drilling any holes. — *Conrad J. Sedlak, Sr., K2HR*

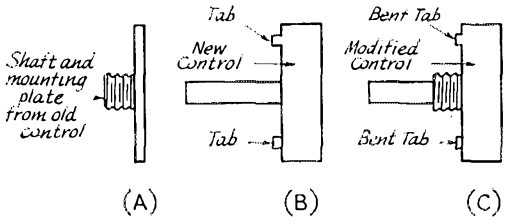


Fig. 1—Steps in the conversion of a tab-mounted control to a shaft-mounted type.

USING THE HAM-M ROTATOR WITH LONG CONTROL LINES

One of the problems that I faced in using the Cornell-Dubilier HAM-M rotator was a 120-foot run between the rotator and control unit. Approximately half the time, especially during the summer when the line voltage sagged due to the heavy electrical load of the air conditioner, the antenna would not rotate when the control lever was pushed. A second or third push on the lever would invariably start the rotator moving. Apparently, the voltage drop on the long lines was such as to provide marginal operation of the brake solenoid. In every case, once the brake released, the antenna always rotated, indicating that the motor had a much wider tolerance to low voltage than the brake.

There are two solutions to the problem. The obvious answer is to run heavier copper leads to the brake solenoid. Carrying out this solution may not be so easy with the rotator already installed at the top of a 60-foot tower. Another solution may be simpler — that of installing a booster transformer in the brake solenoid circuit to make up for the voltage drop in the line.

Fig. 2 shows a 6.3-volt filament transformer connected in series with terminal 2 of the control unit. The transformer should have a minimum rating of 3 amperes.

The primary of the 6.3-volt booster transformer can be energized initially and left on during the operating period. There is no need to turn the primary voltage of the 6.3-volt transformer on and off as the control lever is pushed. Most of the 6.3 volts of the booster transformer will be absorbed across the 30-volt transformer when the rotator is not being used. Almost no voltage will appear across the brake solenoid because its impedance is practically a short circuit compared to the open circuit impedance of the 30-volt transformer. Because of this fact, no modification whatsoever is required to the control unit. The 6.3-volt booster transformer can be conveniently hidden and leads run to the control unit. The 115-volt power plug on the booster transformer may have to be reversed to permit the 6.3 volts to add to the 30 volts rather than subtract.

The booster transformer will have no effect upon the motor or indicator circuits if connected as described. — *H. Lukoff, W3HTF*

(Booster power can be used successfully on any rotor as long as a bit of common sense is mixed in. The best way to judge is to operate the rotor with short direct connections and measure the operating voltage with a good a.c. meter. Then do not exceed these values, *measured at the rotor*, in the actual boosted system. When it is desired to increase the voltage to the motor as well as the solenoid, the booster transformer is always connected in series with the common motor lead on any rotor (Lead No. 1 in Fig. 2). The 115-volt primary of the booster transformer can be paralleled with the primary of the transformer in the rotor control box so that power is applied to both when switched in the normal manner.

— *Bill Ashby, K2TKN*

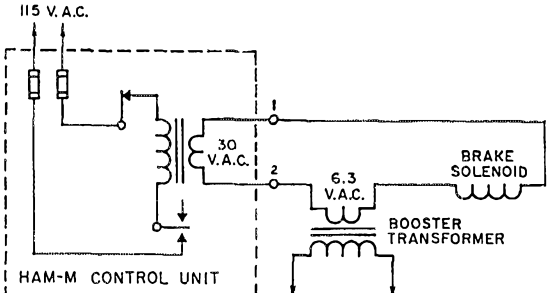


Fig. 2.—A booster transformer makes up for the voltage drop in a long cable run between an antenna rotator and control unit.

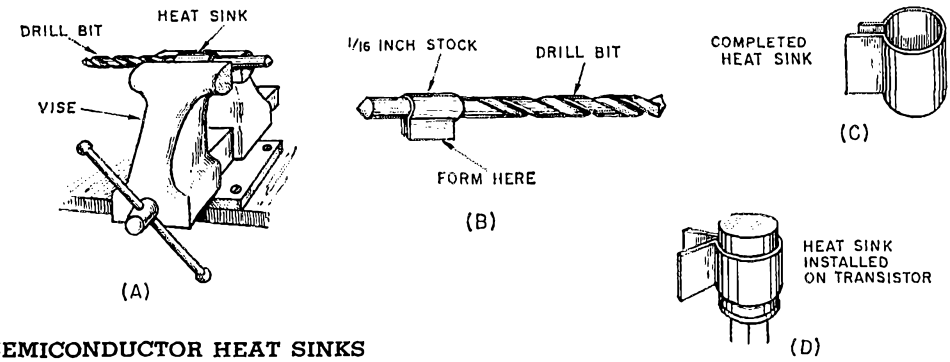


Fig. 4.—Steps used by W1CER in constructing heat sinks for small transistors.

SEMICONDUCTOR HEAT SINKS

HOME-MADE heat sinks can be fashioned from brass, copper or aluminum stock by employing ordinary workshop tools. The physical dimensions of the heat sink will depend upon the type of transistor used, and the amount of heat that must be conducted away from the body of the semiconductor.

Fig. 3 shows the order of progression for forming a large heat sink from channels of near-equal height and depth. The width is lessened in parts B and C so that each channel will fit into the preceding one as shown in the completed model at D. The three pieces are bolted together with 8–32 screws and nuts. Dimensions given are for illustrative purposes only.

Heat sinks for smaller transistors can be fabricated as shown in Fig. 4. Select a drill bit that is one size smaller than the diameter of the transistor case and form the heat sink from 1/16 inch thick brass, copper or aluminum stock as shown in steps A, B and C. "Warp" the stock around the drill bit by compressing it in a vise (A). The completed heat sink is press-fitted over the body of the semiconductor as illustrated at D. The larger the area of the heat sink, the greater will be the amount of heat conducted away from the transistor body. In some applications, the heat sinks shown in Fig. 4 may be two or three inches in height (power transistor stages). — *W1CER*

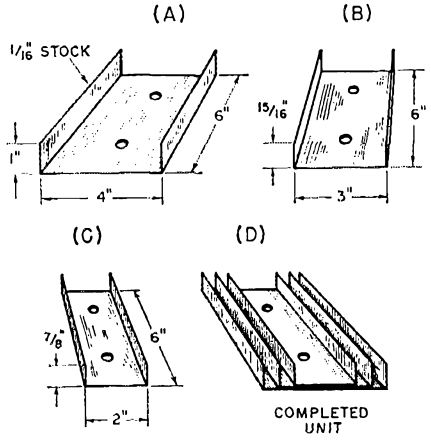


Fig. 3.—Details for forming channel type heat sinks.

EMERGENCY SOLDERING-GUN TIP

IT often happens that the tip of a soldering gun breaks at a time when it is inconvenient or impossible to get a replacement. A satisfactory substitute can be made by bending a piece of No. 8 or 10 copper wire into the form of the original tip. The emergency tip should be tinned in the usual manner. — *Erling R. Jacobsen, K4OJY/9*

COOLING THE RANGER II

CONSIDERABLE heat is generated in the r.f.-tight cabinet of the Johnson Viking Ranger II, most of it coming from the 5R4GYB high-voltage rectifier. This heat can be greatly reduced by using a plug-in silicon replacement for the vacuum-tube rectifier. Several types are available from many of the mail-order electronic supply houses, some rectifier units costing less than a comparable home-assembled version. Replacing the 5R4GYB in the Ranger with one of these plug-in units caused the high voltage to increase to 560 volts under full load and to rise to 580 volts with no load. The 700-volt electrolytic filter capacitor remained well within its rating and the only change necessary was to reduce the static current of the modulator to about 60 ma., by moving the slider of the high-voltage bleeder resistor about 1/8 inch toward the panel.

The use of a silicon rectifier in the Ranger's low-voltage supply is not recommended. The increase in voltage that comes from using a silicon rectifier is undesirable in the low-level stages, requiring that a series resistor be used; unfortunately, this resistor generates more heat than the low-voltage rectifier tube. — *G. L. Countryman, W4JA*

VIBRATION-PROOF HARDWARE

NUTS and bolts that become loosened due to vibration can be secured by applying a drop of "Loctite" liquid to the threads.

— *John C. Nelson, W2FW*

YL news and views

CONDUCTED BY JEAN PEACOR,* K1IJV

Where the YLs Are

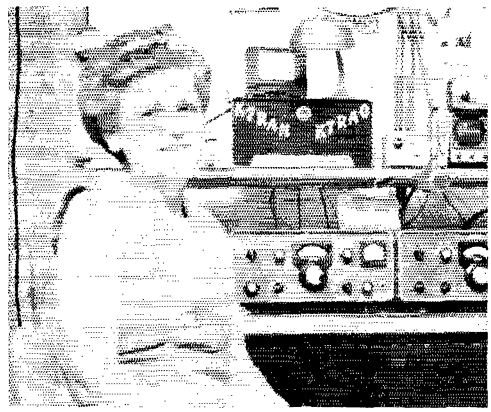
IN this case you won't find the YLs at Vassar, Smith, or Simmons, but rather on the Loaded Clothesline Net, CHC/FHC Service Net, Minow Net, Tangle Net, or Buckeye Belles' Net, to name but a few. September generally finds vacations at an end, school back in session, and a great upsurge of activity on the YL Nets. Here's your chance to meet and talk with YLs from coast to coast, and many times worldwide. At the same time, it's possible to finish up your mending, knit, catch up on ironing, or complete all kinds of odd jobs while enjoying pleasant company. So, if you hear them, join them, as everyone is welcomed.

The sampling of nets to be covered in this issue only scratches the surface of those that are active. Information from the many others will be welcomed for future columns.

Amy Baldwin, K9YIC, is NCS of the IMPS, and also Indiana State Mars Director (AFA9YIC). For services during the tornado emergency in April, 1965, she earned a Mars Trophy, U.S.A.F. Service Award, and the ARRL Public Service Award.

What are IMPS? Indiana Michigan Petticoat Sisters! This daily net can be found at 1800 GMT on 50.4 Mc. Amy Baldwin, K9YIC, originated the net which includes YLs from Indiana, Michigan, and Ohio. The group offers a net certificate to anyone more than 100 miles away who contacts three IMPS other than at net time. For those within 100 miles, contact must be made with five. Amy has been NCS since the net began.

* YL Editor, *QST*. Please send all news notes to K1IJV'S home address: P.O. Box 446, East Orleans, Mass.



Bobbie, K7RAM, of Walla Walla, Wash., originator of the Minow Net and sometimes NCS.

LCL translated is the Loaded Clothesline Net which meets each Monday at 1700 GMT on 7235 kc. All YLs are welcome to check in using any mode. To become a member, a YL must check into the net three out of a possible five times and submit her dues. Helen, W7GGV, is the current President; Marte, KØEPE, is Vice President. Other YLs who serve as NCS are Phyllis, K7WVT; Pat, KØEVG, and Estelle, WØESD.

YLs from Montana, Idaho, Nevada, Oregon, Washington, and British Columbia meet every Friday at 1700 GMT on 3880 kc. for the Minow Net. There is also an Early Bird session an hour earlier for YLs who work or for whom copy is better at that hour. This net differs from many in that it is a roundtable net. Bobbie Wilson, K7RAM, was the net's first President and is still active as NCS from time to time. The net has grown to number thirty-six members with Phyllis Shanks, K7KSF, their current President. YLs who have been licensed many years are encouraged to check in and renew old acquaintances and help newcomers. Their preamble reads: All licensed YLs are welcome, and we mean it sincerely.

All amateurs in the world are invited to check into the CHC/FHC Net which meets daily at 1800 GMT on 14,340 kc. This is a public service net which handles traffic as well as providing a meeting place for those interested in various awards. Orma Donkle, W9BJH, President of Int. YL CHC Chapter 4, is also Master Control Station and Chairman of the net's NCS.

Michigan's YL Welcome Net meets each Wednesday at 1400 GMT on 3900 kc. Open to

both a.m. and s.s.b., newcomers are most welcome following the roll call up. Marion Allen, K8LHF and sometimes NCS, reports that NCS rotates on a voluntary basis.

WRONE's Yankee Lassie Net meets on 3900 kc. each Wednesday at 1330 GMT and NCS rotates. Open to both s.s.b. and a.m. stations, this net, plus a second WRONE net at 1900 GMT on 50.65 Mc. are where you will find many YLs from "1" land each Wednesday.

Many California YLs have discovered the Dishwater Net which meets each Monday at 0300 GMT on 146 Mc. Listen for NCS, Vera Wall, WA6PKP, and join the group.

Where are the YLs? Only as far as your nearest receiver.

Phyllis Shanks, K7KSF

In keeping with the new look of YLRL's *YL Harmonics*, a "new member" column is to be added which will be written by Phyllis, K7KSF, of Richland, Washington. A fine choice too, as Phyllis has made a special effort to meet the newly licensed YLs and tell them about the many activities available to them. She remembers well the mike fright feeling as a newcomer and the fine breakthrough feeling that was hers when their EC, W7YFO, let her run the main transmitter for a SET. In addition, the friendly introduction to all YL activities provided her by Bea, W7HHH, and Fran, K7MRX, made her appreciate how much help does help.

A most active radio amateur, Phyllis has served as Publicity Chairman, Vice President and first YL President of the Richland Amateur Radio Club, secretary and now Vice President of CHC Chapter 33/73, and Vice President of Washington CHC Chapter 15. She is a traffic handler, is also striving to form a local Eye Bank operation, and studying for her C.P.A. on the side.

Phyllis's OM is Bill, K7KSE, and their son Tom is K7KSI. All are active radio amateurs.

The helping hand Phyllis extends to all newcomers sets a fine example for all radio amateurs. Her new column in YL Harmonics will be of interest to all.

Phyllis Shanks, K7KSF, is President of the Minow Net, also newly appointed *YLH* columnist.

Orma Donkle, W9BJH, is an A-1 Op., and chosen for the Operator of the Month list in October, 1965.

Vera Wall, WA6PKP, is a past President of Baylarc and present NCS of the Dishwater Net.

SM7CRJ

Britt Forsberg of Huskvarna, Sweden is SM7CRJ. Britt also QSLs Sure and answers inquiries; otherwise this story could not be written.

Of the approximate 3200 licensed radio amateurs in Sweden, Britt judges that perhaps the YLs number about forty. However, she knows of only three or four YLs who actively frequent the bands. Sweden does not have a special YL club, and they rely on *QST* and other foreign publications for news of other YLs and their activities.

It is thanks to her OM Nick, SM7ACR, that Britt is now SM7CRJ. Nick was QSL manager for their local radio club a few years ago and used to deliver QSLs to Britt's father Hans, SM7AAZ. Hans had been a radio amateur since 1949, but Britt paid little attention until she learned that Nick planned to teach code classes at the club. That is when she decided she would very much like to learn code. They were married in 1959.

Britt and Nick later became the parents of two sons who kept her busy and away from continuing her studies for a radio license for a few years. But, in July of 1964 she received her first ticket (Class C) which allowed her to operate on 3.5-and 7 Mc. c.w. using 10-watts input, crystal controlled. Even so, she managed to contact many DX stations. In November of 1965, she got her Class B ticket which raised the input to 50 watts on 3.5, 7, and 21 Mc. and permitted v.f.o. control which did much to increase her operating fun. This year in November, Britt hopes to get her General license (Class A) after which she can operate on all bands using up to 500-watts input on c.w., a.m., or s.s.b.

In the short space of two years' time, Britt has contacted 3500 stations, has 140/110 for DXCC, 380/295 for WPX, and 38/25 for WAS — all proof of an active YL. You'll hear her often on 7- or 21-Mc. c.w. during the evening. She is a member of

. . . SM7CRJ, pupil

SM7ACR, teacher . . .

SSA (Sveriges Sändare Amatörer) and EKSJO Radio Club which has a club house, club station, and many active hams.

Nick can well be proud of his former pupil who is now one of Sweden's few active YLs.

Howdy Days for all YLs
Sept. 20, 21, 22

Starts: September 20, 1700 GMT
Ends: September 22, 1700 GMT
Rules: Scores will be based on licensed YL contacts only. All bands and modes of emission may be used. Only one contact with each station will be counted. Contacts on nets do not count.
Scoring: Score two points for each YLRL member worked, and one point for each non-YLRL member worked. No multipliers. Logs not required . . . submit a list stating date, time, call, name, and whether YLRL member or not.
Awards: Top scoring YLRL member will receive a choice of YLRL pin, charm or stationery. Top scoring non-YLRL member will receive one year paid membership in YLRL.
Score sheets must be received by October 14, 1966. Submit score sheets to Edie McCracken, K1EKO, P.O. Box 285, Westwood, Mass. 02090.

All YL Contest
27th YLRL ANNIVERSARY PARTY

Time: c.w.
Start, October 19, 1966, 1700 GMT (1200 EST)
End, October 20, 1966, 2300 GMT (1800 EST)
Phone
Start, November 2, 1966, 1700 GMT (1200 EST)
End, November 3, 1966, 2300 GMT (1800 EST)
Eligibility: All licensed YL and XYL 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.
Operation: All bands may be used. Cross-band operation is not permitted. Only one contact with each station will be counted in each contest.
Procedure: Call, "CQ YL."
Exchange: Station worked, QSO number, RS/RST, ARRL Section or Country. Entries in log should show the time, band, date, transmitter and power.
Scoring:
A. C.w. and Phone sections will be scored as separate contests. Submit separate logs for each contest.
B. Important! Note Change in Scoring from Previous Years! All YLs located within an ARRL Section, score 1 (one) point for each QSO with another station located within an ARRL Section. Score 2 (two) points for each contact with a station not located in an ARRL Section (i.e.: DX). DX YLs (by definition all stations not located within an ARRL Section) shall score 2 points for each contact with a station located in an ARRL Section. Score 1 point for each contact with another DX station.

Note: It is imperative that each YL know her Section. Do not use the name of the country if it is an ARRL Section. Hawaii, Puerto Rico, Cuba, Virgin Islands, Alaska, etc. are not DX as they are in ARRL Sections. (Section lists are available from the vice president. Send S.A.S.E. to receive one).

Multiply number of contact points by total number of ARRL Sections or countries worked.

C. Contestants running no more than 150-watts d.c. input at any time, may multiply this score by 1.25 (low power multiplier).
D. S.s.b. contestants running 300-watts p.e.p., or less, at all times may use the low-power multiplier.

Awards: highest c.w. score — Gold Cup (YLRL Member only). Highest Phone score — Gold Cup (YLRL Member only). Highest phone and highest c.w. score in each district and country shall receive a certificate. Highest combined Phone and c.w. scores (YLRL Member) will receive the Corcoran award.
DX Awards. Given by Arlie Hager, W4HLF. — Highest combined phone and c.w. scores. From North and Central America, including Greater and Lesser Antilles — Cup." DX YL from any other part of the world — Cup.
Please Send Logs Airmail to be Sure of Qualifying.
Logs: Copies of all logs must show claimed score, be signed by the operator, postmarked no later than Nov. 25, 1966, and received no later than December 9, 1966, or they will be disqualified. Send copies of logs to: Edie McCracken, K1EKO, P.O. Box 285, Westwood, Mass. 02090. No logs will be returned. Be sure it is a good copy of your log that you send. Carbon copies which are smudged in mailing and handling and become unreadable will be disqualified. QST

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Many among more serious stamp collectors are "specialists". They're not particularly interested in obtaining postage samples from as many different countries as possible. Apparently philately has no incentive equivalent to DXCC. One chap may concentrate on Queen Elizabeths, another will pursue only South American flora issues, etc. In time, despite limited means, such a collector can accumulate a distinctive and noteworthy collection.

Amateur radio's DX men usually prefer a worldwide approach to trophies of the hunt. There are a few specialists by band and large groupings by mode, but geographical specialization, except for incidental award qualification, is relatively scarce. Most of us are glad to grab whatever DX comes along, the rarer the better.

An interesting exception to this rule is WA6IVM of the Northern California DX Club. In the course of recent routine correspondence Ray remarked: "Been busy trying to become the best-known W/K in Japan. I've worked well over 2700 different JA stations, many on three or four bands or modes. QSLing them got to be so much work I engaged JA1DCY as my QSL manager over there. Now have 59 awards from Japan including some real toughies. Most aren't too difficult with more than 6000 JA QSLs in file! Consequently I've learned to read, write and speak their language passably and am in process of mastering the Japanese radio code, a stiff challenge. I hope that my efforts at Part 97, subpart A, 97.1 (e) of United States amateur regulations can continue for quite a few years to come."

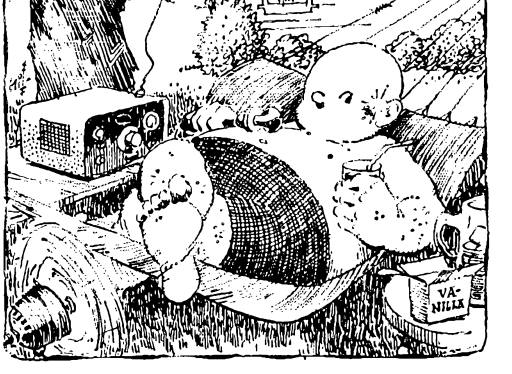
In the same mailbag K1UOV mentions his growing collection of 365 Italian QSLs. Is geographical DX specialization on the upswing? These activities bring to mind the remarkable British Isles work of the late "G-man", W1WV/W6ZZ. And who, outside Puerto Rico, has worked more KP4s than QRP sharpshooter W2QHH? Any other regional specializers out there in DXland? Drop us details, if you will.

By the way, the FCC regs section to which WA6IVM refers, under Basis and Purpose, goes: *Continuation and extension of the amateur's unique ability to enhance international good will.* Unique certainly is the word. No other radio service is franchised to tackle this job where it really pays off, at the person-to-person grass roots level, as a bona-fide spontaneous voice of America.

What:

Whew! Some summer, eh? Not for a long time has the WX man hit DXCC so regularly on thermometers far and wide. There was understandable general reluctance to flip on the QRO for hot DX doings down in the bottom layers, for even the most compact kilowatt can sweat up a shack. Nevertheless the lads kept the game going gaily from 3.5 through 29.7 Mc. Twenty's turn for the "How's" spotcheck spotlight this month. . . .

20 phone first, where **Ws** 1CKA 1DYE 3HNK 8IBX 8YGR, **K1ZJA, WAs** 4PSA 4WIP 4YDR 8GGN 8MAT 8OBF 9IBT ØJTB ØKYB, **WBs** 2UFN 6KIL 6MOS, tuners C. Durnavich and P. Kilroy shovel in **BV1s** USA (14,215 kc.) 1800-0100 GMT, USF (235) 14, **CEs** 1HL 1HU 3HQ 3PL (102) 20, **CN8s** BB MT 23, **COs** 2FA* 8HN* 8MN 3, **CPs** 1CY IEO 2, 5AD 6GC 8AC 12, **CRs** 4AJ 5SP (203) 21, 6GQ 7CI 7GF 9AI 16, **CTs** 1IW 1, 2AM* (120) 21, **CXs** 4AAW (340) 0, 5BC 12, 8AAW (332) 23, 9AAN 0, **DKØAA/p** (220) 1, DM2BRN 4-5, **DUs** 1FH 2, 1MR 9MVC, **EAs** 8AH 20, 9EO (231) 1, **EIs** 6AG 9AC (270) 23, ØR (240) 22, **ELs** 2AT (228) 21, 2O (333) 23, 3C (250) 11, **EP2s** AX (220) 13-14, BQ (204) 3, **ET3s** USA WH (350) 18, F9RY/FC (110) 13, **FB8s** WW (229) 11, YY (50) 3, **FG7s** XF (50) 3, XL 12, **FH8CD** (233) 21, **FK8s** AB (255) 12, BB BJ (235) 11, BG (237) 12, **FL8AC** (110) 18, **FO8s** AA 6-7, AD AN AQ, **FW8RC** (241) 7, **FY7s** YJ (140) 4, YL (274) 11, **GCs** 4LI* (110) 17, 8HT (110) 18-19, **GD3RFK** 23, **HAs** 5DU (215) 5, 5KBB (242) 0-1, 9OZ, **HCs** 2JJ 2MV 5BZ 6, 5NW 8GJ, **HH9DL, HIs** 3XFF 1, 7XTM 8EFO 6, 8JAN 8LC (220) 22, 8XPH 0, 8XWZ 22, **HPs** 1JC (125) 6, 3MC 23, **HRs** 1JMF 1SO 2GC 6, 9EB, banned **HS1s** AK (130) 7, HC (130) 19, JG, **HV1CN** (330) 20, **HKØs** AI 22, AVK 16, **HL9s** KH 14, KT (250) 11, TH TQ 12, TU (240) 14, **HMs** 2BD (240) 19, 5BF 13, **IS1VAZ** (251) 20, **IT1s** ATK AUA 0, **JAs** 1AEZ 1AFN 1BJS 1CFN 1CWZ 1KG 2ADH 2BY 2CZD 8AF 3CWV 3OMV 3UI 4BJO 4OI 4XW 5ACF 5AHO 6AGA 6AV 6BEE 6CZD 6HK 6NP 6ZI 7ARZ 7DK 8AA 8EL 8GY 9BJ ØVI all 13-14, **Ks** IYPE/XV5 14, 3SWW/**KG6** 12, 4ERU/**KB6** (232) 12, 5BZS/**KG6** 12, **KAs** 2DM 2KS 11, 2NY 7AB, **KB6CZ** (225) 10, **KCs** 4AAA/mm 4AAP (274) 1, 4USB (341) 23, 4USV, 6AA (228) 13, 6CD (237) 11, 6CE (210) 12, 6FM (231) 15, **KGs** 4AA 0, 4AM 4AN 4BQ 4CV (332) 21, 6AAY 6ABD 2 6ADP 6IF 6IG 6IJ 6SB (228) 13, **KJ6s** BZ 5, CF (255) 13, **KL7s** EBK FDR, **KM6s** BI (230) 12, CE 8, DI 11, **KR6s** AF BD 13-14, BL 11, BU 11, CD CF 12, CI (241) 13, CO (225) 19, DJ 14, LL (282) 14, MM (115) 18, NH (266) 14, SR (203) 12, UL (240) 13-14, US USA 11, **KSs** 4CC 6BH (310) 3-7, 6BO 6BR 6BT 11, **KV4s** AB ES (340) 1, **KW6EJ** (254) 13-15, **KX6s** BQ (255) 20, BU BW 13, DC DQ 12, DT (317) 11, EL, **KZ5s** AY ED MK MM, **LAs** 1EE/p 2JK/p (110) 11, 4FG/p (220) 6, 6XE/p (221) 2, 8FG/p 23, LX1DB (330) 23, **LZs** 1BZ (215) 0, 2KKZ (237) 3, M1B, **MP4s** BBL (211) 2, BCC BFS (285) 0-1, BFT (285) 1-2, BFU (262) 23, BFV (218) 1, TBO (200) 1, **OAs** 1W 4BI 4OS 4KK/5 4J 4RK

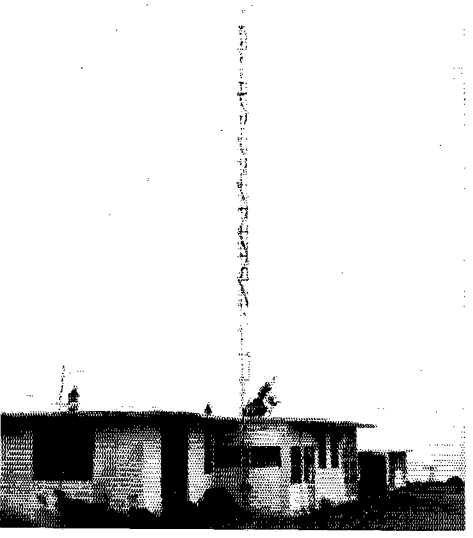


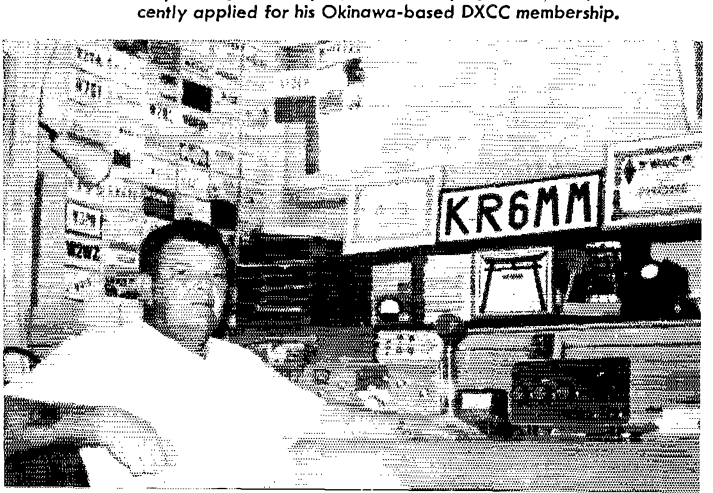
*7862-B West Lawrence Ave., Chicago, Ill. 60656

4TF 4VF **8D**, **OD5**s BZ EE 5, EJ LX 4, **OH0**s NI (120) 5, NJ 12, **OE**s 2FUL 2HVL 8WV 0, **OX5**AC, **OY**2J (111) 23, **PJ**s 2AQ (110) 21, 2CE 2MI 3CD, **PX1YR** (120) 16, **SM**s 1CJV (229) 20, 2BHX 0RN (311) 20, **SP5**AIA 4, **SV**s 1AE 1AT 1BH (331) 23, 1BI (283) 21-23, 0WAA 6, **TF**s 3EA **5TP**, **TG**s 7AG 8CJ (332) 1-2, 9AG 9EP 2-3, 9RN, **TI**s 2EVA (336) 20, 2FMO/6 2, 2IO 2JK 2RO 2WR 0, 4VV* 5RV 23, 6CAL (330) 2, 8LM, **TU2**s AM (143) 21, BA BD 7, **UA**s 1KED (212) 12, 2AC 2AO 2KBD (105) 5-11, 9EL 3, 9EU 9HA (206) 1, 9KCE 9KG 0NL 0NM, **UB5**s EO (216) 2, LV 2, UN WI WJ 20, **UC2**BF (241) 5, **UD6**BR (102) 2, **UF6**s FB (215) 4, KPA (125) 5, UD 5, **UG6**s AW (210) 4, SG, **UH8**BO (175-213) 2, **UL7**JA (205) 2, *UM8EZ* 1, **UN1**BK 14, **UO5**s AN (265) 5, PK (106) 3, RO (110) 5, WS, **UP2**s CG KNM KNP (231) 22, OK 15, PO, **UQ2**s AN BT GA KFG (246) 6, LL PD 5-11, **UR2**s AR 4, BU KAA KAW (110) 3, **UW**s 9CC (220) 1, 0IN 5-13, **UY5ZA** (240) 4, **VE**s 1AED/SU (212) 5, 2BUJ/SU 3, 8AC 8MD 0MIY, **VK**s 1VP 8AB 13, 8KK 9AG (135) 12, 9DJ (229) 12, 9GN 9JK (217) 11-12, 9LF (200) 12, 9MD (330) 12, 9MK (210) 13, 9NT (254) 12-13, 9SI 9XI (242) 12, 0AA (213) 5, **VO**s 1DW 2DB 21-22, **VP**s **1LB 1TC 2AA 2AP** 2AZ (130) 21, 2KD 23, 3AA (120) 21, 5AR (220) 6, 5RS **6JC** 7NA 0-1, 8HZ **9FC** 23, 9FE 9FK, **VQ**s 8AM (213) 0, 9BC (125) 18-19, 9RH (127) 17, **VR**s 2D1 (265) 6-11, **6TC** (153-205) 7, **VS**s 5MH (223) 13, 6AJ 14-17, **6D**S (203) 14, 6FR (207), **9ABL 9ARV 9ATH** (175) 17, 9OC (195) 23-0, 9OSC (237) 23, 9PRV 11, **VU2**s CW (100) 13, HIZ TP (120) 15, Ws 4GJU/**KS4** 4MCI/**KS6**† (340) 17, 5HWR/**VP9** (125) 22, 6FHM/**DU1** 14, 6IBU/**KG6** (268) 15, 8TNC/-**KW6** (330) 12, WAs **7BVE/KW6** 0GFS/**KM6** (270) 11, **XE**s 1CCW 1EH 1JC 1JJJ (335) 17, 1KKV 1NC 3LK, **XW8**s AY 17, AZ (235) 16, **YA**s 1AW (215) 2, 1DAN 1KC (235) 18, 3TNC, **YK1AA** (115) 18, **YN**1s CML SR WPE, **YO**s 3LM (233) 2, 3ZA 9AFT 4-5, 9CN 4, 9VI (120) 2, **YS**s 1HKU 1IGM 5, 1RFE 1VST 0, 2CL 7, 2GM 2RU 0, **YU3**LC 5, **YV**s 4MW 8AZ, **ZC4**s CI (215) 5, CN 4, JM MO (125) 23, RW, **ZD**s 5D 13, 7RH (221) 19, 8CR (332) 21, 8RD 9BC (125-140) 17-21, **ZF1**s GC RD (250) 14, **ZK1BW***, **ZL**s 4CH (120) 3, 5AA 5AB 6, 5AD, **ZP**s 5DL (307) 1, 5HK 5ZT 2, 7BJ, **ZS8**L 14, **4S7**NE (117) 2, **4U1ITU** (300) 18, **4X4**s AS BL (191) 4, FV (200) 3, GV (228) 4, JV (130) 0, SO SW 0, TP, **5A**s 1TZ (245) 22-0, 3TY 4, 4TK (140) 23, 4TR (242) 21, 5TJ 1-3, 5TR 6, **5N2**AAW 6, **5U7**AC (120) 16, **5W1**AZ 5, **5Z4**IR (240) 20, **6O**s 1AU (275) 18-19, 6BW, **6Y5**s AR 0, MJ 3, UC, **7Q7**PBD (203) 22, **7X**s 3RT (125) 15, 0AH (221) 0GL (120) 17, **7Z3**AA 6, **9G1**DU (221) 2, **9H1**s A 22, L 0, **9L1**HX, **9M**s 2AP 12, 2AV (110) 16, 2DQ (216) 13, 2GR (255) 15, 2GV 2KR 2LO 2SS 6AC 6AP (222) 15, 6AR 6NQ (196) 13-14, 8RS (225) 13, **9N1**s BG MM (201) 1, **9Q5**s CZ (113) 22, DM GM HD RH (230) 2, YL 14, **9U5**BB (120) 17, **9V1**s JG (259) 15, MT (110) 16, MU (235) 13, MW (235) 13, NO (150) 19, **9X5**MH (125) 17 and **9Y4VT** (279) 11-12, the lonesome asterisks representing non-s.s.b. holdouts.

20 c.w. comes on strong for **W**s 1AYK ICNU 1DYE 1ECH 1VAH 2ADP 3HNK 3JZI/9 4DRK 7RGL 7VRO 8PKU 8YGR, **K**s 3FKU 3KMO 5YPS 8YSO 9UCR 0DEQ, **WA**s 1CUN 1FGN 3AZI 4CWA 4PSA 4WIP 4YDR 5IHZ 6JDT 8CGN 8MAT 8MGD 9AQE 9IBT 9MQI 9NXH 0FRM, **WB**s 2TGA 2UFN 2UHZ 8KIL 6MOS 6MPE and tuner C. Durnavich, producing the beeps of **BV1**USA (45) 17, **CE**s 1AV (10) 0, 1DN 2, 2AP (80) 23, 3CB 3CJ 4AD 1, 6EF 8BJ, **CM2**BD, **CN8**FV, **CO**s 2DR 2JB 2RL 21, 5FS 6AH 8BH 8HT, **CP5**EZ (30) 0, **CR**s 3KD **6**CS (15) 22, 7IZ (80) 17, 9AH (55) 13, **CT**s 1AQ 1BC JIT 1JM 1LL 1TX 1VB 2BO (30) 19, **CX3**AN (25) 21, **DK0**AA, **DM**s 2ACO (78) 6, 2CDL (70) 22-5, 3LOG 3SBM 3VGL 3WSO 4BO, **DU**s 1FP (15) 14-15, 1HR 1OR (47) 17, 1RK 1VM 6KC 7SSV (91) 11, **EI**s 3AK 4AZ (21) 1, 5F (70) 0, 9AR 9N, EL2FD, ET3USA (50) 17, F9UC/**FC** (8) 23, **FB8**s WW 10, XX (5) 21, YY ZZ (58) 11, **FG7**s TD (5) 23, XC 15, XF (50) 0, XT XX (5) 21, **FP8**AP (45) 9, **FL8**s MC RA (40) 4, **FO8**s AQ BI (30) 20, **GD3**FXN (40) 19, **GC4**LI 16, **HA**s 1SB 3JM (50) 4, 3MB 4KYB 5FE (50) 23, 5FW 5, 5KBB (73) 4, 5KDQ (30) 23, 5KFR 5KUC 6NI (8) 22, 8CZ 23, 8WU, **HC**IGC (5) 0-1, **HI8**s LC XAL (30) 11, XAM (50) 20, **HK0**AI (50) 2, **HL9**s TH US (50) 13, **HM**s 1CG 3CG 5BF (25) 20, 5FA, **HP**s 1BR 1BZ (25) 23, 7GH (20) 21, **HR**s 1AT (5) 7, 1BR 1HZY 0, 5LB (60) 9, 1S1JD, **HV1**CN (35) 12, **HZ**s 1AB 3TYQ, **IS1**FIC (25) 18-19, **IT1**s AGA (40) 2, SBT PST (65) 1, **JA**s 1AAP 1AKH 1CIB 1CWZ 1EFE 1ERB 1EZ 1EZT 1FDU 1FGW 1GTF 1KFN 1OJE 1VX 2CMD 2CPD 2DNA 2EIV 2TH 3ADN 3IG 3KEM 4AHV 4BKM 4RF 5GZ 6AA 6BXA 7FS 7KW 7OD 8ADQ 9AMJ 0ASS 0BBB 0CCE all 7-15, **JT1**s AA (39) 14, AD 15, KAA, K3SWW/**KG6** (5) 12, **KA**s 2DM 2KS (15) 4, 2LD (45) 14-15, 8JJ 9MF (35), **KG6**s AAY AQA, **KR**s 6BD 6CU 6KJ (15) 11, 6MM (30) 17, 6QW 6UD 6WT (30) 18-19, 8BI 8CW 8CY, **KS**s 4CA 4CC (41) 8, 6BR (22), **KV4**s AA (81) 21, BO CI (60) 23, **KZ5**s BC FX FY JF, **LA**s 1EE/p (40) 6-7, 4FG/Z 13, 5AK/p (20) 9, 6XF/p (13), LU2YE (15) 14, **LX1**s LU MR, **LZ**s 1KAA 1KNB 1KSB 1KSV 1SP (31) 5, 2AW (30) 3-4, 2KKZ 2, 2KLS 2ZZ, **MP4**s BBA (5) 21, BDF (20) 6, BFU MFV, **OA**s 4KF 8D/3 (20) 0-1, **OD5**s EE (50) 23, EJ (20), **OE**s IZK 2LEL 2MCL 3BCN 3REB/1 3SJW 5AH 6HZG, **OH0**NH (25) 17, **OK**1s BI/mm CM/mm (25) 22, **OX**5s AC AF (65) 23, **OY**s IL 1R (60), 2H 2J (20) 8P (50) 18, **PE2**EVO (1) 21 of Holland, **PI**1s KM LC/mm 4-5, **PJ2**s CE (24), CH MI (100) 6, **PX1**YR (12) 5, **PY9**AH, **PZ**1s BI CM (9) 1, **SM0**KY, **SU**1s BL DL (20) 23, IM, **SV**s 1DS 5, 0WH 6, 0WKK, **TA**s 1AB 2BK (10) 14, *TF2WJU* 19-0, **TG8**FA 5, **TI2**s KR LA (80) 22, PZ 4-5, WR, **TL8**SW (15) 22, **TN8**AF (30) 19-20, **TR8**AG (24) 22, **TT8**AW (15) 5-6, **TU2**BA 21-22, **UA**s 1KED (19) 0, 1KFT (20) of Nova Zemlya, 2AC 2AO 2BY 2CD 2CJ 2KAP 9CC (40) 4, 9EM (30) 3, 9ES 9EU 9FW 9JH (50) 4, 9KAG 9KAR 9KCE 9KCF (80) 14-15, 9KDK 9KDL 4, 9KHA (22) 0, 9KOA 9OO (20) 3, 9PG (30) 1, 9PP (42) 1, 9LZ 9TM 9UC 9WS 0AF (20) 0, 0AG (50) 0, 0BN (10) 6, 0BP 0CK (30) 1, 0CH 6, 0DV 0EJ 0GA 0GR 0IA 0IJ 0IK 0IM (25) 1, 0JU 0KAE 0KCO 5, 0KFG 6, 0KFF 0KIA 0KIN 5-6, 0KUV 0KZD 0KZG 2-3, 0LL 0NR 0RD (30) 13-14, **UB5**s AE CV (45) 22, EK EW 3, GE 4, HS IF KAA KBA KDS KHQ KNF LC ML 4, NU **PL** 4, SL TR 1, YL ZO ZP, **UC2**s AX (25) 3, FM (30) 4, KI 4, OM (29) 4, RX (34) 4, WP (55) 17, WR, **UD6**s AM (5) 1, BA BG BZ (50) 3-4, CE, **UF6**s BD (20) 1, FP LA (99) 2, QB, *UH8BO* (10) 3, *UI8*s AX KBA LC LK (25) 1, MF MV (80) 19, **UJ8**s AB AC (1) 1, AH (25) 1, **UL7**s AP BF (55) 1, BG (27) 1, CG (15) 1 GQ JE (10) 1, KAD (25) 3, KLD (30) 15, LK (50) 3, RN RX 3, SA (60) 3, YL (45) 1, **UM8**s AB (65) 17, AP (35) 19, IE (86) 2, KAA (40) 1, KAI 15, KAK 3, KAP, **UN1**BK (3) 1-5, **UO5**s DN 21, PK (20) 1, SA, **UP2**s CT 6, KBA 17, KNP 16, KTU, **UQ2**s AB AU HT II (22) 17, KBQ KCT MK, **UR2**s EJ 5, FU KAC (30) 15, LO, **UT5**s AQ BQ 1, EW FI LE LF PQ 4, PX SQ 4, VQ 3, UVs 3TH 9OC (60) 1-2, 9VT (40) 0-1, **UW**s 9EA 9OA 0DB 3, 0EA (50) 3, 0FB 5-6, 0FK 0FM 0IE 0IM (30) 3, 0QZ 0SM 0TV (10) 0-1, **UY5**s AB (40) 20-21, AF (77) 5-6, RH MV (18) 5, **VE**s 8AA 8MD (5) 7, 0NB (27) 18-19, 0NO, **VK**s 8HA (32) 18-19, 9AG (111) 14, 9CJ (58) 12-13, 9TB (34-73), 9WE (8) 12, 0MI (49) 4, **VO**s 1AQ 1EO 1HJ (1), 1HS 2DK, **VP**s 1LP 1PV 2AZ (50) 6, 2GLE (50) 20-21, 2LV 0, 2LS (60) 22, 3YG 5AR (42) 5, 6AK 14, 6PJ (10) 21, 6YF 4, 7NP 7NT 7NW 8HJ (100) 22, 9BQ 9BP 9BY 9DL 9EP 9EU 9FU 9FY, **VR**s 2DK (70) 11, 2EK (33) 7-9, 2ER 4CR (20) 10, **VQ**s 8AI 8BJ 9BC (45) 0, 9TC (50) 22, **VS**s 5JC (5) 18, 9ADF (10) 22, 9ASA 9ATH (40) 12, **VU2**s DIA (22) 0, CU (105) 21, JA KJ RU SO TS,

KR6MM (W3HEO) soon will close down this layout for military reassignment. Clyde, who formerly signed SVØWX, recently applied for his Okinawa-based DXCC membership.





OA1BL, usually OA1BL/4 at Lima, does his part to pep up DX interest on 7-Mc. phone. Roberto also will be trying higher bands with his newly acquired General license.

Ws 1YIS/**KG6** 14, 9FHA/**KG6** 0TJ/**KJ6** (49) 20, WAs 1BOK/**KG6** (18), 9PAE/**VP9** (70) 18, XEs 1AD (10) 6-7, 1EK 1KKV 1LK 1MMU 1TQ 1VQ 1YV 3LK 3RE (55) 17, **XP1AA** 4, **XW8s** AZ BD (18) 15, YAs 1AW 3TNC (2) 15, YN1SL, **YOs** 2BB 2BV 3CR 3CZ 3RF 4KAK 5LC 5, 7DL 7DZ 8CF 9KAF (30) 4, **YS1s** CRD O (9), RFE 1, YUs and YVs galore, **ZC4s** BI EB GB (10) 4, TX (46) 6, **ZDs 5M** 7IP 14, 7RH (11) 9, 8AR 8ES 8J (20) 12, 8WZ (20) 20, **ZEs** 1AE (55) 0, 2KL (80) 19, 8JJ 21, 8JV 8JW 15, **ZL4**CH 5, **ZS3XG**, **ZP5**LS (5), **3V8AX** (20) 18-19, **4S7s** DA (22) 16-17, NE, **4Us** 11TU (80) 14, 2BZ, **4X4s** HJ JR (7) 3, MR MZ 4, TP UH WF (85) 1, 5A3TX (65) 4, **5W1**AZ (45) 9, **5Z4s** BM IR (50) 18-19, JE 6, **6W8s** CQ (60) 18-19, DG 1, **6Y5s** AA AO (40) 22, BB 14, FH (20) 4, **7G1**A (30) 2, **7Q7**JO 18, **7X0s** AH AP PQ (70) 18-19, WQ (19) 20, **9H1s** AD AM AP (50) 1, **9J2s** AR GJ 19, PB (50), VB, **9M8s** 2AS 2AV (45) 16, 2ED 2LN (28) 15, 2YY 15, 6KS (60) 14-15, 8II (5) 15, 8RS (50) 13-14, **9Q5s** HD LF QC (35), **9V1s** AZ JW 13, JY (25) 14, LK (10) 16, MJ (30) 17, MT (30) 16, NM NN NV (40) 18, RS and **9Y6**LT. Compare these tabulations with 14-Mc. rundowns of a year or two back and you'll note that the polar paths are beginning to look alive, indeed!

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Next month we'll turn the "How's" Bandwagon down other DX routes with the aid of (15 c.w.) **W3**IZJ/9, K1ZJA, **WAs** 1CUN 3AZI 8MGD 9AQE 9MQI 9NXH 0KIR 0KYB, **WB6**KIL, **WN7**FLR; (15 phone) K1ZJA, **WAs** 4WIP 8GGN 8MGD 9NXH 0KYB, **WB6**KIL, P. Kilroy; (40 c.w.) **W7**AYC, **Ks** 1ZJA 3FKU, **WAs** 8GGN 0FRM, **WB2**TGA, **WN7**FLR, C. Durnavich; (40 phone) **W8**GGN and s.w.l.s; (80 c.w.) K1ZJA, **WA8**MCQ; (10 phone) K1ZJA, **WAs** 4W1P 9MQI 0KYB, **WB4**CAP, G3IDG; (10 c.w.) **WA1**CUN, **WB4**CAP, G3IDG and brethren now punching their mills Jeevesward. Time to watch 28 Mc. closely, OMs, as the m.u.f. is climbin'!

Where:

HEREABOUTS — This month's "QSLers of the Month" are CN8FF, CO6AH, EIs 4AN 9AR, ET3USA, F7FV, FG7s XT XX, FM7WH, GM3TRI, GW3DZJ, HMOC, IT1AGA, JAs 4BJO 8EL, KC6CF, KP4BLQ, KR6LL, OAs 1BC 4TJ, OE3JBW, OK1ZQ, OZs 4H 7AV, PA0ED, PJ4AC, PZ1BD, SM5DRE, SU1IM, UG6AW, VK9NT, VP2KJ, W2CTN, XE1Z, ZD8WZ, ZS8L, 4O1-ITU, 7X2AII, 9G1FY, 9U5DP and 9V1MT, all cheered roundly by "How's" correspondents W0SUU, Ks 3FKU 5LIL, WAs 2HIU 4CWA 8GGN 8MGD 9AQE 9MQI 9NXH, WBs 2IBQ, 4CAP, WN9PQY, HB9TE and P. Kilroy for especially snappy confirmational comebacks. Got candidates for these kudos? . . . . . Halp! The following italicized colleagues could use clews on obtaining leads to the whereabouts of holdouts mentioned: *W2IU*, ex-CN8GU '58 (Ray Donovan, ex-W9EJY); *W4?YBR*, K9LMG/VP4, VQ1IZ, W5IUW/VP9; *W4?PSA*, ON4NM/LX '65; *W4?WIP*, TA1AX; *W5HNN*, OX3BB' 65; *WB2TGA*, 5A4RCA '65; and *WB6FHH*, KC6BK, VP8CW, 9J2DT all '64. Any tips? . . . . . WA9NXH and WN9PQY offer their good offices to overseas DXers in need of Stateside QSL tenders . . . . . NEDXA's *DX Bulletin* indicates that W5EZE will do QSL chores for K5AAD's recent Caribbean wanderings, while LIDXA's organ has it that K6HZP can help you confirm VP2LS QSOs scored by July visitors W6UIK and WA6WTD . . . . . NCDXC's *DXer* mentions K8TBR as of possible help in nailing down old HH2CE wallpaper . . . . . NNRC's *Bulletin* carries a glowing report or two on W9IOP's revised Second Op, all sorts of DX data read-outs at the twirl of a thumb . . . . . "The usual lunkhead has been using my FP8AC call on 14-Mc. c.w.," reports W6SAI. Bill hasn't fired up from St. Pierre since 1950 . . . . . W3HNK says you'd be wise to cross off the traditional "return in five days" postal legend on your mail to QSL managers, at least during the vacation season . . . . . "Why all the kicks of late against DXpeditioners?" wonders WA3AZI. "I've had the good fortune to work several, have never felt able to send 'contributions', and have always gotten my QSLs promptly."

ASIA — "I've taken over QSL chores for OD5EE (W5LAK)for QSOs dating on or after June, this year," notifies W7VRO. "This will include John's contacts from MP4s BDT MAO QBB TAU and 5A5TA. He recently mailed about a thousand QSLs and should be almost caught up for QSOs prior to the mentioned date. Judging from the first hundred or so QSLs I've received for him, his 140-ft.-high Yagis and kilowatt get fabulous reports." . . . . . "Last I heard from VU2DIA he was having cards printed in India," says K6JIC . . . . . W2IWP has it that 4X4VL wants QSLs sent direct only . . . . . Regarding Japan's impending new label, W9FNX opines, "That JH prefix is nothing new. I've been hearing it for years. They always turn out to be iu California!" Swingy W6s — on c.w., get it?

AFRICA — "For the past several years I've been QSL manager for VQ4RF-5Z4RF and ZD2JKO-5N2JKO," recaps W4MCM. "Since things began happening in Africa we have had trouble getting logs on time or at all. Thus there has been delay in answering requests from the gang, for which I apologize. I have logs for the following periods: VQ4RF, from July 24, 1960, through the prefix change; 5Z4RF, from prefix change through May 29, 1965; ZD2-JKO, from January 12, 1960, through November 28, 1960; and 5N2JKO, from May 12, 1961, through March 20, 1964. Plenty of blanks on hand, so I'll be very happy to answer requests from those who desire cards, self-addressed envelopes and GMT/GMD required." Bob has no logs from 5N2s AAF and LKZ . . . . . DARC's *DX-MB* says CX9AAN formerly signed VQ1GDW.

OCEANIA — "Have my logs with me for my two years on Guam as WA6LED/KG6," announces CN8FC . . . . . "I'm changing my QSL-direct policy," regrets K3SWW/KG6. "Returns have been running less than sixty per cent on almost six thousand cards sent out. From now on it's s.a.s.e. or via bureaus, fellows." . . . . . "All W/K QSOs with VK9WE can be confirmed through me," states WA6GLD. "Others should QSL Blue direct. Incidentally, so far only one per cent of U.S. requests fail to include s.a.s.e., a must. Failure to use GMT runs higher." . . . . . "I've QSLd 100 per cent to more than six thousand contacts," claims KR6MM . . . . . LIDXC reminds us that VK4TE Willis islet QSOs may be confirmed through W8ZCQ. This goes for contacts in late April, all of May and early June, 1965.

EUROPE — SM5CZY, now SM6CZY, tells W1WPO of ARRL's DXCC Desk that former SM5s in laens A and B now are SM0s, addresses remaining the same. Also, the DK label is being revived for issuance to German hams now that the DJ block is saturated . . . . . W1YYM, ARRL Assistant Communications Manager, points out that DM3CK/YK wasn't in Iraq. 'Twas DM3YK guest-opping at DM3CK . . . . . "Cards for contacts with HV1CN while operated by WB6CIY should be sent to HAMU, not to K6CYG as previously announced," corrects the latter . . . . . In NCDXC's *DXer* we note that W6RKP may be of some assistance toward confirming QSOs with rarish U.S.S.R. stations. Check for terms and conditions.

SOUTH AMERICA — W4NJF understands that some-body usurps FY7YJ's call now and then for unauthor-ized and unconfirmable QSOs, also that FG7XL has inter-mittent trouble coaxing logs out of her QSL client, FY7YL . . . . . 4U2BZ is said to display the new Guyana prefix from ex-British Guiana but this is the tag reserved for United Nations installations . . . . . Time to list individ-ual recommendations found in the month's mailsack. Keep mindful of the fact that each datum is necessarily neither official, complete nor accurate. . . .

CM2BD (via ANRAC)
CN8FC, Lt. W. T. Broder, Box 40, NavCommSta, FPO, New York, N.Y., 09544
CR6GO, A. Branco, P.O. Box 73, Luso, Angola
CR9AH (via W7ZAS)
CT1LN (via K2BUI)
DU1VM, Box 1231, Manila, P.I.
FO8BR, P.O. Box 1015, Papeete, Tahiti
GI5AAU/WA4PCE, J. Wolfgram, U.S. NavCommSta, FPO, New York, N.Y., 09512
GM5ABN/KP4BRY, U.S. NavCommSta, FPO, New York, N.Y., 09516
HB0XB (via DJ5CQ)
HC1PE, Box 2848, Quito, Ecuador
HP9FC/mm (via VE1DH)
HV1CN (see preceding text)
HV3SJ, Curia Society of Jesus, Borgo S., Spirito 5, Rome, Italy
ID1IDA (via K1SMN)
IR1REE, Box 361, Rome, Italy
JA1ACA, % D. Noon, 1434 Brydges St., London, Ont., Canada

SV1BH, a 20-meter phone regular around 2100 GMT, is the valued friend of many Yanks stationed in the Athens area. That pert s.w.l. is daughter Margareta. (Photo via K1UOV)

JA1CWP (via WA6TFZ)
K1FOB/VP9 (to K1FOB)
K3SPF/KP4 (via WA4WKL)
K4RSH/mm, Lt. (jg) W. C. Blair, USS *Independence* (CVA-62), FPO, New York, N.Y.
KB6CZ-K4ERU/KB6 (via K4MQG)
KP4CRD, P.O. Box 30, San Juan, P.R.
KS4CC, Box 1148, Miami, Fla., 33148
KX6ER, Box 1427, APO, San Francisco, Calif., 96555
LA1ITU (via NRRL)
OD5EE-5A5TA-MP4s BDT MAO QBB TAU (via W7VRO)
PY4BEX, A. Oliveira, P.O. Box 492, Juiz de Fora, Brazil
SM0CZY (see preceding text)
TI2JH, Box 2259, San Jose, C.R.
TI8LM, P.O. Box 1518, San Jose, C.R.
TT8AB, G. Brodard, Box 12, Ati, Tchad
TT8AW, Box 234, Ft. Lamy, Tchad
VK2ADY/VKØ (via W4ECI)
VK9TB (via WA8DXA)
VK9WE (W/Ks via WA6GLD)
VP1RC, Box 691, Belize, Br. Honduras
VP2LS (see preceding text)
VQ4RF-5Z4RF-ZD2JKO-5N2JKO (see preceding text)
ex-VS5MC-9V1MK, M. Caplan, 14th Sig. Reg., Gloucester, England
VS9AJC (to G3TTJ)
WA2TBQ/KP4, E. Garcia, P.O. Box 2049, San Juan, P.R.
WA4FHJ/mm (to WA4FHJ)
ex-WA6LED/KG6 (to CN8FC)
XW8BJ, Box 231, Vientiane, Laos
YO9VI, P.O. Box 193, Ploesti, Roumania
YS1HHM, P.O. Box 1055, San Salvador, El Salvador
ex-ZB1BJ (to 9H1I)
ZB2AM (via W1HGT)
ZC4CN (via CARS)
ZD7RH (via G2IO)
ZS1JK (via WA6TFZ)
4X4s FQ KX/4 (via K2IRK)
4X4s SK SO UL (W/K/VE/VOs via W2IWP)
5A3TY, Box 364, Tripoli, Libya
7X0GL, 3 rue Flamand, Bechar, Algeria
9N1MM, % E. Blaszczyk, W3KVQ/2, 2308 Branch Pike, Cinnaminson, N.J., 08077
9Q5LJ (via ON8RA)

For these we thank **Ws** 2ADP 2APH 3JZJ/9 6PQT 7AYC, **Ks** 1ZJA 9UCR, **WAs** 4WIP 9AQE, **WBs** 2IBQ 2TGA 6KIL 8GGN, W. P. Kilroy and **WN9PQY**, DARC's *DX-MB* (DLs 1EP 3RK), DX Club of Puerto Rico *DXer* (KP4RK), Far East Auxiliary Radio League *News* (KA2LL), Florida DX Club *DX Report* (W4MVB), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (WB2HXD), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N.Y.), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif.) and VERON's *DXpress* (PAØs FX LOU TO VDV WWP). Mail away!

Whence:

HEREABOUTS — Results of Long Island DX Association's 1965 DXCC Contest, a year-long marathon, declare G3FKM world champion with 266 confirmed countries. Wow! Continentwise, WA6SBO with 248; YV5BPJ, 249; 4X4JU, 245; ZL3OY, 133; are tops (no Africans applied). U.S. call area winners include W1JYH, WA2DIG, Ws 3FWD 4NJF 7TDK 8PQQ 9SFR and KØARS. Best from other countries: DL7AA, EA4CR, FG7XL, HK4EP, HL9KF, HP1JC, I1SF, JA4BJO, KP4CL, KR6JZ, LA5HE, OD5LX, ON4ZY, PY2SO, SM5ATN, SP6AKK, UB5FG, VE7CE and VK4SS. As you know, the 1966 version is well under way. Who's going to be *this* year's DX king? . . . . . October 1st is target date for the annual W9-DXCC meeting, a gala midwestern DX event since '53. The clambake will closely coincide with the National Electronics Conference at Chicago's McCormick Place. Acting chairman W9WYB, assisted by W9s DWQ FKC and JUV, urge your earliest attendance inquiries. No, you *don't* have to be a Nine to dig this deal . . . . . Northern California DX Club secretary-treasurer W6PQW points out that the club's old Box 75 address is passé. All correspondence to NCDXC should be sent to P.O. Box 608, Menlo Park, Calif., 94025, including mail concerning the California Award. Prez W6WX, veep W6RGG and W6PQW are new club brass. W6UMI relieves retiring *DXer* editor W6HVN . . . . . W4CRW (ex-K2BHE) joined the giant-killers with a modified DX-20 at 45 watts and ground-plane. Within three months Bob has WAC and 102 claimed countries. W4CRW quotes St. James 1:19 in behalf of all DX hunters: ". . . Let every man be swift to hear, slow to speak, slow to wrath." . . . . . Former *QST* assistant managing editor W3JZJ/9 gets in DX licks from his Air Force post, Scott AFB in Illinois. "I operate from the office and at home," says Ed, "but home activity is limited. The guy next door has an abysmally touchy TV set and outranks me decisively." . . . . . New reciprocity regs continue to bring interesting calls to our shores. W6SAI reports 4X4OC/W6 workable, VK2DL/W4 is heard on 20 c.w., and NCDXCers entertained ZL2AFZ/W6 at length . . . . . Fifteen was too easy, so WN9PQY closed out his Novice DX career with eighteen countries on 40 and 80 meters . . . . . G5ACK/W4NJF, back from a jaunt across the waters, agrees that American DX manners are by no means below the average . . . . . VE1DH says HP9FC/mm is research vessel *Vema* of Lamont Geological Observatory, Columbia U., operated on this year's scientific cruise by VE1AHK . . . . . Multilinguists among us are requested by FCC to identify in English, please, to facilitate their monitoring tasks in our behalf.

OCEANIA — Next month NZART (New Zealand) invites amateurs throughout the world to frolic in the 1966 VK/ZL/Oceania DX Contest to be held (phone) from 1000 GMT the 1st to 1000 GMT the 2nd, and (c.w.) the 8th–9th, same times. Exchanging the usual RS- or RST001, RST002, etc., serials, non-Oceanian participants earn a point for each non-VK/ZL Oceanian worked per band, 2 points for each VK/ZL captured, and for final score multiply this total by the number of VK/ZL band-call areas accumulated. (Oceania contestants outside VK/ZL work both sides of the fence at 1 point per non-Oceanian and 2 points per VK/ZL, same multipliers.) Your log should clearly indicate date, GMT, call of station contacted, band, serials sent and received, and each new VK/ZL call area as worked per band (separate sheets for each band). Include a summary sheet showing your call, name, address, equipment description, and designate multi- or monoband entry classification. Then whisk the works off to NZART, Box 489, Wellington, N.Z., postmarked on or before January 21, 1967, to be eligible for possible certifications of outstanding test performance. Propagation conditions for this one should be noticeably improved over last year — good fishin'! . . . . . From WA6GLD: "VK9WE will return to Sydney from Port Moresby in November after operating in Papua since June, last year. Thus far Blue has worked over 350 W/Ks with his 60-watt 6146. Watch for VK9WE on 14,010 kc. at 1100–1400 GMT, on 21,030 or 21,060 kc. at 2100–2200, mostly week ends. Other Papua actives are VK9s CJ DJ and TB." WA8DXA finds VK9TB quite available on 14,065 kc. around 0700 GMT. Ted expects to work as Telecom radio officer in Papua for two more years . . . . . Pacifigrams via the clubs press: New licensees bring KG6IF of Marcus back on the lower U.S. 14-Mc. phone subsegment around 1000 GMT. . . . VK5MQ, near 14,275 kc., needs only N.H. and Vt. to clinch WAS. . . . KC6s CE and FM represent E. Carolines on 20 phone. . . . W9WNV emphatically made good on Heard in July as VK2ADY/-VKØ.

EUROPE — EDR (Denmark) welcomes world-wide participation in the 1966 Scandinavian Activity Contest scheduled for (c.w.) the period 1500 on the 17th of this month to 1800 the 18th, and (phone) on the 24th–25th, same times, on 3.5 through 28 Mc. Non-Scandinavians will scare up as many LA LA/p OH OHØ OX OY OZ and SM/SL stations as possible, swapping the usual RS- or RST001, RST002, etc., serials. Scores are calculated at one point per completed QSO, this total multiplied for final score by the number of Scandinavian band-prefixes collected (40 the possible maximum). 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 Traffic Dept., P.O. Box 335, Aalborg, Denmark, postmarked no later than October 15, 1966. Good chance to zero in on such certifications as OHA, OZCCA, WALA, WASM, etc. See you on that north Atlantic path! . . . . . As indicated in

August's "How's", DARC's WAE DX Contest phone week end is slated for the 10th–11th of this month . . . . . East Germany's 1966 WADM Contest, a c.w.-only deal, takes place from 2000 GMT the 1st of October to 2000 the 2nd, on 3.5 through 28 Mc. Non-DMs will work DM stations exchanging the usual RST001, RST002, etc. serials. Each DM may be worked once per band at 3 points per QSO, this total to be multiplied by the number of DM band-districts worked, for final score (the last letter of a DM's call indicates his district, A through O, 15 possible per band). October 30, 1966, is the deadline date for entries mailed to Contest Bureau, Radio Club of the GDR, P.O. Box 30, 1055 Berlin, GDR. This one should move you toward DMCA certification, diplomas administered through DM2ACB, Box 185, 27 Schwerin, GDR . . . . . On *November 13th* CCRC of Czechoslovakia will hold its world-wide c.w.-only International OK DX Contest, details in a later "How's" . . . . . Say, there's a YO-30-R sheepskin available from Central Radio Club, P.O. Box 1395, Bucharest V, Roumania, for September QSOs with a minimum of 25 YOs (for non-Europeans). Applications must arrive by October 30th, so rush a request for details to YO3FF at the given address. Incidentally, those numerals Roumanian amateurs are adding after RST reports this month represent the number of years each has been hamming . . . . . K1RSH/mm, doing the Mediterranean

ET3AC (K8UZA-K4CGC) keeps this outfit warm at a 5000-ft.-high location some 300 miles south of Addis Ababa. You may have worked Blake previously as DL5AC, HL9KT, KA2AC, KR6ER, M1AC, 9A1AC and, most recently, FL8AC. (Photo via W4NJF)

aboard USS *Independence*, is impressed by the 3895-kc. signals of K4s OKA TSW and others of the "alligator group" on 75. "Fantastic signals far above all other W/Ks. Wonder what makes the North Carolina bunch so loud over here." K4RSH discovers that one should obtain a French license before going after a 3A2 ticket, at least for the present. He plans a two-week Monaco maneuver in December . . . . . Continental clippings via literature of aforementioned clubs and groups: WB6CIY hoped to follow 3AØDXing with a Tunisia tune-up. . . . Bear island, a chunk of Svalbard, is the site of LA1EE/p emanations on 20 s.s.b. and c.w. . . . IR1REE was an exhibition installation at a summer electronics show in Rome. . . . WA5EFL schedules UM8FZ thrice weekly at 0200, the latter on 14,190-kc. sideband. . . . HV3SJ helps HV1CN dispense Vatican QSOs, mostly Tuesdays and Thursdays at 1800–2200 GMT on 14-Mc. voice.

SOUTH AMERICA — RCP (Peru) joins the activities parade by inviting "radio amateurs of all American republics and Panama Canal Zone" to participate in its Pan Americano Peru 1966 Contest, a voice-only shindig to run from 1700 GMT, September 10th, to 0500 the 12th. "Logs must show at least one OA contact and not less than 20 QSOs." For your first test contact transmit the usual RS report plus three digits chosen at random; thereafter transmit RS reports plus the last three numerals of the previous serial received. Final point scores apparently are equal to the number of successful contacts, and entries should reach Radio Club Peruano, P.O. Box 538, Lima, Peru, no later than October 12, 1966. The top non-OA scorer gets a jet roundtrip to Lima, and there are *other* awards. *Adelante, amigos!* . . . . . PYs 4CB 4KL 4FQ 4BEX and 7ACQ plan further c.w./s.s.b. assaults on St. Peter & Paul Rocks, a DXCC item still in crying demand . . . . . "9Y4AR is a new member of the DX set with 60 watts and an inverted vee on 7 and 21 Mc.," observes W7AYC. Arnim's main problem down there at this time of year is visits by uninvited YLs. Hurricanes, that is.

AFRICA — 9G1ED (G3BQH) of GARS makes it official: "We are pleased to inform you that the ban on amateur transmission has been lifted from this date, July 8, 1966." This temporary prohibition occurred on the Ghana end, no FCC/ITU action that we know of . . . . . "G3SJ/-CT3 is an interesting one," comments G3IDG. "He was heard to say he's been in Madeira for two years and it has taken all this time for him to get a licence, the first issued to a foreigner by the Portuguese government. When it arrived he found it allowed him to use 500 watts but gave him no call sign. It was decided to use G3SJ/CT3 after consultation with the locals. Presumably a regular CT3 call will arrive ere long." G3SJ/CT3 likes 28-Mc. phone around 2000 GMT . . . . . CN8AW reports a lively mid-April hamfest at the Meknes shack of CN8BF attended by CNs 2BS 8AI 8AM 8AW 8CS 8MT 8MZ, F8BC and others. CN8s AW and MT accepted certificates attesting to the success of their labors in promoting amateur radio in Morocco.

ASIA — Last year's code-only 6th All-Asian DX Contest sponsored by Japan's JARL, saw JA1BRK, 9J2FK, PY2CQ, WA6SBO, OH2TI and KH6EPQ snag continental honors. U.S. call area leaders were W1YYM, K2SHZ, Ws 3MSK 4KXV 5LJT, WA6SBO, Ws 7NPU 8VSK 9IOP ØAIH and KH6EPQ, with VEs 8BB 2NV 3FID, VO1BD and VE7BPM finishing likewise and in that order for Canada. On the home scene, JAs 1BRK 2JW 3AOV 4DGG, 5FQ 6ACZ 7KW 8QA 9AMW and ØPX turned in highs for their call areas. Country leaders include CRs 6DX 7IZ, DL7AA, EI9F, F8EX, G2DC, GM3JDR, HA3KGC, HB9MO, HMØBQ, I1IZ, KH6EPW, LA7H, LZ1KAA, OD5LX, OE5XXL, OHs 2TI ØVF, OK3KAG, ON4XG, OZ1LO, PAØGMU, PY2CQ, SM3BJI, SP9DH, TF3AB, UAs 2KAP 6KAF 9KAG, UB5KBA, UC2SE, UD6BD, UF6LA, UH8BO, UI8LB, UL7IP, UM8FM, UO5KOG, UP2NK, UQ2GA, UR2FD, VK2APK, VS6BJ, VU2JA, YO9HH, YU1BCD, ZE3JJ, ZL4BO, 4S7DA, 4U1ITU, 4X4XL, 9J2FK, 9Ms 2LO and 4LP. Only 40 W/Ks filed entries, while 164 U.S.S.R. stations submitted results. Most embarrassing — will we do better this year? . . . . . Reminder: The 3rd VU2/4S7 Contest comes off on the 8th–9th (phone) and 15th–16th (c.w.) of next month, ARSI (India) sponsoring. Details in October's "How's" . . . . . MARS prexy 9V1MT tells W1BPY he hunts Ala., Del., Me., Miss., Nebr., N.C., R.I., W. Va. and Wyo. for you-know-what. "Still have a year to go in Singapore, so I'm hoping to fill in those holes." Harry has a 6146 75-watter on 160 through 10 meters, dipoles and a 2-el. beam fixed on the U.K. . . . . K6JIC is designing and building a hefty 220-volt 50-cycle power transformer for VU2DIA, a challenging assignment. As things now stand, Hegde's line voltage problems limit his operation, especially at 1200–1600 GMT when U.S.A. paths optimize.

QST

Strays

Every now and then someone will say, "If these old walls could talk . . ." Other inanimate objects might also carry on interesting conversations. Let's look at a few examples:

Transmitter: I'm loaded.
Antenna: I'm higher than you.
IBM Card: I'm holier than thou.
Impedance: Got a match?
Vacuum Tube: I'm all keyed up.
Dipole: I'm about to fold.
Ground: I've got a potential.
Harmonic: I'm trapped.
DX: Si, Si.
Grid: I'll drive.
Capacitor: I need a fix.
Audio: I've been converted.
Band: I'll pass.
Log: I've been "kept."
(from Auto-Call)

Strays

Vermont Invasion from Canada

Vermont SCM Reg Murray, K1MPN, reports that a group of Canadian amateurs from the Toronto area will take over the top of Mt. Mansfield, Vermont's highest peak, for the September V.h.f. Party. Operation will be around-the-clock on 50, 144 and 432 Mc., under the call VE3CDX/W1. Mt. Mansfield, in the northwestern portion of the Green Mountain State, has a clear shot in all directions and should provide excellent v.h.f. coverage.

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MARS members who are owners of current-model Hallicrafters amateur-band-only transmitters and transceivers, such as the HT-32, HT-37, SR-150 and others, are being offered a Service Bulletin from Hallicrafters describing methods for putting the sets on MARS frequencies. Address the Hallicrafters Co., 5th and Kostner Ave., Chicago, Ill. 60624, and ask for "Notes on Operating Hallicrafters' Transmitters on 'MARS' Frequencies."

Feedback

In the "Technical Correspondence" column in *QST*, July 1966, the r.f. amplifier shown in Fig. 1 should not have a lead between the antenna and the 75 pf. capacitor. The antenna should connect to the arm of the switch only.

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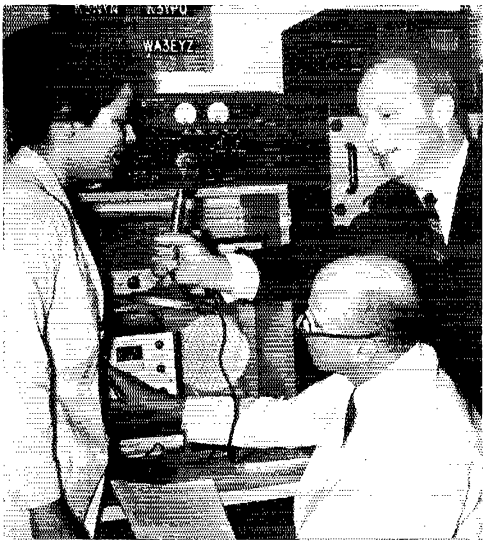
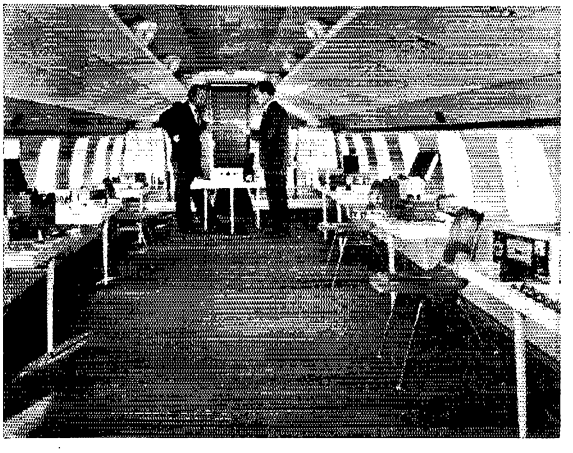
In last month's Gimmicks and Gadgets ("An Experimental U.H.F. Oscillator"), the transistor heat-sink mounting clip shown in Fig. 2 is labeled "solder to L_2." It should read, "solder to L_{1B}."

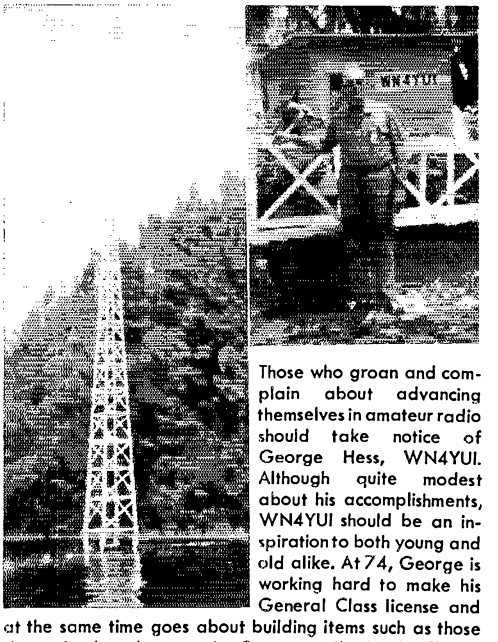


A group of amateur radio operators at Lankenau Hospital in Philadelphia have formed a club to provide a ready means of emergency communication for the hospital and surrounding community. Shown here at the station, WA3ESP, are Glen Keiser, K3TKF (r.), Judy Banda, WA2IQT (l.), and Dr. Charles Wang, K3IFS (seated).

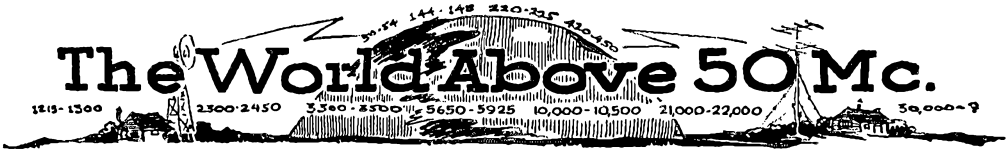


Amateur equipment has been displayed in automobile trailers by several companies—Collins and Swan, for example—but here's a layout that takes to the air.

International Crystal's "Flying Showroom" is a Martin 202 airliner converted to give a large showroom for product display and a conference room. Special generators have been installed to furnish power for heating and cooling as well as for operating the displays. The company has a tentative itinerary for the summer, but will be glad to hear from clubs, conventions or other groups who would like special showings in their areas.



Those who groan and complain about advancing themselves in amateur radio should take notice of George Hess, WN4YUI. Although quite modest about his accomplishments, WN4YUI should be an inspiration to both young and old alike. At 74, George is working hard to make his General Class license and at the same time goes about building items such as those shown in the photograph. George calls this his "ARRL ivory tower," since it was constructed from plans for a lattice tower published in an ARRL *Handbook*. The tower stands 60-feet high and was built entirely by George, as was his radio shack shown in the photograph.



CONDUCTED BY SAM HARRIS,* W1FZJ

One-Way California—Australia on 144 Mc.

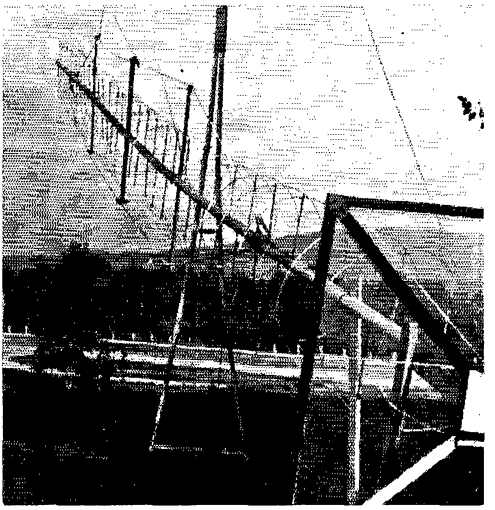
On July 18 at 2259 the first copyable signals from K6MYC via 144-Mc. moonbounce were received by VK3ATN at Birchip, Australia. On each succeeding listening period until 2320, Ray was able to copy complete sequences of Mike's transmission. By "copy" we mean to hear and understand by ear the intelligence transmitted by another station. No trick gadgets or integrating pen recorders were necessary. The tape recorded signals when played back later on on 7.090-Mc. s.s.b. were easily copied. In fact, instead of answering the "How did you make out?" question, Ray played a section of the tape and let us decide for ourselves. We had no trouble in identifying K6MYC's complete calling sequence despite the trip to Australia via the moon and back to Puerto Rico via 40 meters. Unfortunately, frustrating noise problems plagued the entire July schedule period. Fortunately, Ray was able to eliminate his interference by using an i.f.-noise blanker. (Described by W7UAB in the November 1965 *VHFer*.) Mike was not able to clear his problem in time to make the effort pay off with a two-way contact. About one more schedule should do it. Congratulations are in order for the operators on both ends of the circuit and good luck wishes for future skeds! Keep tuned to 7.090 Mc. at 0800 GMT Mondays and Thursdays for the latest news.

144 Mc. and Up

1215 Mc. is still the prime target of K3WFN in Pittsburgh. Tom is converting a pair of APX-6s for use on 1215 and is interested in talking to anyone in his area who'd be willing to help with testing the units. WA5EQP and W5ZCJ are also working with equipment for this band with main interest at the moment being antennas. W6GDO is planning on repackaging his 1296-Mc. gear and changing to doubler/mixer with 50 Mc. to obtain 1296 s.s.b. Jay also works on 432 Mc. and sez that "on Saturday night during the June Contest, 432 Mc. sounded like 75 meters for a while." Only one 220-Mc. report and that from K1YON who sez that activity was good on that band during the June contest with nineteen different stations worked in nine sections. 432-Mc. antennas are gaining in size at W3BDP and K4SUM. Sam (W3BDP) is now using a 10/10 J slot up about 40 feet and Joe (K4SUM) has installed four ten-element Yagis. WB6BOW noted more activity than ever seen before on 432 during the Field-Day weekend. Rod is working on an all transistor 9-Mc. s.s.b. generator and will soon be on 432 or 144-Mc. s.s.b.

K4RSH writes: "I am in charge of the hamshack on the *Independence* and we are interested very much in u.h.f. Our gear at present is a Parks converter for 432 and 144 Mc. The transverter for 144 uses an 829B with the oscillator from the two-meter converter in common. I have a pair of 4CX250Rs for 144 and 432 with the power supply complete and the amplifiers almost finished. The transmitter receiver is a Collins S Line. The 432 antenna is an 8 by 8-cylinder dish with a claimed true 18 db. Final antenna for two meters will probably be a stacked Yagi of good design. Cavity filters are set up on both bands to eliminate local ship interference on receiving and transmitting. The antennas and converters are mounted 60 feet above the water with a perfect view. Due to flight operations and sea periods of electronic silence we will be limited to the times we can be on the air." Charles goes on to say that skeds can be arranged on 14.318 Mc. when K4RSH/mm operates daily at 2000 to 0500 GMT, and that he hopes to operate with a 3A2 call during December.

Aurora was the big event for K1HTV on July 9. Rich worked four new states (Ohio, Kentucky, Michigan and Illinois) during the session plus fourteen additional contacts. K1HTV sez he hasn't worked any meteor scatter yet but is open for skeds if anyone needs Connecticut on 144 Mc. So far his total is 15 states in 6 call areas. Rich suggests that the following information will be helpful to those interested in communications via aurora: "A letter symbol indicating the current geophysical alert as declared by the World Warning Agency of the International Ursigram and World Days Service is broadcast in very slow c.w. from WWV during the first half of the 18th minute past each



60-foot long 144.000-Mc. helix at Peru, Vermont, out of K1KKP. Object, Moonbounce.

* P.O. Box 1738, Arecibo, Puerto Rico 00613

hour. The various letter symbols used and the type of Geoalert to which each refers are as follows: M, Magnetic Storm; N, Magnetic Quiet; C, Cosmic Ray event; E, No geoalert issued; S, Solar Activity; Q, Solar Quiet; W, Stratospheric Warning." This should be helpful to many of us,

Most of the OES reports for 144 Mc. for the month of June noted good conditions on that band on several occasions during the month. From New York to Florida plus Michigan and Illinois reports say that June 3, 4, 6, 8, 11, 12, 15, 21, 23, 27, 29 and 30 brought forth good tropo QSOs with the 12th being exceptionally good for several of the gang. As many of the boys caught from two to four of these openings. Guess it means that if you're there, you'll catch them, and good conditions probably prevail many times when there just isn't anybody there. Two meters also has its share of antenna workers. K9AQP/1 compared the halo versus a quarter-wave vertical. Results indicated that although both antennas are about the same in open country the vertical appears to have an edge in hilly and wooded surroundings. WA4BMC is trying an 11-element beam at 78 feet and comparing it with 32 elements at a lower height.

Kathy Hall, WA2OGA, saying farewell to Charles Kahn, K2GZ, at 4:00 A.M. as she prepares to take off (mobile) for California. Kathy helped make the Amateur VHF Institute of New York a great success, is a willing worker and can be reached by mail c/o F. Calie, 802 Masonic Ave., San Francisco, California.

W2IYR is now s.s.b. on two meters and K3OBU lists a number of stations in 1, 2, 3 and 4 lands who are operating via that mode on 144 Mc. Joe (K3OBU) sez: "Seems you only have to get on for a little while with a good bit of power, before you stir up some good s.s.b. activity up and down the coast. But, if nobody gets on s.s.b. and calls a few CQs then nobody gets on at all." At Lemont, Pennsylvania, K3CFA has also been working on antennas 'cause his came down during May. Because of this casualty Joel worked the June contest using his log periodic and contacted five sections in one hour. The beam is now back in operation having been rebuilt, strengthened, etc.

Back in Michigan W8PT worked W5RCI (715 miles) on June 11 and 12 on 144 Mc. and then switched to 432. W5RCI was heard (running 5 watts) a 3-3-9 and gave Jack a report of 4-5-9. Advice from W8PT: "High power is not required on 432 Mc. when the band is open. Just tell the guys to get on!" So, get on! Recently W8PT erected a 48-element colinear at 83 feet and finds no difference in operation from the four 15-element Yagis at 70 feet. On the 12th things picked up for W9HOT in Illinois when he heard and worked 10 states on 144 Mc. in a period of about four and a half hours.

Thanks to *The Carolina V.H.F. Society Ragchewer* and K4QIF we have the following information. "During mid-Spring and early Summer, many 144-Mc. operators are constantly on the lookout for the possibility of Sporadic-*E* layer skip. There are many reports on record that, in part, substantiate this phenomenon. W8KAY has worked several stations on several different occasions that may have been the product of two-meter *E* skip. The signals bore a resemblance to six-meter skip in that they were very strong. These openings occurred during extremely dense ionization of the *E* layer, and, for the most part, there was no evidence of weather conditions favorable to strong tropospheric openings. From Orlando, Florida, W4AWS reports what was probably *E* skip on June 6. Around noon Art worked W8KAY, W8YIO and W4WNH, and he was heard in Nebraska. The possibility of a tropospheric path at this time of day over this distance is practically nil. Most all skip contacts on 144 Mc. have been very close to 1200 miles in range. The stations Art worked were somewhat closer, but this was a north-south path."

Along similar lines is a report relayed from WA4SIQ, Maysville, Ky., by W4WNH. On the morning of June 29, between 0557 and 0636 GMT, WA4SIQ is said to have heard or worked the following stations, all around 145.2 Mc.: WB6GMX, WB6FTD, WA6SQT, K7LCR, K7DU, K0CUX and an Idaho station. All signals are reported to have been weak and fluttery, in and gone in about three minutes. As sporadic-*E* skip of such wide distribution is practically unknown in 144-Mc. experience, we'd appreciate corroboration and additional details from any of the stations listed.

DXpedition Reminder

In this column in the April, 1966, issue, we told you of the proposed expedition of Rich Wujciak, K2OJD/FP8CA to St. Pierre. We've heard no more from Rich so presume the trip is still on his agenda for the period from September 4 through the 18th. Watch for him on 50 and 144 Mc. and particularly during any auroral sessions.

50 Mc.

A thirst for knowledge and a couple of weekends on 50 Mc. have added a new v.h.f. addict to our fraternity. W1CT sez that wanting to become more familiar with transistors he decided to build the W1HDQ 50-Mc. transistorized transceiver (Nov., 1964 *QST and V.H.F. Manual*). After building the unit of course he had to test it, so he took off for

Mt. Monadnock on one weekend and for Cuttyhunk Island the following weekend. Only a few contacts were made from the mountain but George attributes this to the fact that he had only two crystals, 50.25 and 51.02. Contacts from Cuttyhunk were numerous and included an "almost" contact with WA4MGT who came back to a long CQ from George. Glad you're havin' fun, George, and believe me it gets worse and worse (or better and better?)!

The month of June was a big one for almost all of our 50-Mc. OES appointees. K1MTJ, WB2RVE WN3EOP and K3FNG all report openings almost daily. K1MTJ notes that Texas and California were getting into Maine on the 6th; WN3EOP sez he was hearing stations in Maritime, Canada, Iowa, South Dakota, Nebraska, Arizona, etc., during the Field Day weekend on 50 Mc. From Florida WA4STJ, W4YRM and W4FP agree that six meters was open almost every day to such places as Vermont, Washington, Oregon, California and of course a number of the closer states. Jim, WA4STJ sez that he finally worked all call areas in one evening on two-way 50-Mc. s.s.b. (June 25) and he did it in three and a half hours. He now has 38 states worked (35 confirmed) via 2-way s.s.b. plus 3 states worked on 2-way RTTY. WA4LTS in South Carolina hits only the high spots when he tells us that: "All states were heard at one time or another during June except KH6 and KL7. VP7CV and XE1PY were in on the 1st in addition to 46 states. I picked up Montana, New Mexico and Idaho to run my total to 49 (48 confirmed). W4DGS and WA4SSJ reported hearing ZS1s and 2s on the 13th (?). June 25, XE1PY was heard and again 48 states. June 26, a number of foreign stations with FG7XT identified and a near miss with ZS1?A at 50.162 Mc. Who was it?" Anybody else have any ZS information? We'd surely like to hear it! Practically the same story from Tennessee via K4KYL and K4PZT. Jim, K4KYL worked his 24th country on the 24th when he worked TI2NA and his 25th on June 26th when he worked FG7XT (on 50 Mc., of course). Among other skip stations worked or heard by WA3DMF can be numbered XE1PY, W6ANN, WB6CKR, K7ILB, TI2NA, CO2DL, KP4COA, K7YOF/7 and VP7NA. The same good story from OESers in 5, 6 and 7 lands, WA5JVL, WA6FWU, K7TES, WA7BSN and K7ICW. In addition to skip and DX Bruce, WA5JVL is working on a teletype converter for his newly acquired Model 14. K7TES observed openings on 17 days and worked 22 states. All call areas (except 1 and 4) were heard plus

K7ZWI at the 6-meter controls of W7GNP/7 on tower Mountain, Arizona, 7627 feet above m.s.l.

"Man at Work" could be the title for this photo of WA8KRH. However, he's just too "fixed up" at the moment so it will have to be "Man at Mike."

VE3, VE5 and VE6. WA7BSN writes from Washington that June 2 was very good with a number of California stations worked, Nevada, Utah, Texas and Iowa also being heard or worked with good signals.

From K7ICW, "Best month of activity and QSO DX since June 1959! EE and triple hop (or possible multiple or 4 hop) conditions prevailed more often than expected. Unconfirmed sources indicated that a solar flare occurred during the afternoon of June 25, which enhanced to a considerable degree sporadic *E* and *EE* signals which were available to a area of the U.S. and Caribbean areas. WP7DD was coming into Las Vegas S9 at times. Later, FG7XT showed up (3980 miles) and was working W6s over 4000 miles distance. Soon I heard a two-way QSO between VP7DD and FG7XT on single-hop E_s at their end, and was able to receive both ends of the QSO on double and triple hop! Right after VP7DD signed with FG7XT, I had a QSO with the Guadeloupe station. Heard no KP4s during this period, skip was too short! About ten minutes after my QSO with FG7XT I heard New Mexico at 500 miles, short E_s."

W8CVQ, K8VEX, WA8KRH, W8MBH, and K8AQA from Michigan all caught the June openings. W8CVQ sez that the Gulf States were the most consistent; K8VEX worked 18 States, VE4 and VE5 lands during the VHF-QSO Party and had his first 50-Mc. RTTY contact with WA4STJ; W8MBH sez W8ADR/8 worked 10 states, VE3 and VE4 lands during Field Day; K8AQA noted openings to all call areas and VE1. WA8JYR writes that although there's not been much time for operating all call areas have been heard in Huntington, West Virginia, during the month of June. WA9FIH in Illinois and WA9ABI in Indiana concur with all other 50-Mc. operators that June was "a big month." Jim, WA9FIH, caught 23 days of openings and besides hearing all call areas he heard or worked TI2NA, VE1ARJ, VE4MA, VE4MA/VE5, VE4MB, VE4YW, XE1PY and XE1ZQ. Up in Minnesota WAØIDB heard 12 days of openings and 16 states but sez that "June 1 was probably the hottest day on 52.525-Mc. f.m. with 3, 4, 5, 8, 9, and Ø lands all in during the day via f.m." QST

Operating News

F. E. HANDY, W1BDI, Communications Mgr.
LILLIAN M. SALTER, W1ZJE, Administrative Aide
GEORGE HART, W1NJM, National Emergency Coordinator
ROBERT L. WHITE, W1WPO, DXCC Awards
ELLEN WHITE, W1YYM, Asst. Communications Mgr.
GERALD PINARD, Club Training Aids
PETER CHAMALIAN, W1BGD, Communications Asst.

ID Requirements and Phonetics. Let's hope the reminder in August *QST* to comply with FCC portable/mobile signing requirements to include a statement of the geographical location in which the portable or mobile is operated will be heeded. It is perhaps due to the limitations of propagation that FCC gives out fewer advisory warnings or citations about this to the mobiles on these bands! Since, in qualifying for an amateur license, knowledge of proper use of calls and ID is required, the number of violations is surprising. Phonetics can be used to assist identification but *not* to replace the use of a call, when identifying. Phonetics, however, are unnecessary for the most part and should be used only in instances where readability is a problem. The prescribed order for calls is to give the other station's call sign first and your call last. Under tough conditions one can use the call *and* the phonetic. When calling another station it is foolish and unnecessary to phonetically spell out the other fellow's call. (He knows it already!) But the phonetics on your own call, especially for certain letters, is sometimes helpful just prior to standing by for replies. It is required that your own call must be the last used, after a transmission. Follow the FCC's specifications on transmission of call signs (Section 97.87) and you can hardly go wrong.

New Numbered-Text Messages. We announce, effective September 1st, certain additions in the C.D. Form 3 list of ARRL Numbered Radiograms. The numbers presently used to identify texts have *not* been changed. However, about a dozen *new* texts have been added, and given new numbers. These make some new selections possible for vacation and holiday wishes, use of exhibit stations, to provide congratulations for new family arrivals etc. The staff review to update our form will result in a gradual discontinuance in the use of texts found to be an excessive duplication of each other. These were mostly in the seasons-greetings category. Our new CD-3 indicates for practically all cases (where an originator using an old form selects a number NOT in the new list) which numbered texts in the newest list should be delivered, to convey closest to the desired meaning.

Our new CD-3 is available to all traffic handlers (gratis on radiogram request). The ARRL Precedences and Handling Instructions and a Message Number Sheet are combined with this CD-3 list of ARL TEXTS, and an example showing how to use numbered radiograms. The texts all should be especially useful in the coming holiday season traffic operations.

On Using CL and VA. When a station says, "clear," says K6KA, "I feel that he *really is* and he can be called without getting angry. If clear, he *is* clear, and not awaiting some last, l a s t *final* transmission." When two operators can make up their minds and conclude a voice transmission this way, there's no problem at all. In c.w. work the use of the procedure signs alone should clue in listeners on the status that the operators desire. If a person is at the very end of his back and forth contact (and only then) he should use VA or SK. If a person sends VA

ARRL ENDING SIGNALS

Signal	Meaning	ARRL Recommended Use
AR	End of transmission	After call to a specific station before contact has been established. Example: W6ABC W6ABC W6ABC DE W8LMN W8LMN AR
		At the end of transmission of a radiogram, immediately following the signature, preceding identification.
K	Go ahead (any station)	After CQ and at the end of each transmission during QSO when there is no objection to others breaking in. Example: CQ CQ CQ DE W1ABC W1ABC K or W9XYZ DE W1ABC K
KN	Go ahead (specific station); all others keep out	At the end of each transmission during a QSO, or after a call, when calls from other stations are not desired and will not be answered. Example: W4FGH DE XU6GRL KN
SK	End of QSO	Before signing last transmission at end of a QSO. Example: SK W8LMN DE W5BCD
CL	I am closing station	When a station is going off the air, to indicate that it will not listen for any further calls. Example: SK W4HIJ DE W1JKL CL

ARRL Communications Department
Operating Aid No. 2

then he should mean it. If he doesn't mean VA, then he shouldn't use it. The contact is really over, only when *both* parties have said VA and to be properly polite one should wait for both stations to indicate, but if you can hear but one station that makes it a little difficult. There has perhaps been too much tendency in DX work to call a DX station right on top of the last transmission of the station he is finishing with and only by precise timing, of course, can one avoid blotting out essential parts of a contact, which may hold everybody up, if a repeat is required. To clarify "recommended use" we reproduce Operating Aid #2 herewith. Note that CL should never be confused with VA. An exchange of SKs shows when a station is *clear*, and may be called. CL on the other hand is used only when a station is going off the air and will *not* listen for further calls.

More Top-Level Code Proficiency Certificate Issuances. Again we take pleasure in reporting the names or calls of those earning *top-level* certificates, January through June 1966, in the W1AW/W6OWP monthly run-offs at 30 and 35 w.p.m. Only 5% of our *initial* certifications are at speeds this high, and only 15%

of those attaining *endorsement stickers* that show *advance in skill* "make" one of the two top levels.

All amateurs (and prospective amateurs) are urged and invited to use our twice-nightly code practice sessions from W1AW. We cover the whole 5 to 35 w.p.m. range of speeds each week and you can find us by checking our listed frequencies to see which is best for your location at the scheduled time. Our certificates are awarded starting at 10 w.p.m. but space permits only listing the top awards. We now especially commend those receiving certificates or endorsements, as listed below:

ARRL Certified at 35 w.p.m.

WA1CQW*	K3WNL	W4YGY	W7NGW
W1DAL*	WA4CNH	WA5DFR*	W8DJD*
W1PJE	WA4NBT*	W5GHP*	W8GDW
WB2ERK*	W4OWE	WA5KAJ*	K8RXD*
WB2RBA*	K4SMO/W5CFT	WB6KIF*	WA9CTN
WA3EEQ/WA8PLY*	WA4SOL*	WA7AGY	KØOAL*
WA3ESL	K4TUA	W7JOQ*	KW6CF/KL7
	VO2AG		

E. Bernhard Olson, Old Greenwich, Conn.

ARRL Certified at 30 w.p.m.

WA1CQW*	W3URE	WA5AWO	WA8CFJ
W1DAL	W3VDX*	W5FBJ*	K8YSO*
W1WFZ*	WB4BMW	W5LML*	WA9AXL*
WB2HZY*	W4JHU*	WA5NOM*	WA9FCK
WA2ZXL	K4LND*	K5ZCA*	WA9HJM
WA3AHK	W4MVE	WB6JMH/7	W9IZF
WA3EEQ/WA8PLY	WA4OXG	WA6TZN*	K9YBC*
WA3FQU	W4PZS*	W6JZK*	WØBGX
W3JGH*	W4TGB	WA6WNG*	WØGXQ*
W3TZW	WA4UBH*	WA7BSG*	WØVBR
	VE3CPO* VE3EAW*	VE3GBW*	

Thomas M. Ellison, Jr., Pensacola, Florida; Ralph D. Fair, Seville, Ohio; W. F. Lewis, Duluth, Minn.; Robert Pinheiro, Bethpage, N.Y.

* Endorsement Sticker

Re VHF Repeaters and VHF Contest Scoring. Activity in the v.h.f. contests has brought in one or two questions about repeaters. Most amateurs want to operate in a sportsmanlike manner in contests, if given the chance. Use of repeater stations for v.h.f. contest QSOs is contrary to the contest rules on at least two counts. Reports have to be deleted when known to have been made and reported by operating in a large way through a "repeater." If someone is manning a repeater station, sure you can work him just like you can work any other station on the band. A *single* score-count is possible if you work the repeater. Also one instead can work through the repeater for a point (this is *like* working the repeater) but one *cannot* work the repeater *and* work through the repeater at the same time for two contacts. If there is a contact made through the repeater, also, it can't count for any exotic or additional Section. This is like working the fellow manning the repeater and the Section where the repeater is located.

Tulsa Has an AREC Kit. In these pages last July we detailed an eleven-point emergency program, as put forward in New Orleans. It involved important training and alerting plans *every* Public Service Corps group should adhere to. Individual Local Preparedness of every amateur, and *every group member* is important. At this time we want to commend the leadership at Tulsa, Okla. and report briefly the measures taken there. Each amateur in the organized amateur group under Tulsa's EC, K5ZCJ, is provided with a folder or kit entitled TULSA EMERGENCY PLAN. This contains (1) A Tulsa city map; (2) The full AREC membership

FREQUENCY MEASURING TEST
SEPTEMBER 8

ARRL invites every amateur to try his hand at frequency measuring when W1AW transmits signals for this purpose starting at 0130 GMT, Sept. 8. *CAUTION:* Note that since the date is given in Greenwich Mean Time the early run of the frequency measuring test actually falls on the evening previous to the date given. *Example:* In converting, 0130 GMT, Sept. 8 becomes 2130 EDST Sept. 7. The signals will consist of dashes interspersed with station identification. These will follow a general message sent to help listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3502, 7041 and 14,034 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 0136. It is suggested that frequencies be measured *in the order listed.* Transmission will be found within 5 or 10 kc. of the suggested frequencies.

At 0430 GMT, September 8 W1AW will transmit a second series of signals for the Frequency Measuring Test. Approximate frequencies will be 3545, 7070 and 14,094.

Individual reports on results will be sent to all amateurs who take part and submit entries. When the average accuracy reported shows error of less than 71.43 parts per million, or falls between 71.43 and 357.15 parts per million, participants will become eligible for appointment by SCMs as Class I or Class II OOs respectively.

This ARRL Frequency Measuring Test will be used to aid qualification of ARRL members as Class I and Class II observers. Present observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required accuracy. Class I and Class II OOs must participate in at least two FMTs each year to hold appointments. SCMs (see listing page 6) invite applications for Class III and IV observer posts, good receiving equipment being the main requirement. All observers must make use of cooperative notices, reporting activity monthly through SCMs, to warrant continued holding of appointment.

Any amateur may submit measurements on one or all frequencies listed above. No entry consisting of a single measurement will be eligible for *QST* listing of top results. Listing will be based on overall *average* accuracy, as compared with readings made by a professional lab.

roster with Red Cross and CD telephone numbers; (3) Bus. and Residence numbers and addresses for the 50-member group (with data on bands, emergency generators and assignment; (4) The 5-page plan, information on h.f. and v.h.f. circuits and the communications centers; (5) A how-to-report-disasters form; (6) A "Brief Procedures Plan-Card" for station posting. A nice job ZCJ.

Individual Responsibility. We can hardly imagine any amateur in his right mind who would refuse to go silent (QRT) or change frequency (QSY) to assist in amateur transmission of medical information to a mercy flight, or to yield a v.h.f. frequency for reporting a highway smash. Who in his right mind "will denounce a MAY DAY"? We're told by K6IUW that all of these things occurred!

It is incumbent on those amateurs who may have to ask for cooperation to move or yield a frequency or stand by while emergency traffic is handled to do so tactfully and intelligently. *Instant compliance* should be the rule of the day. This is essential for humanitarian reasons, not to get into the penalties prescribed by the law and regulation for wilfully interfering with such necessary circuit operations when called for.

Join a Club. Most clubs welcome new members, whether newcomers or specialists. Many clubs hold Licensing Classes to assist the interested newcomer to become a fully licensed amateur. Many prospective amateurs, remote from a local club, manage to study ARRL and other publications and with the help of W1AW's code practice at different speeds make the grade for a license.

Nevertheless, we want to emphasize the great value in associating with other amateurs. If you belong to a group, you have a greater chance

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for June Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
K6BPL	209	4741	4509	232	9691
W3CCL	253	1697	1401	81	3432
W4LEV	2348	518	498	20	3384
W7BA	13	1307	1185	119	2624
W0LGG	14	1336	1225	36	2611
W6WPF	54	1248	1210	38	2550
K6EPT	11	1054	922	132	2119
W6RSY	142	885	625	201	1853
W1PEX	49	792	713	39	1593
K7TCY	28	619	558	58	1263
K5TEY	30	568	563	5	1166
K0ONK	70	540	522	7	1139
K6ZJB	18	532	526	6	1082
K0GSY	55	582	421	0	1058
WB4AIW	11	467	459	8	945
W8UPH	16	455	394	56	921
WA9CCP	57	449	402	8	916
W6VNQ	14	417	417	1	849
W3VR	65	396	371	14	846
W6UDY	3	415	367	48	833
W3EML	21	417	319	7	764
W0OHJ	7	344	330	14	695
WA4WWT	19	347	327	0	693
WA5AUZ	37	317	187	128	669
W7HMA	22	317	313	2	654
WA4TPB	15	319	298	5	637
WB6BBO	40	297	273	10	620
K4EVY	426	111	28	42	607
K7NHL	7	282	292	26	607
WB6JUH	17	289	251	38	595
WA0IAW	19	287	279	1	586
W9HRB	11	272	271	1	555
WA2UPC	19	261	241	26	547
WB6GMM	15	209	301	16	541
K8LNE	6	265	247	4	522
K0JMF	55	236	28	200	519
K3MYS	14	256	245	3	518
Late Report:					
WA0GHZ (May)	6	280	32	194	512

More-Than-One-Operator Stations

W6YDK	7850	499	427	72	8848
K1KBO	44	581	578	3	1206
K6MCA	32	235	225	18	510

BPL for 100 or more *originations-plus-deliveries*

WA4HJM 362	W4RHA 156	K0JPS 102	
W5QEG/5 325	W1OC/1 152	W2OE 101	
WA3ATQ 287	WA6OQM 126	K4KJD 101	
WA4VUF 281	WA4UAZ 123	K8KMQ 101	
WA4BMC 262	W6KVQ 121	Late Reports:	
K1BCS 182	K1RCD 111	WB4ABF (May) 348	
W4PQP 165	K9WMP 109	W5GHP (May) 171	

More-Than-One-Operator Stations

W5OK 249	WB2RWD 171	Late Report:
		WB4ABF (May) 348

BPL medallions (see Aug. 1954, p. 54) have been awarded to the following amateurs since last month's listing: K1GPH, WB2RBA, K3SOH, WA4YDT, WB6QXY, WA8KME, K8LNE, WA8QND.

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.

A.R.R.L. ACTIVITIES CALENDAR

(Dates shown are in GMT)

Sept. 8: Frequency Measuring Test
Sept. 9: CP Qualifying Run — W6OWP
Sept. 10–11: V.H.F. QSO Party
Sept. 16: CP Qualifying Run — W1AW
Oct. 7: CP Qualifying Run — W6OWP
Oct. 8–9: Simulated Emergency Test
Oct. 15–17: CD Party (phone)
Oct. 15: CP Qualifying Run — W1AW
Oct. 22–24: CP Party (c.w.)
Nov. 3: CP Qualifying Run — W6OWP
Nov. 12–14: Sweepstakes Contest (phone)
Nov. 15: CP Qualifying Run — W1AW
Nov. 19–21: Sweepstakes Contest (c.w.)

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of *QST* issue in which more details appear.

Aug. 27–28: All-Asia DX Contest, JARL (p. 83, last issue).

Sept. 10–11: Pan Americano Peru Contest, RCP (p. 93, this issue).

Sept. 10–11: WAE DX Contest, phone, DARC (p. 134, last issue).

Sept. 17–19: Washington State QSO Party, Boeing Employees' AR Society, (p. 126, this issue).

Sept. 17–19: Pennsylvania QSO Party, Nittany ARC (p. 105, this issue).

Sept. 17–18, 24–25: Scandinavian Activity Contest, EDR (p. 92, this issue).

Sept. 19: WIEIA High Speed Code Test, Connecticut Wireless Assn. (p. 102, this issue).

Sept. 24–25: VE/W Contest, Montreal ARC (p. 57, this issue).

Oct. 1–2: WADM Contest (p. 93, this issue).

Oct. 1–2, 8–9: VK/ZL Test, NLART (p. 92, this issue).

Oct. 1–3: Massachusetts QSO Party, M.I.T. Radio Society (p. 120, this issue).

Oct. 15–16, 29–30: VU2/4S7 Contest, ARSI (next issue).

Oct. 19–20, Nov. 2–3: YL/AP, YLRL (p. 88, this issue).

to visit a fellow amateur's station, to learn "ham lingo," and to pick up practical tips on ways to do things! Progress is much slower when one is on his own than when he has the advice and experience of others!

There are over 1,300 active ARRL-affiliated amateur radio clubs. The League assists clubs on request with outlines for radio study, suggestions for getting publicity, and TVI kits (for the club-committees), and each ARRL-affiliated club may, on its request, loan-book visual training-aids (as listed in TA-21). Specimen club constitutions and advice are available for any and all groups of amateurs desiring to form amateur radio clubs. The League thoroughly believes in the club principle. Not the least in the list of advantages in affiliation is that a club receives weekly bulletin information from Hq. on matters of concern to the amateur fraternity. — *F. E. H.*

SUGGESTED OPERATING FREQUENCIES

RTTY 3620, 7040, 14,090, 21,090 kc.
WIDE-BAND F.M. 52.525 146.94 Mc.

GMT CONVERSION

To convert to local times subtract the following hours:

ADST −3, AST −4, EDST −4, EST −5, CDST −5, CST −6, MDST −6, MST −7, PDST −7, PST −8, Hawaiian −10, Central Alaska −10.

A convenient GMT conversion card is available, free of charge, from the ARRL communications Department, 225 Main St., Newington, Conn. 06111.

DXCC Notes

Reference is made to paragraph numbered 4 of DXCC Notes which appeared in January *QST*, page 90. Responsive to correspondence, and views of League members expressed directly to Headquarters and through the Board of Directors, the indicated date of January 1, 1967 for implementing a change with respect to certificates and endorsements for voice DX work has been postponed indefinitely.

DX CENTURY CLUB AWARDS

From June 1, through June 30, 1966, DXCC Certificates and Endorsements based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

New Members

WA2SFP....296
W2CES....220
OK2KMB...166
K3BNS....160
UD6BZ....139
UG6AD....139
UF6KPE...137
OE2JZ....133
DJ4KU....128
VE2TJ....126
UB5TQ....124
WB6FYW...124
UA1KEA...118
DM2BIJ...113
WA3ATP...113
UB5KIX...111
UB5LU....111
W5TKB....111
G3OHG....110
JA4XW....110
UF6FN....110
F3RG.....109
UA3KBO...108
W1SWX....108
UP2OK....107
DJ7OM....106
K8NSE....106
DM2AIO...105
JA1AKH...105
WA6JYL...105
VK5OL....104
WA1AKL...104
WA2YRV...104
WB2FIT...104
HK3HY....103
K1JKT....103
W2CNQ....103
WB6JWY...103
CR4BB....102
G3SVH....102
K5BYV....102
UA4ZA....102
VO1AQ....102
WA9GQT...102
5Z4IR....102
K4ARO....101
PE2EVQ...101
PY1BYK...101
SM5BTS...101
SM6CZU...101
UA3KZO...101
UB5HU....101
K2BYX....100
K2PKH....100
K8POJ....100
KP4BJM...100
SM5BPZ...100
UA0EK....100
VE3BBB...100
W1CT.....100
W1DMD....100
WB2OQU...100
WB2POH...100
WB6K1L...100

Radiotelephone

HB9AAA...159
G3NLY....139
VE2TJ....136
OA4BI....125
WB6FYW...120
F5JA.....110
WA3ATP...110
VK3KB....109
JA8ADQ...106
K7IIU/6...105
WA5DAJ...105
ZP5IT....105
VE3LZ....104
W4KOU....104
DJ4VZ....103
DM2AEC...103
UA1CX....103
WB6ABL...103
W8IBX....103
WA8LUC...102
UA1TT....101
W2CNQ....101
W4ZDK....101
DL3RE....100
G3SVH....100
K1WYD....100
K2PKH....100
K2PZF....100
K4KZZ....100
SM5BPZ...100
W3ABI....100
WA4OQO...100
WB6JWY...100

Endorsements

Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 10. The totals shown do not necessarily represent the exact credits given but show only that the participant has reached the endorsement group indicated.

310
W2ZKQ
300
VE2YU
KP4RK
WA6TGY
W8QNW
280
VE6TP
W1YYM
W2PZI
W6ERS
W8LY
260
K4EZ
OH2YV
WA2CBB
WB2EPG
240
CR6AI
F3AT
OK1MP
OK3EA
W2MEL
W5LZG
W6BCT
WØVQ
220
G3OZU
K1LPL
K8EHD
PAØVO
SM5AM
SM5RK
VE3LZ
W1BFA
WA4FKL
WA4WIP
W4ZXI
200
F8CW
G2AJB
K5LIL
SM3BNV
VK5KO
W7WLL
180
LA1H
SP8YA
W3AG
WA4GCS
W6DYJ
WB6LZI
W7RVM
WØRZU
160
EP3AM
I1BAY
K1OZR
K1EUW
K4KLR
W1RLV
WB2CKO
W3KID
WA9JDV
W9FJX
4X4HK
140
JA7MN
K5TYW
120
DJ1QT
HM5BF
JA2AB
UA3KAO
WB2PGM
W9UTQ
ZL2VN
K5BXG
W3KID
K8PYD
K9ZXG
LA8PF
K5LMG
K9YRC
UD6BW
VE2RB
W1DYE
W1OQP
W3UHN
WA6TKQ
W7YBX
W8ELE

Radiotelephone

300
W4EEE
280
WA2SFP
260
EA1GH
W2CZF
W4HUE
W8CUT
240
K2YLM
VE6TP
W2JLH
WA2WVL
WB2EPG
W3BSC
W4NI
W8QNW
220
K1DPI
SN5ATN
W2CES
W2FXA
W5JWM
200
F8CW
HK3AFB
IT1GAI
K8AXG
SM5RK
VO1BD
WA2VOH
WA4WIP
180
CX2CN
K4PQV
W2EVV
160
EP3AM
W1BAB
WA4GCS
WB6GOV
140
I1YRK
VE3BSJ
K2FZA
K3BNS
K4PQV
W8LUZ
120
I1LAG
K2PIU
K4GXO
K4UFE
OK3EA
VE2RB
W1FXD

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Sept. 16 at 0130 GMT. Identical tests will be sent simultaneously by transmitters on c.w. listed frequencies. The next qualifying run from W6OWP only will be transmitted Sept. 9 at 0400 Greenwich Mean Time on 3590 and 7129 kc. *CAUTION!* Note that since the dates are given in Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0130 GMT Sept. 16 becomes 2130 EDST Sept. 15.

Any person can apply. Neither ARRL 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 qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Daily tape-sent code practice transmissions are available on an expanded basis this season. These start at 2330 and 0130 GMT and are sent simultaneously on all c.w.-listed W1AW frequencies, with about 10 minutes practice given at each speed: 5 7½ 10 13 20 and 25 w.p.m. on Sun. Mon. Wed. Fri from 0130 to 0235; 15 20 25 30 35 w.p.m. on Tues. Thurs. Sat. from 0130 to 0220; 10 13 and 15 w.p.m. daily from 2330 to 2400 GMT. [All days are in GMT.]

To make the practice more beneficial the order of words in each line of the text is sometimes sent reversed. The 0130 to 0220 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending *in step with W1AW* and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0130 to 0220 GMT practice on those dates.

Date — Subject of Practice Text from July *QST*

Sept. 7: *It Seems to Us*, p. 9

Sept. 13: *An Amateur Application of Modern Filter Design*, p. 14

Sept. 19: *A Readout A.C.-Line Voltmeter*, p. 20

Sept. 22: *Stable Microwave Oscillators*, p. 33

Date — Subject of Practice Text from *Understanding Amateur Radio*, First Edition

Sept. 27: *Visualizing Selectivity*, p. 51

Sept. 30: *Bandwidth and Skirt Selectivity*, p. 53

C.D. ARTICLE CONTEST

This month's winner in the Communications Department Article Contest is Mr. Paul C. Amis, W7RGL, and his article appears on the facing page. Periodically the best articles submitted for the "CD Contest" will be chosen to appear, with the winner electing to receive (a) a bound 1966 *Handbook* or (b) a *QST* binder. League emblem and the ARRL DX map.

High Speed Code Test, Sept. 19

Twice each year a small but select group of c.w. speedsters makes an attempt to copy, for the record, speeds higher than those transmitted by W1AW. This program is sponsored by the Conn. Wireless Assn. and consists of high speed code practice every Monday (Sunday evening local times in U.S. and Canada) at 0130 GMT and twice-annual tests for certification. The next such test is scheduled for Sept. 19, starting at 0130 GMT. Speeds start at 40 w.p.m. for certification, and progress in 5-w.p.m. increments to 60 w.p.m., five minutes of plain language at each speed. Copy of one minute of consecutively-solid text of any transmission will qualify you for certification by CWA.

Although only club station W1EIA transmits the weekly practice, we now have five volunteer stations transmitting the certificate-testing runs. On Sept. 19 (Sept. 18 local times) we hope all five will again be available. Tentative frequencies are 3637 (W1EIA), 3640 (W6EOT), 3653 (WØFA), 3665 (W5QMJ), 3690 (K6DYX), 7115 (W6EOT) and 7120 kc. (W1EIA). Most run quite high power. All stations transmit the same text using copies of the same tape. Take a listen to W1EIA's announcement (prior to the code practice) for any late info on the above tentative schedule; we start sending this announcement a month before the test — August 22 in this case.

There were 27 copiers of the March '66 test run, of which 22 qualified. Many others advised us they tried but were not submitting copy; we estimate about 50 or more were having a go at it. The following qualified at the speeds indicated: At 60 w.p.m. (!): W5JPC and W7FKK. At 50 w.p.m.: W2LYH, WA3ESL, W4OWE, W5FRZ, WA7AFQ. At 45 w.p.m.: K1ZND, W2RF, W6KGW, K6SST, WA8GYT. At 40 w.p.m.: K1ESG, WB2DXM, WA4FJM, W4RHZ, W6ENA, W7AMP/Ø, W7BHH, WA7DLQ, W8CHT, WA8KPO.

Like to try it? There is nothing to lose! September 19, 0130 GMT, on one of above frequencies. — *W1NJM*.

W1AW SCHEDULE, SEPTEMBER 1966

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.–1 A.M. EDST, Saturday 7 P.M.–2:30 A.M. EDST and Sunday 3 P.M.–10:30 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. The station will be closed Labor Day, September 5.

*GMT**	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]
0020–0100[4]	.....	.....	3.555[6]	14.1	14.1	7.08[6]	14.1
0100	.....	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]
0105–0130[4]	.....	145.6	3.945	145.6	50.7	1.82	21.41
0130	**Code Practice Daily[1] 15-35 w.p.m. TThSat., 5-25 w.p.m. MWFSun.**						
0230–0300[4]	.....	.....	3.555	7.08	1.805	7.08	3.555
0300	RTTY-OBS[3]	.....	RTTY-OBS[3]	RTTY-OBS[3]	RTTY-OBS[3]	RTTY-OBS[3]	RTTY-OBS[3]
0310–0330[4]	.....	.....	3.625	14.095	3.625	14.095	3.625
0330	Phone-OBS[2]	.....	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]
0335–0400[4]	.....	.....	7.255	3.945	7.255	3.945	7.255
0400	CW-OBS[1]	.....	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]
0420–0500[4]	.....	.....	3.555[6]	7.08	3.945	7.08[6]	3.555
1700–1800	.....	21/28[5]	21/28[5]	21/28[5]	21/28[5]	21/28[5]	.....
1900–2000	.....	14.28	7.255	14.28	7.255	14.28	.....
2000–2100	.....	14.1	14.28	14.095	21/28[5]	7.08	.....
2200–2300	.....	21/28[5]	21.075[5]	14.1	7.255	14.28	.....
2330	**Code Practice Daily 10, 13 and 15 w.p.m.**						

[1] CW. OBS (bulletins, 18 w.p.m.) and code practice on 1.805, 3.555, 7.08, 14.1, 21.075, 50.7 and 145.6 Mc.
[2] Phone OBS (bulletins) on 1.82, 3.945, 7.255, 14.28, 21.41, 50.7 and 145.6 Mc.
[3] RTTY OBS (bulletins) on 3.625, 7.045 and 14.095 Mc. 170/850 cycle shift optional in RTTY general operation.
[4] Starting time approximate. Operating period follows conclusion of bulletin or code practice.
[5] Operation will be on one of the following frequencies: 21.075, 21.1, 21.41, 28.08 or 28.7 Mc.
[6] W1AW will listen in the novice segments for novices on band indicated before looking for other contacts.

Maintenance Staff: W1s QIS WPR NPG. * Times/days in GMT. General operating frequencies approximate.

"Radiomanship"

BY PAUL C. AMIS,* W7RGL

THERE are those who say that the present-day radio amateur is little more than an "appliance operator" who is unable or unwilling to understand the toys he plays with. They point out, for instance, that the emergency communication aspect of our activities has been withered by the blast of mobile CB units and imported Walkie-Talkies. They equate the educational aspect of a modern ham station with that of a color-TV set; each can provide some measure of mental upgrading, perhaps, but unless you are a sponsor or manufacturer, there is little lasting benefit. At the drop of a jaw, these malcontents will conclude that since, to their knowledge, modern hams have been technically euchred out of the invention field, their utilitarian import is approaching zero, that they occupy commercially desirable spectrum space, and, therefore, are not worth saving.

While these observations may have some truth buried in them, the point remains that the basic skill of amateur radio to establish and maintain communication continues to be forgotten. That one primary art form tends to be glossed over as a pseudo-science, or never observed in the first place. This accomplishment, call it *Radiomanship*, is cultivated, to some degree, in every active amateur. It is the skill, or necessary ability if you will, which separates the radio amateur from the citizen band and the commercial operator. It has little or nothing to do with one's ability to copy high-speed code or to acquire technical acumen: its growth is discrete from the amount of expensive equipment purchased for the shack, or text books studied for the mind. It is a communication awareness which is acquired by applied osmosis and requires continual contact with jam-packed ham bands and a flighty ionosphere. The handling of traffic from a high-power station, on a clear channel, or the sporadic use of a transceiver over a five-block path on Channel 11, does not tend to cultivate it. It blooms only under infernal interference, is fostered by sickly signals, and feeds on heavy doses of adverse band conditions and static. Yet most of us who have acquired a modicum of *Radiomanship* never fully realize it, much less understand it. What makes a ham select one specific band, at one specific time, to make a certain specific long-haul contact? Experience? Partly. Propagation theory? Partly. Skill? Not necessarily. A sixth sense derived from long hours of observation plus an inborn hunch? Undoubtedly. Have you ever noticed how often hamdom's top DXers can be found on a normally "dead" band, at a normally "wrong" time of day, but at the "right" time to work some rare DX who just happens to be there? Have you ever watched an experienced phone operator dig through three or four layers of QRM during Field Day to work stations whose signal substance borders on the ghostly? Have you ever noticed that the strong Sweepstakes Contest leaders always work the answering station who won't stay around if ignored? How does he know that a particular station should be worked first? Have you ever watched a v.h.f. man work DX during a meteor shower or sporadic *E*? He knows exactly where to point his beam; exactly when and how long to call; and under the toughest of marginal contacts, knows exactly who called him, and what was said. Have you ever noticed the touch that *Radiomanship* inspires? The calloused hand which cannot be trusted to dry a delicate tea cup will tune a receiver like a caress with the deft and sureness of a surgeon's scalpel.

This acquired ability to woo the fickle mistress of radio communication is probably refined to its purest state by the radio amateur. He learns how to read un-readable signals, to communicate on dead frequencies, to be a radio man under interference circumstances bordering on the impossible. There are no books to learn this art form; there are no courses of instruction which espouse it. It must be acquired in the solitary clutter of a ham shack, with the heart ranging as it will beyond the glowing window of the receiver dial.

In a world where technological advancements tend to outpace the individual, where just running some device, whose design is totally beyond our ken, takes study and application, the art of *Radiomanship* becomes a rarer thing. When a commercial or military circuit cannot pass traffic over a given distance at all times, we provide a more powerful transmitter. The operator does merely as he must — he uses the equipment provided, or he reports that "communication is impossible due to propagational disturbances." A radio amateur, while he may have no powerful transmitter or state-of-the-art equipment, has, and is learning, the etherial sixth sense of the true communicator. He makes do with his equipment at hand, but he bolsters his ironmongery with the feeling that such-and-such is the band to use, and that so-and-so is the time to try, and that the other station, be he at the other end of the state, the country, or the globe, will be waiting for him at that precise kilocyclic intersection.

In this day and age, a tape recorder or a computer can talk; but it still takes skill to communicate. QST

* Route 2, Box 2378-B, Bainbridge Island, Washington 98110

SCM AREC ORS CP SEC OBS TCC OO

Station Activities

PAM WAS NTS WAC

OES AIOPR EC DXCC CLUBS RM OPS RCC

• 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, Roy A. Belair, W3IYE—RM: W3EEB. SEC. K3NYG.

Net	*Freq.*	*Local Time*	*Days*
DEPN	3905 kc.	1800	Sat.
DSMN	50.4 Mc.	2100	Tue.
Dover 6 & 2	50.4 Mc.	2000	Wed.
KCEN	3905 kc.	1300	Sun.

Renewal: K3GKF as OBS. Appointment: WA3DYG as OO. The Delaware Amateur Radio Club's new officers are K3OHI, pres.; WA3DYG, vice-pres.; K3NHL, secy.-treas. WA3CRU is working as a life guard for the summer. WA3DUM is on 40-meter s.s.b. WA2NXF/2 is now K3UON in Dover and active on 75, 20 and 2-meters. Traffic: W3EEB 120, WA3DUM 9, WA3CRU 5, K3NYG 5, W3IYE 3.

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: W3ELI. RMs: K3YVG, W3EML, K3MVO. PAMs: W3FGQ, W3SAO. The EPA C.W. Net had a QNI of 249 with QTC 228 and meets daily on 3610 kc. at 2330Z. The Pennsylvania Training & Traffic Net, PTTN, had QNI 287 with 200 QTC and meets daily on 3610 kc. at 2230Z. The E. Pa. Emergency Phone & Traffic Net had QNS of 449 with QTC of 216 and meets daily on 3917 kc. at 1830R. WA3FWT is the new EC for Adams County and held the first drill from a fallout shelter. W3AES and W3FGQ are now OOs. WA3CFU is pres. of the West Pittston High School RC, WA3GBI. W3DRS changed his QTH. K3YVG is active on 6- and 75-meter RTTY. K3MYS received the BPL medallion. W3GYH was a visitor at W3VR and W3CUL. New Gear Dept.: WA3DWD, a new General, added a quad antenna. K3HTZ is on the Dean's list at College and added a quad. WA3CKA added a Matchbox and HA5 v.f.o. K3HLU graduated from Lehigh University and is on active duty with the Air Force. W3BUR spent 2 weeks in Maine and Canada. New club officers: North Penn ARC—K3ROK, pres.; K3HNW, vice-pres.; K3OZB, treas.; W3ADX, secy. Mt. Airy V.H.F. Club—W2EIF, pres.; W3LHF, vice-pres.; W3SAO, secy.; W3-MVF, treas. W3ID still is doing ground work around the shack, landscaping, that is. A new station active on 6 meters in the Penns Park area is WA3BXR. WA3BKP worked his first sporadic-E, a WA5JES in Oklahoma. K3QCQ, in Lebanon, has held regular 6-meter skeds with K1ABR in Rhode Island. W3FNF, after a long lapse, is back on 6 meters. WA3FTJ is active on 6 meters from Lititz. K3VAX, an OES, has been experimenting with mobile antennas. Your editor acknowledges receipt of Field Day messages handled in the proper manner via amateur radio from the following: WA3BBI, W3LXN, K3FLT, W3BN, K3SPX, WA3AJT, W3BTN, W3VAP, W3TVK and W3ATR. Don't forget, reference your FD message, the U.S. mails won't be operating in the event of an actual emergency. Traffic: W3CUL 3432, W3VR 846, W3EML 764, K3MYS 518, WA3ATQ 438, K3MVO 181, K3FSV 148. W3FGQ 123, K3YVG 119, W3ZRQ 101, W3FAF 100, W3KJJ 80, W3AIZ 72, W3JKX 69, W3VAP 68, WA3AFI 50, W3RV 49, WA3CKA 48, K3TNL 46, K3WEU 41, W3MPX 38, WA3BLZ 37, WA3BYH 34, W3CBH 32, WA3CCC 23, K3FLT 23, K3WAJ 22, WA3BSV 20, W3OY 14, WA3CFU 13, WA3BBI 12, W3ELI 12, K3ZSK 12, W3-BFF 9, WA3FWT 9, W3KEK 8, W3ID 3, W3OML 2, W3PVY 2, K3BIG 1, WA3BJQ 1, WA3BZO 1, WA3DQT 1, W3LXN 1, K3NKO 1, K3RCM 1, K3TZY 1, K3VDT 1, K3VRH 1, K3YYN 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Bruce Boyd, W3QA—SEC: W3CVE. RMs: K3JYZ, W3-PRC, W3QCW, W3UE, W3ZNW. PAMs: W3JZY, K3-LFD.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*Ave.*
MDDS	3643	0130Z	Daily	30	66	2.2
MEPN	3820	2200Z	M.W.F.	23	23	1.0
MEPN	3820	1700Z	S-S			

Field Day and vacations! This report for June was prepared in the hills of New England. WA3CRA will be ready for DX after two weeks vacation in Utah. K3ZIX is in 4-Land for eight weeks. K3QDD has a summer job with the FCC. W3ECP attended the 50th anniversary of his class at Syracuse University. K3ZSL and W3LBC are off the air for the summer. W3MCG is looking for a bigger antenna farm while on his vacation. W3EOV is on board his boat the *73-88*. *New appointments:* K3URE, long active in MSTN, is now OPS. WN3ELA, a new OES in D.C., is organizing a Novice net on 2 meters. *V.H.F.:* WA3CFK is the new net manager for the Cumberland Valley Net on 2 meters. WN3EOP worked many Washington and Baltimore stations on 2 meters from his portable location on South Mountain. The mountain blocks reception of these stations at his home in Hagerstown. K3LRR encountered many 6-meter openings during June. *Field Day and traffic:* K3LFD handled much of the FD messages to the SCM. K3NCM spent Field Day with the Frederick ARC. In addition to running up a high traffic total, WA3BTA is writing the MDDS page for the *MDD Flyer*. W3WTW is looking for new AREC members in Montgomery County. K3CYA continues to track down intruder stations. *Silent Keys:* Deep regrets follow the Silent Keys of two prominent amateurs in our section, W3FFP and W3PQ. Traffic: (June) WA3CFK 175, WA3BTA 157, W3TN 139, W3EOV 56, K3GZK 40, W3ZNW 29, W3WTW 18, WA3CEK 11, W3MCG 10, W3-ECP 8, K3QDD 3, K3URZ 3, K3NQM 2, K3LLR 1. (May) K3ZSL 19, W3CQS 17, W3WTW 1.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—SEC: W2BZJ. RM: WA2BLV. PAM: W2-ZI. NJN reports for May: 31 sessions, 350 traffic. N.J. Emergency Phone & Tfc. Net had 31 sessions, QNI 505, traffic 179. WA2UPC is high traffic man this month and made the BPL again. The Pre-SET exercise held in May was highly successful. Both NJN and NJPN were activated and handled much traffic. K4RAD/2 was high man during the April CD Party on c.w. and W2BEI on phone. WA2UPC and K2ARY were appointed ECs for their counties. SEC W2BZJ is looking for EC appointees in the other S.N.J. counties. The new NJPN roster of members and map recently was revised. Send SASE for your copy. An OO report was received from W2EIF and an OES report from WB2RVE. The Delaware Valley Chapter of the QCWA held its quarterly dinner at Barretts July 2 and sponsored the Old Timer's Nite Round-Up this year. The 7th N.J. QSO Party will be held from 2300Z Aug. 20 to 2300Z Aug. 21. The SCARA will hold its annual outing and hamfest at Egg Harbor Lake, Egg Harbor City, Sun., Aug. 28. WB2VVJ requests OES appointment and is a member of the AREC. WB2TEN is a new station in Vineland checking in on both NJN and NJPN. FD messages were received from the SJRA, the Cherry Hill Radio Assn. and the SCARA. WA2IHN is a new station in Princeton and a possible OES. WN2SRW is now WB2-WXA. WB2VFX joined the SJRA and is a new OES. The Salem Co. AREC Net operates on 146.88 Mc. Tue. at 0200Z. K2GYM mgr. K2CPR is back from Europe where he met many foreign hams. WB2SBD has been appointed ORS and OBS. WA2UPC received a TCC certificate; he also is station "B" on Thurs. and NCS 2RN Mon. Traffic: (June) WA2UPC 547, WA2KIP 69, W2RG 67, W2ZI 37, W2EWR 11, W2GIW 10, W2ORS 9, K2CPR 6, WA2KIP 3, WB2SBD 3, WB2VFX 3. (May) WA2KIP 89.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2RUF. PAM: W2PVI. RMs: W2EZB and W2FEB. NYS C.W. Net meets on 3670 k.c. at 1900, ESS on 3590 kc. at 1800. NYSPTEN on 3925 at 2200 GMT, NYS C.D. on 3510.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 3510 kc. at 1930 Wed., TCPN 2nd Call Area on 3970 kc. at 0045 and 2345 GMT, NYS County Net on 3510 kc. Sun. at 1000 and is trying a new time of 2400 GMT Mon. at 3510 kc. Congratulaitons to W2OE on making the BPL. Traffic reports must be submitted in writing (use Form 1 available from ARRL) by the 5th of each month, the only exception being those I receive via the SEC. W2FEB

and K2JBX tied for the most valuable member of the NYS. C.W. Net. W2FCG received the most active award for six months perfect attendance and a yearly total of 351 sessions. The Penn-York Hamfest was held at Harris Hill and ARRL was well represented by W3YA, K2HUK, W3ZRQ and W2RUF. WA2TPS and his committee are to be commended for a fine job. WB2OYE and WB2TAG received net certificates for NYS C.W. WB2TAG and K2EQB are ORS and OPS, respectively. Renewals: K2SIL, W2EMW and WA2UFI as ORSs; WA2GLA, K2EQB and K2RTQ as OPSs. Brighton HS ARC elected WB2VRW, pres.; WB2SNT, vice-pres.; WB2SNJ, secy.-treas. WB2SIA is going to Exeter in the fall. Sorry to report K2QKK as a Silent Key. The Rochester V.H.F. group elected WA2GIA, chmn.; WB2RJB, vice-chmn.; WB2RVV, secy. WB2GNC passed the General Class exam. Field Day activity this year seemed to be better than ever. Is your group prepared to render service in an emergency? Have you a plan? How about ARPSC? WA2CEC got married. W2UVE bought a house and will be back on the DX beat. W2ICZ is experimenting with six driven elements on 15 meters. K2HUK is mobile with a Swan 350. RAWNY attendance is up over 100. WA2UAB and XYL K2OEW, members of the Chenango Valley ARC, are renowned for their excellent cakes. The ARATS sponsors transmitter hunts during the summer months. The Niagara Frontier 2-Meter f.m. group is going to formalize its informal association. Traffic: W2OE 470, W2SEI 293, WB2GAL 186, WB2RHJ 169, W2RUG 108, WN2UFI 106, WB2SIA 60, W2FEB 51, K2-SSX 44, W2RQF 43, K2JBX 39, WB2RHJ 36, W2HYM 35, WB2SDM 33, K2IMI 32, W2FCG 31, K2BWK 20, W2MTA 15, WB2NZA 14, K2DNN 12, K2HUK 10, W2PVI 9, W2-PNW 5, W2EMW 4, WB2OMY 4, WB2OYE 3, K2OYE 3, W2FPG 2, K2OFV 2, K2KHB 1, WA2PZD 1, WB2QGK 1.

WESTERN PENNSYLVANIA—SCM, John F. Wojtkiewicz, W3GJY—Asst. SCM: Robert E. Gawryla, W3-NEM. SEC: K3KMO. PAM: K3VPI. (v.h.f.). RMs: W3KUN, W3MFB, K3SOH, W3UHN. Traffic nets: WPA, 3585 kc. 0000 GMT Mon. through Sun. The WPA Traffic Net had QNS of 303 during June although the summer doldrums have set in. K3ZGI runs 1600 watts p.e.p. to a homebrew linear on 14-Mc. s.s.b. K3HKK, Nittany Amateur Radio Club station, will run several hundred watts on 432 Mc. during the Sept. U.H.F. QSO Party. WA3EXP put on a new beam. WN3FTS joined the Coke Center Radio Club. W3PON/6 and WB6BVR mobiled cross-country to visit in Connellsville. K3CFA rebuilt his 24-element collinear antenna. Interested in 1215-Mc. communications? If so get in touch with K3WFN. K3ZMH is now W4GRG. Don't forget the Ninth Penna. QSO Party Sept. 17-19, 1966. W3RTB tries out a new SB-300, K3ZHH a new HQ-145XC. WA3BGE/3 finished 2nd for Western Pa. in multi-operator standings during the U.H.F. SS. K3ZFP and K3ZHH assisted. K3LIY took a job with Bell Labs in Columbus, Ohio. Notice has been received that the New Greater Pittsburgh V.H.F. Society issues a certificate award but no further details are available. W3TZX is recuperating from a broken leg. Now that hamfests are finished this is a good time to reappraise your gear and antennas for the cold weather hamming time ahead. The Nittany ARC again provided communications for the Fireman's July 4th Parade at State College. Traffic: (June) W3NEM 156, W3KUN 143, WA3AKH 60, W3AUD 46, W3LOS 30, WA3AKB 18, W3-GJY 14, WA3EPQ 13, W3ELZ 9, K3EDO 8, WA3DGI 7. W3YA 4, W3UHN 3, WA3BGE 1. (May) W3NEM 4. (Apr.) W3NEM 185.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. RM: WA9GUM. PAMs: W9VWJ, WA9-CCP and W9KLB (v.h.f.). EC of Cook County: W9-HPG. Net reports:

Net	*Freq.*	*Times*	*Days*	*Tfc.*
ILN	3760 kc.	0000Z	Daily	224
IEN	3940 kc.	1100Z	Sun.	No report
NCPN	3915 kc.	1300Z	Mon.-Sat.	289
NCPN	3915 kc.	1800Z	Mon.-Sat.	234
Ill PON	3925 kc.	1700 CDST	Mon.-Fri.	249
Ill PON	50.28 Mc.	2000 CDST	Mon. & Thurs.	No report
Ill PON	145.5 Mc.	2000 CDST	M-W-F	45

New appointees include W9DOB as OBS, WN9SKU as OES. W9DOB and W9EVA as OOs. W9LNQ and his XYL celebrated their 25th wedding anniversary Aug. 16. W9UBI and Judy Jackson were married Aug. 20. W9VBV has acquired an HT-44 and now is on s.s.b. K9EBA has gone s.s.b. on 2 meters. W9SXL has returned to Bloomington after a vacation in the South working 2 meters. WA9FCD has a new tower and antenna installation. K9RAS has accepted a position with Motorola after receiving his EE and BS degrees from IIT. Our sympathy to the family and friends of Tony Utinski (formerly W9JGI of Springfield), who recently passed away. New officers of the Lane Tech Radio Club (Chicago) are WA9JRY, WA9MLX, WA9JSI and WA9PYI. WA9CCP is the new net manager for the 20-Meter Interstate S.S.B. Net. The former net manager, W5OBD (ex-W9IDA), is taking leave. W9IYK has returned to 2 meters with 120 watts, after a long absence. WA9GVW has a new Swan 350 and is looking for more traffic. WA9GUM, a new RM, is seeking new situations to check into the ILN. Contact him if you are interested. From all indications and reports received, Field Day scores may surpass all previous high score years. Many more stations were evident in the Illinois section with your SCM receiving a record amount of messages for additional scoring. The Annual Hamfesters Picnic in Chicago's Santa Fe Park was well attended and an Illinois amateur was presented with an award. New officers of the Tri-town Radio Amateurs Club, Inc., are K9RPX, K9CSW and WN9RWY. WA9OYR received his General Class license. K9CDM is now K9CDM/5 at Fort Polk, La. WA9CCP, K9KZB and K9WMP are recipients of the BPL award. Traffic: WA9CCP 916, K9WMP 227, K9-AVQ 133, W9EVJ 124, K9CYZ 106, W9JXU 105, WA9EBT 83, WA9GUM 73, W9DOQ 71, WA9GVW 64, K9BTE 62, W9ELL 56, W9IOT 55, W9NXG 49, K9TVA 40, W9-HPG 24, K9HSK 18, W9PRN 18, WA9MRU 12, W9-SMD 12, W9LNQ 8, W9IDY 6, WA9AJF 3, WA9PDI 3, W9JMG 2, K9RAS 2.

INDIANA—SCM, M. Roberta Kroulik, K9IVG—Asst. SCM: Ernest Nichols, W9YYX. SEC: K9WET.

Net	*Freq.*	*Time*	*June Tfc.*	*Mgr.*
IFN	3910	1330Z Daily, 2300Z M-F	226	K9IVG
ISN	3910	0000Z Daily, 2130Z M-S	411	K9CRS
QIN	3656	0000Z Daily.	168	WA9BWY

K9GLL, PAM of the Hoosier v.h.f. nets, reports June traffic of 50. K9EFY, Mgr. of PON, reports June traffic of 20. W9PMT, NCS of WX Net, reports June traffic of 6. W9QLW, RM of 9RN, reports Indiana was represented 100% in June. QIN Honor Roll: K9VHY 26, K9HYV 24, WA9BWY 23. W9QLW 23, W9HRB 20, K9RLW 20, K9-WWJ 18, W9HRY 18, WA9FDQ 15, WA9OYI 15, WA9-IZR 15, WA9GJZ, mgr. of the Bartholomew AREC Net, reports June traffic of 20. W9HRY is the new RM of QIN. WA9IHH is spending some time spelunking in So. Ind. (exploring caves) this summer. W9MBM has moved to So. Dak. W9HRB received an A-1 Operator certificate and soon will be entering pre-med. school at the University of Colo. W9UGH finally took down the old wooden tower and put up a new aluminum one. W9WE is recovering from cataract surgery. We all wish him a speedy recovery. W9BUQ is working on slow-scan TV. New officers of the Lake Co. ARC are WA9PBD, pres.; W9-JZA, vice-pres.; K9FNP, secy.; W9TUB, treas. K9FHQ is now mobile with a Swan 350. WA9EZP is enjoying new s.s.b. equipment and the same goes for WA9GJZ. WA9IZR, mgr. for RFN, reports June traffic of 39. BPL certificates went to K9IVG and W9HRB. *Amateur radio exists because of the service it renders.* Traffic: (June) W9HRB 555, WA9IZR 201, WA9BWY 214, W9QLW 200, W9HRY 134, K9DHN 127, K9HYV 119, W9ZYK 86,

NINTH PENNSYLVANIA QSO PARTY

Sept. 17–19, 1966

Rules: (1) *Time:* The contest begins at 2300 GMT Saturday Sept. 17 and ends at 0300 GMT Monday, Sept. 19. (2) *Suggested Frequencies:* 3575 3875 7075 7275 14075 14275 21075 21325. Check phone bands on even numbered GMT hours. (3) Each station may be worked once on each band and mode. (4) *General call:* CQ PA and Pennsylvania stations sign de PA. (5) *Exchange:* Stations send QSO number, RS(T), and ARRL Section or country. Pennsylvania stations send their county. (6) *Awards:* Certificates will be awarded to the first place station in each ARRL Section and country with second and third place certificates where justified. (7) *Scoring:* Pennsylvania stations 3 points per out of State QSO, 1 point per Pennsylvania QSO multiplied by the number of ARRL sections and other countries. Out-of state stations, 1 point per QSO multiplied by the number of Pennsylvania counties. (8) *Entry:* A copy of the log, showing QSO number, station, date, time band, mode and station worked should be submitted to the Nittany Amateur Radio Club, P. O. Box 60, State College, Pennsylvania, 16801. Entries must be postmarked no later than October 17, 1966.

WA9FDQ 82, K9CRS 73, W9CC 60, K9VHY 50, W9DKR 44, WA9GJZ 40, K9RWQ 40, W9BUQ 35, WA9JHH 33, WA9LUG 33, W9SNQ 32, W9FWH 27, WA1DAG/9 26, K9ZLB 26, K9EFY 23, W9RTH 23, WA9BWT 22, WA9-AXF 16, WA9QAH 15, K9FAP 14, W9CLF 13, K9FZX 13, WA9FCW 11, WA9BGI 10, K9FUJ 10, W9UB 10, K9BSL 8, W9DUD 8, K9ILK 7, W9BDP 5, W9BZI 5, WA9NGN 5, W9DOK 4, WA9CYG 2, K9YFT 2. (May) W9DKR 28, K9KTL 11.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: K9ZPP. RM: WA9MIO. PAMs: K9HJS, K9IMR and W9NRP.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNS*	*QSP*	*Mgr.*
WIN	3662 kc.	0015Z	Daily				WA9MIO
BEN	3985 kc.	1200Z	Mon.-Sat.	26	173	40	W9NRP
BEN	3985 kc.	1700Z	Daily	30	570	194	K9HJS
WSBN	3985 kc.	2215Z	Daily	30	887	206	K9IMR
SWRN	50.4 Mc.	0200Z	Mon.-Sat.				W9CIU

A net certificate went to WA9MIO for WSBN. New appointee: K9ZMS as ORS. Renewed appointment: W9-NLJ as ORS. The Milwaukee and Sauk County AREC groups furnished communications for the Annual Circus Train Trip from Baraboo to Milwaukee. The Milwaukee AREC furnished communications for the Circus Parade July 4. W9OTL is on s.s.b. with an SBE-33. W9TQ, K9YRL, K9DJR and K9JVP assisted the AREC with a RTTY relay setup for a sports car rally. W9AYK has a new Swan 350. WA9NDV reports getting out much better with the new antenna. WA9NPB also is using a new antenna. W9VSO led the OOs with 30 notices. Everyone reports that the WX is too hot. I agree. Traffic: W9DYG 166, WA9NPB 138, WA9NFG 78, W9KQB 68, K9IMR 67, W9IFS 48, WA9NDV 42, WA9QKP 39, K9HJS 35, WA9-NBU 35, W9NRP 31, W9AYK 24, W9HWQ 23, W9MWQ 22, K9RCK 21, W9BLQ 19, K9GSC 10, W9HQT 10, K9-JVP 5, W9ONI 4, W9OTL 2.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., WØTCK—SEC: WAØBZG RMs: WØISJ, WAØOPX. PAMs: KØQBI, WAØJKT, WØHEN, WAØDWM. MSN meets daily on 3595 kc. at 0300Z. MJN meets M-S on 3595 kc. at 0100Z. Noon MSPN meets M-S on 3820 kc. at 1805Z and Sun. at 1500Z. Evening MSPN meets daily on 3820 kc. at 2400Z. MSTN meets M-F on 50.4 Mc. at 0430Z and Sat. at 0200Z. Co. Hunters WZ Net meets Sat. on 3820 kc. at 1500Z. PO Net meets Sun. on 3812 kc. at 1830Z. During DST nets meet one hour earlier by GMT: same local time. KØFQA, WAØDYM and WAØDVH, instructors for the NSWA code and theory class, recently graduated 7 members. The NSWA, serving Hennepin Co., was active in handling traffic in this area for the Topeka emergency. Some fifty amateurs attended the Midwest ARMS Picnic at George, Iowa, recently. Those attending were treated to a plane ride. Past SCM WOOPX and her OM, WØRIQ, now living at Eagle Mountain, Calif., enjoyed operating from Aitkin during their vacation. WAØIAW has a new antenna for 40 meters. Tom is a member of the TCC and also operates 160. WØMLJ is back on 75 after a long absence. WØMLJ, KØIGY, WAØIAW, WAØIDZ and W9HWQ participated in the Winona Co. c.d. exercise. WAØMMP received a WAC award. WAØIDB is the proud owner of a new Motorola D31BMT rig. New officers of the St. Paul ARC are KØIUV, pres.; KØWKY, vice-pres.; WAØFUR, secy.; WØKKO, treas. Many groups participated in Field Day exercises this year with the usual number of problems. WAØFUR reports that after the Ramsey Co. group had antennas strung 150 feet up a 300-ft. tower they were asked to remove them as they hadn't signed a statement clearing the owners should members of the group get hurt! WAØIAW made the BPL award in June. Traffic: (June) WAØIAW 586. WAØJKT 260, WAØMJF 170, WAØMMP 165, WØISJ 62, WAØEPX 53, WØTCK 48, KØZRD 45, WAØFUR 41, WØRIQ 27, KØFLT 24, KØICG 24, WAØKFJ 21, WAØKQU 20, KØQBI 20, KØIGZ 19, WAØJPR 18, WØBUO 17, WOOPX 13, WAØDOT 12, WØKLG 11, KØORK 10, WAØMMV 9, KØSXQ 8, WØATO 7, WAØIUJ 7, WAØ-HRM 6, KØHJC 5, WAØLOH 5, WØUMX 5, WAØDFT 4, WAØEDN 4, WNØOIO 3, WAØFFU 1, WØFKC 1, WØSZJ 1. (May) WAØFUR 12.

NORTH DAKOTA—SCM, Harold L. Sheets, WØDM—SEC: WAØAYL. KØSPH has a new TA33 beam up on a 65-ft. tower and guyed this time against all weather. WØCAQ found a bum solder joint in the coax line and that chased the bugs away from his antenna and linear. WØCGM is in Bismarck again this summer with portable and working for the State Communications System. WØEFJ and XYL WAØMND vacationed in the Western part of the state with mobile and then went up to the Lake of the Woods via WAØGRX in Moorehead. WØKON/Ø is a welcome addition to the c.w. traffic-handling net being set up. WAØKSB is lining up the c.w. net on 3650 kc. as Route Manager. If interested drop Larry a line. WAØAYL and KØOVE plan to hold skeds between the east and west coasts using Joy Stick antennas on 20 meters while on vacations. WAØMJK is a new Conditional in Greater Grand Forks while the XYL of KØOVE is patiently waiting for the returns of her Novice exam. The Bismarck Radio Club was out at the farm of KØEOF for Field Day and the Minot Club was busy too. The Fox Amateur Radio Club operated WAØJXT/Ø on a farm northeast of town on 20 meters for about 250 contacts. WØKZL worked a few on 80 meters. WØDM went to Iowa for a family reunion of which U.S. Supreme Court Justice Byron White was a member. The N.D. RACES Net had a total check-in of 614,133 messages handled and a total of 22 sessions. WØKZL will be working portable from Dickinson and Minot. He has a Webster Bend Spanner for mobile work with the SB-100. Traffic: (June) WAØKSB 95, KØITP 87, WØDM 10, WØCGM 7. (May) WAØKSB 72.

SOUTH DAKOTA—SCM, Seward P. Holt, KØTXW—SEC: WØSCT. WAØMQK is on the air with an HT-32. Welcome aboard, Erland. K6YAL is operating mobile while on vacation in So. Dak. Net activities are in the summer doldrums. Those who participate are to be commended for their interest in keeping them active. KØFKJ reports continued activity on 6 meters. Traffic: KØGSY 1058, KØVYY 128, WØSCT 110, WAØJUM 26, WAØAOY 17, WØIGG 11, WAØBMG 10, WØDVB 8, WØRWM 6, KØCER 4, KØKOY 4, WAØCKH 3, WAØNRE 3, KØ-TNM 3, WØDJO 2, WAØDNG 2, WØZAL 2.

DELTA DIVISION

ARKANSAS—SCM, Don W. Whitney, K5GKN—SEC: WA5KTX. PAM: WA5GPO. RM: K5TYW. NMs: WA5IIS, K5IPS, WA5HNN. Asst. SCM: Lyle F. Shaw, W5GZP. Thanks to the splendid efforts of WA5KTX, our section ranks 9th nationally in our reports to Headquarters on EC activity. To the best of my knowledge we now have the largest number of ECs appointed in the Arkansas section and the new EC Net on Tue. at 1830 CST, with our SEC as Net Control, is being used to very good advantage in informing ECs of activity throughout the section. The recent EC meeting at the picnic in Forrest City was well attended and much was accomplished in the area of "organization." I hope to be able to attend several more of this type meeting before the year is out. June 1966 Net reports:

Net	*Freq.*	*Time*	*Day*	*Sess.*	*QTC*	*QNI*	*Time*
RN	3815 kc.	0001Z	Daily	?	?	?	?
AFN	3885 kc.	1200Z	Mon.-Sat.	26	18	907	1623 min.
OZK	3790 kc.	0100Z	Daily	30	54	169	562 min
APON	3825 kc.	2130Z	Mon.-Fri.	22	50	324	630 min.
Late report for May:							
OZK	3790 kc.	0100Z	Daily	27	65	193	537 min.

Traffic: W5NND 183, K5TYW 23, WA5KUD 18, WA5-KAK 10, W5MJO 5, K5AKS 1.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—RM: W5CEZ. SEC: K5KQG. V.H.F. PAMs: W5UQR, WA5DXA.

Net	*Freq.*	*Time*	*Days*	*QTC*	*QNI*	*Mgr.*
PON	3870	1300Z	Sun.			W5KC
LAN	3615 kc.	2300Z	Daily	5.0	9.7	WA5FNB
Delta 75	3900	1230Z	Sun.			WA5EVU

WA5JOL has been bitten by the v.h.f. bug. K5KQG has a new emergency power supply. W5GHP is working on 2-meter gear. K5OKR had company so not much time for operating. W5EA is spending his time fishing. W5IOG has a new Heathline. Congrats to WA5ORX who got his General. W5FMO's FD group had excellent publicity in the *St. Tammany Farmer*. WN5PDN handled some nice traffic from Camp Edgewood. Paul and his dad, W5CEZ, were in camp for several weeks. We will miss WA5KIV and WA5KHG, who have moved Texas way. W5MBC is trying s.s.b. WA5LQZ says the City Fathers of Lake Charles cooperated nicely on the FD location. WA5DXA has been appointed V.H.F. PAM for the Greater New Orleans Area. Amateur Radio Week was proclaimed in June by the Mayor of New Orleans. WN5PWX has just received his Novice. WA5KTW works 40 but is putting up a trap vertical to work all bands. W5LQ has been bitten by the DX bug. WA5JVL is going RTTY. W5TAV and WA5EVU sent in very fine reports on the Cent. Gulf Coast Hurricane Net and the Delta 75 S.S.B. W5BUK is on a trip to California. W5PM operated from the Miss. Coast via mobile. W5CEW has had rig trouble. W5BV operates mobile away from home. WA5ENH has been appointed EC for West Carroll Parish. Traffic: (June)

OUR advertisement on the inside back cover of this month's *QST* announces what is perhaps the most important new product from any amateur equipment manufacturer in the past five years — the new National 200 five band SSB/AM/CW transceiver.

AT ONLY $359.00, the National 200 is actually lower in cost than a five band *kit* transceiver, and has all of the workmanship and performance for which National has been so famous for over half a century. The '200 was developed to make it as easy as possible to obtain a top-notch five band station when operating requirements do not demand a "deluxe" transceiver such as the NCX-5. With 200 watt PEP SSB input on all bands, 80 through 10 meters, the National 200 also offers CW operation plus compatible AM operation with separate AM detection. Of particular interest is the fact that frequency determination is by means of a premixed crystal-controlled front end and a single VFO which tunes the same range on all bands — thus providing high stability as well as identical calibration and tuning rate between 80 and 10 meters.

WHAT else? ALC . . . a rock-stable solid state balanced modulator . . . choice of push-to-talk or front-panel controlled operation . . . automatic carrier insertion in AM and CW modes . . . filter-type sideband generation and receiver selectivity obtained with a high frequency crystal lattice filter . . . and an edge-reading meter which automatically switches between PA cathode current on transmit and S-units on receive. The mobile mount is included, and the '200 may be operated from either the NCX-A power supply or from the new AC-200 117/234 V.A.C. power supply which sells for only $75.00. Of course, it may also be operated from any of the available D.C. supplies which deliver the proper voltages and currents.

QUITE frankly, the National 200 is intended to place five band SSB operation within the reach of all — whether as a fixed station transceiver or as a mobile transceiver in addition to the present rig. Owners of single band or triband transceivers (such as the NCX-3) can move up to five band operation for the home station and move the restricted coverage equipment into the car.

BEST of all, the National 200 is available *now!* Manufactured at our new assembly plant in Maine, the National 200 is being shipped to dealers all over the world at this very minute. Why not see it at your National dealer's store today?

MIKE FERBER, W1GKX

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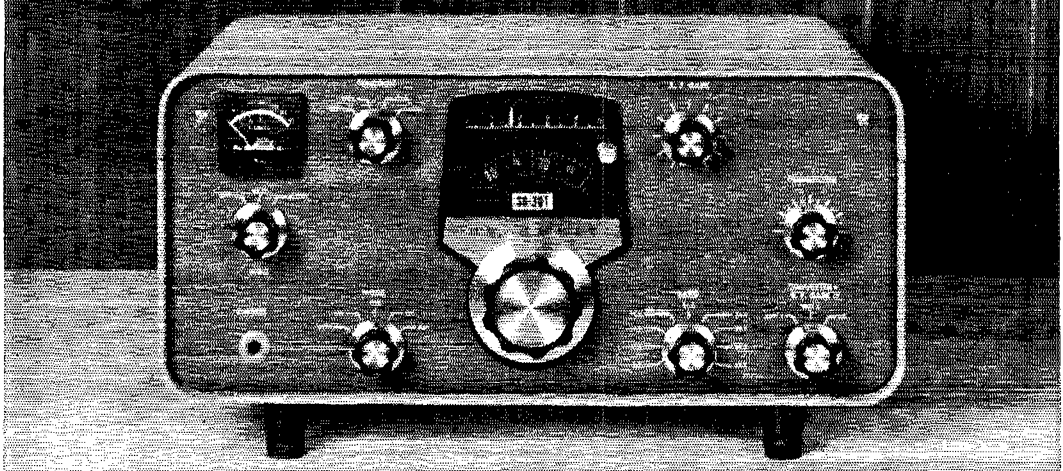

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• 80 through 10 meter AM, CW, & SSB reception with all crystals furnished • Crystal controlled front-end for same rate tuning on all bands • Famous Heath factory-assembled & tuned LMO for the ultimate in high stability and linear tuning • 1 kHz dial calibration — 100 kHz per dial revolution • Bandspread equal to 10 feet per megahertz • Tuning dial to knob ratio approximately 4-to-1 • The unequaled satisfaction of using a truly high-performance receiver you have assembled yourself

THE NEW SB-301 SETS "THE STATE OF THE ART" FOR AMATEUR BAND RECEIVERS. The new 15 to 15.5 MHz tuning range enables the most accurate attainable frequency check with the built-in 100 kHz crystal calibrator and WWV ... and as you read the specifications, notice the Heath pre-built LMO surpasses the tuning characteristics of every other receiver on the market. What's more, if your QTH is a high noise location, you'll appreciate the new ANL, providing excellent impulse noise rejection.

NEW "SUB-PACK" PACKAGING & ASSEMBLY SPEEDS CONSTRUCTION TIME. Components are packaged separately for each phase of construction ... saves you time in selecting components ... lets you see your progress more clearly as each phase is completed. Order the new SB-301 for unmatched value in a deluxe AM, CW, SSB, and now RTTY amateur band communications receiver.

Kit SB-301, Amateur Band Receiver, less speaker, 23 lbs.....$260.00

SBA-301-1, Optional AM crystal filter (3.75 kHz), 1 lb...$20.95

SBA-301-2, Optional CW crystal filter (400 Hz), 1 lb.....$20.95

Kit SBA-300-3, 6-Meter Plug-in Converter, 2 lbs.....$19.95

Kit SBA-300-4, 2-Meter Plug-in Converter, 2 lbs.....$19.95

Kit SB-600, Communications Speaker, 5 lbs.....$17.95

SB-301 SPECIFICATIONS — Frequency range (megahertz): 3.5 to 4.0, 7.0 to 7.5, 14.0 to 14.5, 15.0 to 15.5, 21.0 to 21.5, 28.0 to 28.5, 28.5 to 29.0, 29.0 to 29.5, 29.5 to 30. **Intermediate frequency:** 3.395 megahertz. **Frequency stability:** Less than 100 Hz per hour after 20 min. warmup under normal ambient conditions. Less than 100 Hz for ±10% line voltage variation. **Visual dial accuracy:** Within 200 Hz on all bands. **Electric dial accuracy:** Within 400 Hz on all bands after calibration at nearest 100 kHz point. **Backlash:** No more than 50 Hz. **Sensitivity:** Less than 0.3 microvolt for 10 db signal-plus-noise to noise ratio for SSB operation. **Modes of operation:** Switch selected; LSB, USB, CW, AM, RTTY. **Selectivity:** RTTY; 2.1 kHz at 6 db down, 5.0 kHz at 60 db down (crystal filter supplied). SSB; 2.1 kHz at 6 db down, 5.0 kHz at 60 db down (crystal filter supplied). AM; 3.75 kHz at 6 db down, 10 kHz at 60 db down (crystal filter available as accessory). CW; 400 Hz at 6 db down, 2.0 kHz at 60 db down (crystal filter available as accessory). **Spurious response:** Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **Audio response:** SSB; 350 to 2450 Hz nominal at 6 db. AM; 200 to 3500 Hz nominal at 6 db. CW; 800 to 1200 Hz nominal at 6 db. **Audio output impedance:** Unbalanced nominal 8 ohm speaker and high impedance headphone. **Audio output power:** 1 watt with less than 8% distortion. **Antenna input impedance:** 50 ohms nominal. **Muting:** Open external ground at Mute socket. **Crystal calibrator:** 100 kHz crystal. **Front panel controls:** Main tuning dial; function switch; mode switch; AGC switch; band switch; AF gain control; RF gain control; preselector; connector & ANL switch; phone jack. **Rear apron connections:** Accessory power plug; HF antenna; VHF #1 antenna; VHF #2 antenna; mute; spare; anti-trip; 500 ohm; 8 ohm speaker; line cord socket; heterodyne oscillator output; LMO output; BFO output; VHF converter switch. **Tube complement:** (1) 6BZ6 RF amplifier; (1) 6AU6 Heterodyne mixer; (1) 6AB4 Heterodyne oscillator; (1) 6AU6 LMO osc.; (1) 6AU6 LMO mixer; (2) 6BA6 IF amplifier; (1) 6AU6 Crystal calibrator; (1) 6HF8 1st audio, audio output; (1) 6AS11 Product Detector, BFO, BFO Amplifier. **Power supply:** Transformer operated with silicon diode rectifiers. **Power requirements:** 120 volts AC, 50/60 Hz, 50 watts. **Dimensions:** 14⅛" W x 6⅝" H x 13⅜" D. **Net weight:** 17 lbs.

Independent Operation On This New SB-Combo

New HEATHKIT® SB-401 5-band SSB transmitter

With Expanded Versatility — Whether You're DXing, In A Round Table, Net, Or Rag-Chew

• A single panel switch selects transceive or independent operation of SB-401 and SB-301 (or SB-300) combination — no cable changing required • Can be operated as an independent transmitter with any receiver when SBA-401-1 crystal group is installed • New simplified assembly procedure through "sub-pack" packaging and assembly techniques

Plus The Innovations And Rugged Performance Capabilities That Have Put The SB-400 Among The "Standard-Bearers" of Amateur Radio

• A completely self-contained desk-top transmitter with built-in power supply • Built-in antenna changeover relay • Famous Heath pre-built & tuned LMO frequency control • ALC for higher talk power • Optimum power level for operation "bare foot" or as a driver — 180 watts PEP SSB, 170 watts CW • Crystal filter SSB generation • Operates upper or lower sideband • VOX and PTT control • The same uncompromized tuning calibration, linearity, and stability that have made the Heath SB-Series unequalled not only in specifications but on-the-air performance.

VALUE COMPANION TO THE SB-301 OR SB-300. The Heathkit SB-401 provides full transceive operation with the SB-301 or SB-300 ... gives you outstanding performance 80-10 meters with single-knob LMO control. In addition the SB-Series "combo" goes from transceive to independent transmitter-receiver operation with a flip of a single switch on the SB-401 front panel ... perfect for DXing! The SB-401 derives all the necessary crystal oscillator voltages from the SB-301 or SB-300 ... eliminates redundant circuitry! Include the SBA-401-1 crystal pack for complete, independent transmitter operation with receivers other than the SB-301 or SB-300.

Kit SB-401, 34 lbs.....$285.00
SBA-401-1, Crystal Pack, 1 lb.....$29.95

SB-401 SPECIFICATIONS — Emission: SSB (upper or lower sideband) and CW. **Power input:** 170 watts CW, 180 watts P.E.P. SSB. **Power output:** 100 watts (80-15 meters), 80 watts (10 meters). **Output impedance:** 50 to 75 ohm — less than 2:1 SWR. **Frequency range:** (MHz) 3.5 — 4.0; 7.0 — 7.5; 14.0 — 14.5; 21.0 — 21.5; 28.0 — 28.5; 28.5 — 29.0; 29.0 — 29.5; 29.5 — 30.0. **Frequency stability:** Less than 100 Hz per hr. after 20 min. warmup. **Carrier suppression:** 55 db below peak output. **Unwanted sideband suppression:** 55 db @ 1 kHz. **Intermodulation distortion:** 30 db below peak output (two-tone test). **Keying characteristics:** Break-in CW provided by operating VOX from a keyed tone (Grid block keying). **CW sidetone:** 1000 Hz. **ALC characteristics:** 10 db or greater @ 0.2 ma final grid current. **Noise level:** 40 db below rated carrier. **Visual dial accuracy:** Within 200 Hz (all bands). **Electrical dial accuracy:** Within 400 Hz after calibration at nearest 100 kHz point (all bands). **Backlash:** Less than 50 Hz. **Oscillator feedthrough or mixer products:** 55 db below rated output (except 3910 kHz crossover which is 45 db). **Harmonic radiation:** 35 db below rated output. **Audio input:** High impedance microphone **Audio frequency response:** 350-2450 ±3 db. **Power requirements:** 80 watts STBY, 260 watts key down @ 120 V AC line. **Dimensions:** 14⅞" W x 6⅝" H x 13⅜" D.

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W5QEG/5 421, W5GHP 411, WA5JOL 272, WN5PDN 147, WA5LQZ 132, W5MXQ 66, WA5FNB 47, K5KOR 46, W5MBC 40, WA5HGX 5, K5KQG 5, WA5JVL 3, WA5KLF 2. (May) W5GHP 366, WA5FNB 101, K5KQG 5.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. The Miss. Sideband net had a fine picnic at Roosevelt State Park. Glad to see W5JDF, WA5KMF, WA5JWD, WA5CAC, W5OYH, W5ODV, W5IHQ, K5SSZ, WA5GHF, K5SYG, W5EHZ, K5IOG, W5YLD, just to mention a few. W5MUG is doing lots of 6-meter work now. New Officers: Keesler ARC—K3SFC, pres.; K5WYN, vice-pres.; K1YPP, secy., WA3FRQ, material officer. Biloxi ARC—W5RWV, pres.; W5ODR, vice-pres.; K5UII, secy.; W5SPX, treas. Columbia ARC—W5JDF, pres.; WA5KMF, vice-pres.; K5TAH, secy.-treas. The Biloxi Club's current project includes purchase of Braille books, tech-talk-disc recordings for the blind to assist sightless in obtaining an FCC license and also teaching code to the sighted and sightless. WA5JTB did a fine job handling traffic from the USS *Wasp*. W5PAF is back on the air from Columbia. WA5NWZ now is General Class. K5TYP handles lots of Armed Forces traffic. The Gulf Coast Sideband Net meets daily on 3925 kc. at 1735 daily; Miss Sideband Net daily on 3888 kc. at 1815 CST; Miss CW Net daily on 3647 kc. at 1845 CST. Traffic: K5TYP 210, W5WZ 156, WA5JTB 11.

TENNESSEE—SCM, William A. Scott, W4UVP—SEC: K4RCT. PAMs: WA4EWW, W4PFP. RM: K4UWH.

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
ETPN	3980	M-Fri.	1140Z	22	464	50
TN	3635	Daily	0100Z	56	380	280
TPN	3980	M-Sat.	1245Z	31	1119	249
	3980	Sun.	1400Z			
TSBN	3980	Tue.-Sun.	0030Z	20	860	101

Sorry to report the passing of two well-known West Tenn. amateurs—Gene Stringer, K4WCE, of Whitehaven, and Crutcher Dunlap, W4AFB, of Memphis. W4HHK's reports on sun noise make interesting reading. Sixteen Field Day messages were received. We continue to receive reports of members allowing their licenses to lapse because they do not check the expiration dates. WA1AFP/4 has been transferred from Millington. The Frye Club still requires 5 x 9 envelopes with the call in the upper left corner to process your DX cards. K4EJQ is taking a tour of the West Coast. Six meters is holding up. ECs are reminded to send monthly reports to K4RCT. Your SCM needs station activity reports by the 7th by mail or on nets. Traffic: W4OGG 290, W4PQP 195, K4UWH 145, K4SXD 131, WA4YDT 81, W4TZB 48, W4RUW 40, K4DE 35, WA4JBZ 35, WA4BML 31, W4TZJ 31, W4UVP 28, WA4GLS 25, W4PFP 24, WA4NUJ 22, WA4YEM 22, K4OUK 15, W4IGW 11, WA4CGK 10, W4MXF 10, W4TYV 8, W4VTS 7, W4FLW 6, W4SGI 4, WA4EWW 3, WA4WYP/4 2.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, WA4KFO—SEC: W4OYI. Appointments: WA4BZS, W4NBZ, WA4AUZ as ORSs; WA4IBG, W4RCE as OPSs.

Net	*Freq.*	*Days*	*EST*	*Sess.*	*QNI*	*QTC*	*Mgr.*
EMKPN	3960	M-F	0630	22	384	60	W4BEJ
MKPN	3960	Daily	0830	30	462	174	WA4KFO
KTN	3960	Daily	1900	30	872	583	WA4AGH
KYN/KSN	3600	Daily	1900/1700	46	389	516	W4BAZ
KPON	3945	Sat.	1300		(Not received)		WA4AVV

FD messages were received from W4ABK/4, WA4UAZ/4, W4KVK/4, WA4MBD/4 and K4HOE/4. The Owensboro Amateur Radio Club provided radio communications for the Annual Boy Scout Canoe Race on the Ohio River. A telephone failure in Morehead took out long-distance lines and EC WA4TJS provided emergency communication facilities. WA4YQE is Asst. EC for Rowan County. W4BAZ, WA4DYL, WA4RVP and WA4VGG provided communications for a Sports Car Rally using 80-meter c.w. and 144-Mc. f.m. K4DZM is a new A-1 Operator Club member. The Blue Grass Amateur Radio Club, Lexington, sponsored a Soap Box Derby car and driver. K4FPW is working on his RTTY equipment for h.f. and v.h.f. W4JUI and W4KHZ turned in good accounts of themselves in the May FMT. W4WNH reports successful contacts on meteor scatter. WA4SIQ worked the sixth and seventh districts on 145.2 Mc. Traffic: (June) WA4WWT 693, WA4TPB 637, WA4AGH 449, WA4HJM 411, WA4VUE 349, WA4UAZ 286, WA4IBG 271, W4YOQ 157, WA4DYL 119, WB4AIN 110, K4UDZ 93, K4DZM 88, W4RCE 83, WA4GMA 75, K4MAN 65, WA4VCN 60, W4ISF 56, WA4KFO 47, W4YYI 40, K4NHY 36, K4LOA 35, W4OYI 35, WA4TJS 33, W4KJP 30, WA4DXA/4 18, K4FPW 17, WA4GHQ 17, W4CDA 13, K4KKG 13, WA4BZS 9, W4BTA 7, W4JUI 4, WB4ACQ 3. (May) WB4ABF 420, K4LOA 16, WB4ACQ 7.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—Asst. SCM: K. E. Stecker, W8SS. SEC: K8GOU. RMs: W8ELW, K8QKY, W8EU, K8KMQ. PAMs: W8CQU, K8LQA, K8JED. V.H.F. PAMs: W8CVQ, W8YAN. Appointments: K8YHK as EC, W8QGE as OBS. BPLers: K8LNE, K8KMQ. Silent Keys: WA8OLF, W8OGP, ex/-W8TMN. W8TMN was first licensed in the first 1913 Government Call Book as 8DB, Bernard D. Fellows, and W8DPE, then 800, worked with him in the Pontiac Western Union Office in 1914. New Officers: Amateur V.H.F. Assn—K8BMC, pres.; W8CLH, vice-pres.; W8KOX, secy.; W8VRU, treas.; W8JXU, editor, Grand Rapids ARA—WA8DNX, pres.; WA8AAT, vice-pres.; WA8CTC, secy.; WA8KEP, treas.; WA8IKP, editor, Central Michigan ARC—W8FSZ, pres.; Kelley, editor. Visitors in the Detroit area were ZL2BX, G3RKK, ON5DS and W4ID. G3RKK went to the Boat Races with W8SS, and he and ON5DS attended a Motor City RC meeting. New officers—Metropolitan Ragchewers Club—W8CXS, pres.; K8PUS, vice-pres.; WA8QPN, secy.; K8OJI, treas.; K8JKU, W8JXU, K8UOF, board. Communications for the Dearborn Girl Scouts Camp June 21, 22, 23, 28, 29, 30, was handled by 2-meter f.m. by the AREC. OPSs: K8AMA, WA8CUT, W8BEZ, W8MPD, WA8SEL, W8VWY, WA8SDC, WA8PSD, K8ODW, WA8HFV, WA8HGL and K8ZJU. K8NNV has a complete new S/Line. W8NOH/6 was back in Michigan for a month. W8AAM made WAC and K8YEK made WAC/s.s.b. and WAC/RTTY. CMARC's *Scope* has fine dope on the 146.94-Mc. solid state f.m. handie-talkie. W8SSK and WA8LAL are trying to get m.c.w. going on 6. W8FGB had a nice article on 75-40 meter antenna for short lots in the *Pictured Rocks RC Bulletin*. W8FWC, who uses a leader dog as he is blind, found out his dog, Dell, had cataracts. Many Detroit area hams contributed and Dell was taken to Mishawaka, where the cataracts were removed. Now both Jack and Dell are happy again. WA8BLU blasts hams who won't cooperate with Novice tests. He is right, you know. Traffic: (June) K8LNE 522, K8KMQ 326, K8QKY 193, WA8PIM 126, WA8OEE 97, W8EU 87, WA8OGR 74, W8YAN 68, W8IWF 64, WA8LRC 54, W8FX 51, W8UFS 49, W8IUC 48, K8YDA 48, W8ELW 44, K8ZJU 43, WA8IML 33, W8TBP 28, W8EJR 27, WA8CZJ 26, WA8BJD 24, WA8LXY 20, WA8MCQ 20, W8ZHB 20, W8FWQ 19, W8SWF 12, W8BEZ 9, WA8HGE 8, W8AUD 7, W8DSE 6, K8AQA 5, W8NOH 5, WA8GBN 4, WA8KME 4, W8AAM 3. (May) K8ZJU 78, K8HLR 65, W8UM 30, W8MRM 25, W8FAW 20, W8MGQ 9, WA8OEE 7.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE and K8LGB. PAMs: W8VZ and K8UBK. Lancaster & Fairfield ARC's *The Rag Chewer* informs us that WA8CUI and WA8LTO received their General Class licenses, about 500 attended the Lancaster Hamfest, WA8EDH received an Ameco 6 & 2 transmitter, W8JRJ gave a talk and demonstration on metering, WA8STF and WA8STG received their Novice/Technician Class licenses and WA8MLI was elected to the National Honor Society. K8RKY has a new Mosley Yagi six-element 6-meter beam. K8MMZ is now in the Ohio Air National Guard. WA8HFI reports that the Wyandot County AREC held a family picnic. Canton ARC's *The Feedline* says K8RFW is vacationing in Florida, K8YVZ vacationed in Tennessee, ex-W8MWI has a new Swan 350 and W8HR is VE1AO for the summer. Greater Cincinnati ARA's *The Mike & Key* conducted an Antenna Workshop with practical application of the Antennascope and s.w.r. bridge and two pictures of members of the CMRA operating K2US at the New York World's Fair. Parma RC's *P.R.C. Bulletin* tells us the club saw a color movie by W8EPP of the State of New York, local call books were distributed by W8CZM and *Ham Antenna*, written by W8BAH for the *Cleveland Plain Dealer*, completed its seventh year. In the Yt. QSO Party of 1966 and in Ohio W8KMF was first. K8NQP second and W8AL third. Many amateurs attended the Northeast Ohio V.H.F. group's hamfest with WA8LRM going home with an HQ-110 receiver, K8CSB a 40-ft. tower, WA8RLW a TX-662 with v.f.o., K8JHU, W8LBW and W8UDR Regency 6-meter transceivers. W8GIU vacationed in W7-Land. K8LGA and K8LGB attended the graduation of their older son from Marine boot training. W8EEQ has a new Finco 6- and 2-meter beaf. W8AQ has a new mini beam for 6-10-15-20. W8QCU underwent surgery. WA8-RXU reports that WA8PCH has a new TA-36 beam. K8ZUW has a new R-4A and K8AXK received his third harmonic. K8BXT reports that W8QI is on s.s.b. with an HX-50. W8WEG reports that WN8TPE and WN8TPR are new Novices in Lima. W8EFW underwent heart surgery. The Miami County ARC held a stag picnic with W8ZCV and K8TKL as speakers. Ohio teenagers are invited to check into the Tenn Net at 1400 GMT on 7130 kc. Toledo's *Ham Shack Gossip* informs us that WA8-TXF and WA8TXG received their General Class licenses, WA8TWK and WA8SST their Technician licenses, WN8-TMC, WN8TOS and WN8TWF their Novice licenses,

QTC*

(*I have a message for you)
de Stuart F. Meyer, W2GHK

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WA4FVP, ex-K8GDD, is a Silent Key, K8YON joined the Air Force, W8VAE was married, ZL2AN and his wife visited with K8KFO. Massillon ARC's *MARC* tells us the club saw slides and heard a tape commentary about England presented by W8FSM. According to Mt. Vernon's *K8EEN Newsletter* the club toured the Pittsburg Plate Glass plant. Warren ARA's *Q-Match* says W8RQ, the holder of more than 250 awards, is planning on quitting the ham bands for stamp-collecting. W8UPH made the BPL in June. The Sunday Noon Naggers Net's 1966 officers are WA8KXB, pres.; WA8FAA, vice-pres.; WA8HZO, secy.; WA8NDB, treas.

Nets	*Freq.*	*Sess.*	*QTC*	*Percentage*
BN	3580	29	183	6.3%
OSSB	3972.5	64	608	11.3%

Traffic: (June) W8UPH 921, W8RYP 304, WA8CFJ 218, K8NCV 191, WA8PMN 166, W8DAE 146, W8QCU 97, W8BZX 86, K8UBK 84, WA8FKD 79, WA8BTE 74, K8VMI 70, K8YSO 64, WA8AUZ 62, K8LGA 55, K8BYR 48, W8DQD 38, WA8LAM 38, W8LAG 25, W8TV 24, K8BNL 23, W8WEG 18, K8LGB 11, K8DDG 9, W8GOE 9, WA8MHO 9, W8EEQ 5, W8LZE 5, W8ERD 4, W8IBX 4, WA8QMZ 4, WA8JXM 3, W8EFW 1, K8MMZ 1, WA8POE 1. (May) WA8JXM 41.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RM: WA2VYS. PAM: W2IJG. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT. Endorsement: WB2DXL as ORS. Your SCM received messages from Field Day groups in Albany, New Rochelle, Kingston and Schenectady. K2LLK spoke on his experiences at the South Pole to a group at the Westchester Club. Up in Albany, WA2CKW gave a guided tour to the club through the new civil defense building at the State Campus Complex. Field Day plans featured the June meeting of the New Rochelle Club. June was Family Night at the Schenectady Club, with Professor Harlow of Union College discussing "Gardens of the Northeast" for the XYLs. K2IOW won Schenectady's Broughton Award for meritorious service as EC. WA2SFP won the trophy for top U.S. honors during the Oct. CQ World-wide DX Contest. Jim placed fifth among the world's amateurs. Congrats. WB2NVJ is a new General Class licensee in New Rochelle. WB2OTR is mobile on 75 and 20. New Equipment at Westchester Co. Civil Defense is being installed under the supervision of WB2FVD. WB2QYZ is proud of his new HQ-110. W2URP and WB2HZY received certificates of merit for Armed Forces Day code copy. WB2HXZ is working on a 432-Mc. kilowatt. Sorry to report that WB2HYA has been on the sick list. W2MEK is the new EC for Schenectady County. Traffic: WB2HZY 146, K2SJN 86, WA2VYS 82, W2THE 68, W2ANV 29, W2PKY 17, W2ODC 16, W2URP 16, WB2OTR 15, W2BXP 13, WA2HGB 13, WA2JWL 13, WB2HXZ 10, WA2ZPD 10, WB2DXL 7, WA2QEG 6, WB2QYZ 6, WB2VHZ 4, K2AJA 2.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. Section nets:

NLI	3630 kc.	1915 Nightly	K2UFT - RM
VHF Net	145.8 Mc.	2000 TWTh	W2EW - PAM
VHF Net	146.25 Mc.	1900 FSSnM	W2EW - PAM
NYCLIPN	3932 kc.	1600 Daily	WB2DXM - PAM
NLS(Slo)	3630 kc.	1845 Nightly	WB2SLI - RM

NYC-LI AREC Nets: *See Dec. 1965 column for skeds.*

K2DKK, WA2UWA, WB2DXM, WB2EMJ, WB2OCA, WB2SLH and WB2RBA all got together to see what everybody looked like. WB2SLI finished the new keyer with a prayer that it holds together until the next CD Party. WA2UWA, WB2FHP, WB2SRN and WB2RPP had the Eastern Suffolk ARC station, WB2RWD, fired up for traffic-handling at the Sag Harbor Whaler's Festival. WB2SLH's first stint as recording secy. of the NLI Planning Committee resulted in 10 pages of close-spaced notes—some plans! WB2FAJ chugged the NYCLIPN gang out to Field Day in his machine of rare vintage. WB2RQF also is NØFLO of Navy MARS. WB2TNY/bicycle-mobile, has velocipede-will QSL! WA2DTY is handling Vietnam traffic on Navy MARS. K2OVN, who painted six rooms in between five FLIRC meetings, went back to work for a vacation! While at the beach club at Ft. Tilden, W2PF also was able to be at the W2AVD 2 Field Day site. WB2MBU, of the V.H.F. Net, just put up a 40-ft. tower and "J" beam to aid his v.h.f. traffic range. *Wanted:* Amateurs with the rare combination of (1) equipment to span the gulf betwixt 145.8/146.25 Mc. and 3630/3932 kc. (2) willingness to exercise such equipment for short hours (with shorter pay) and (3) ability to relay traffic in the form received. Applicants must

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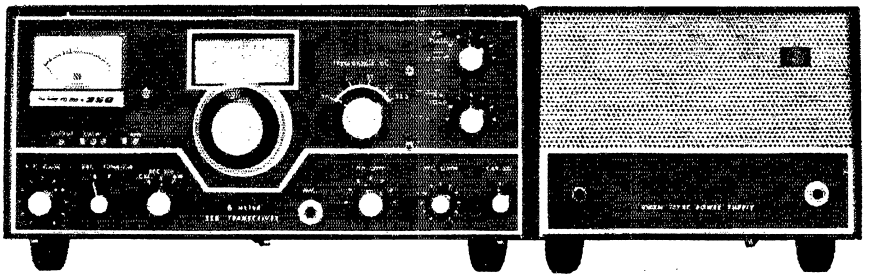

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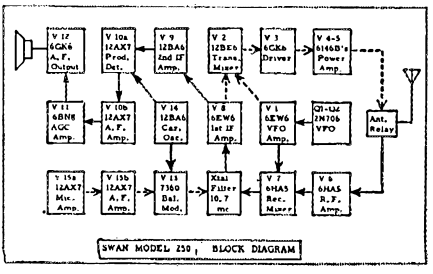
- ★ **Separate AM detector.**
- ★ **Automatic noise limiter.**
- ★ Audio response essentially flat from 300 to 3100 cycles.
- ★ Pi output coupling for matching wide range of load impedances.
- ★ Meter indicates either cathode current or relative output for optimum tuning and loading.
- ★ Provisions for adding 500 kc calibrator, or plug-in Vox unit.
- ★ Dimensions: 5½ in. high, 13 in. wide, 11 in. deep. Weight: 17 lbs.
- ★ Automatic noise limiter.
- ★ **Price, amateur net:**
  Swan-250 .....**$325**

External VFO for separate transmit-receive control available soon.



6 Meter Band Openings Increase!

With sun spot activity now on the increase, 6 meters is rapidly becoming one of the most interesting bands to operate, and the next few years will undoubtedly see tremendous activity on this band. Sporadic E openings are occurring several times each week over all parts of the country, making excellent contacts possible from Coast to Coast and over intermediate paths. With long F2 skip and trans-equatorial propagation to look forward to, plus the consistent ground wave and tropospheric scatter contacts made possible with the power of the Swan 250, there is practically no limit to the operating pleasure you can find in the VHF world above 50 mc.

The Swan 250 is at its best in the SSB mode. for which it was primarily designed. With 240 watts PEP input and an average beam antenna, its talk power does an outstanding job. To work your AM friends you simply insert carrier to 75 watts input, and they will read you loud and clear. AM reception is provided for by the receiver function switch. Also, a noise limiting circuit is effective on both AM and SSB.

The Swan 250 is engineered to provide the same excellent voice quality which has become the trademark of all Swan transceivers. And, naturally, the same customer service policy, second to none, applies to our VHF models.

If you are seriously interested in working 6 meters, see the new Swan 250 at your dealer. We are delivering now, but the back order list is getting longer, and we suggest you place your order soon.

73 Herb Johnson
W6QKI

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ELECTRONICS CORP.
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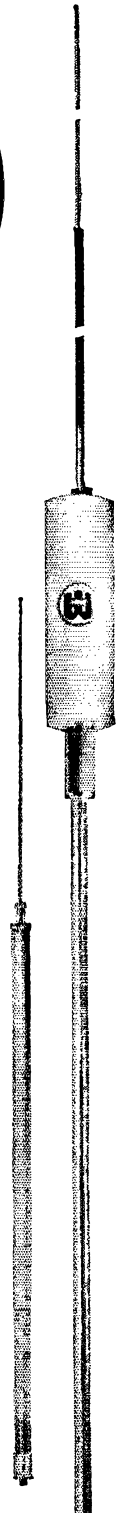


meet requirements (1) and (2). Requirement (3) will be provided with "On the Job Training Program." Although, Ph.D.E.E. Electronics with CP-65 is desirable, applicants with kindergarten and CP-13 will be given every consideration. Don't miss this once-in-a-lifetime opportunity to improve your "Amateur Image." Apply now to W2EW, K2UFT, WB2DXM or WB2SLI. They are waiting to process your application! Be the first in your neighborhood to be an NYCLI Liaisoneer! A BPL certificate was awarded to WB2RWD. AREC Kings 2, 6 and 10 met at WA2GAB's abode. WB2AWX, who is working at the Post Office for the summer, now knows how the QSLs get lost. WB4APN is sojourning with the Navy in this section this summer. Lt. Commander W2TUK is the new Commanding Officer of the Freeport Naval Reserve outfit. WB2TCS was awarded a net certificate for the V.H.F. Net. WA2YQW is playing 15 meters on a new Eico 720. WB2QWZ has a new linear ready for 2 meters while WB2EYS is beatin' the dickens out of the 6-meter skip with a new three-element! WB2IIA is now ready with a Drake 2B, BW-6100 and a something, or other, tribander. New Officers of the NYRC are W2OMM, pres.; WA2OVC, vice-pres.; K2CON, treas.; W2NJS, secy. This club meets every 2nd Mon. at 2000 at the George Washington Hotel, 23rd & Lexington, N.Y.C. Hams and SWLs visiting the city are encouraged to drop in. Traffic: WA2UWA 476, WB2SLI 429, WB2RWD 180, W2EW 136, WB2AEK 131, WB2EUH 107, WB2SLH 93, WB2FAJ 74, WB2RQF 64, WB2SIZ 45, WB2TNY 33, WA2LJS 25, WA2DTY 24, K2OVN 23, W2DBQ 22, WB4APN/2 16, W2EC 15, WB2TCS 14, WB2MBU 12, W2PF 12, WA2PMW 8, WB2UIV 5, WA2QJU 4, WB2BKS 2, WB2AWX 1.

NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW—Asst. SCM: Louis J. Amoroso, W2LQP. SEC: K2ZFI. NNJ section nets:

NJN	3695 kc.	7:00 P.M.	Daily	WB2AEJ - RM
NJ Phone	3900 kc.	6:00 P.M.	Ex. Sun.	W2PEV - PAM
NJ Phone	3900 kc.	9:00 A.M.	Sun.	W2ZI - PAM
NJ 6	51,150 kc.	11:00 P.M.	M-W-Sat.	K2VNL - PAM
NJ 2	146,700 kc.	10:00 P.M.	Tu-Sat.	K2VNL - PAM

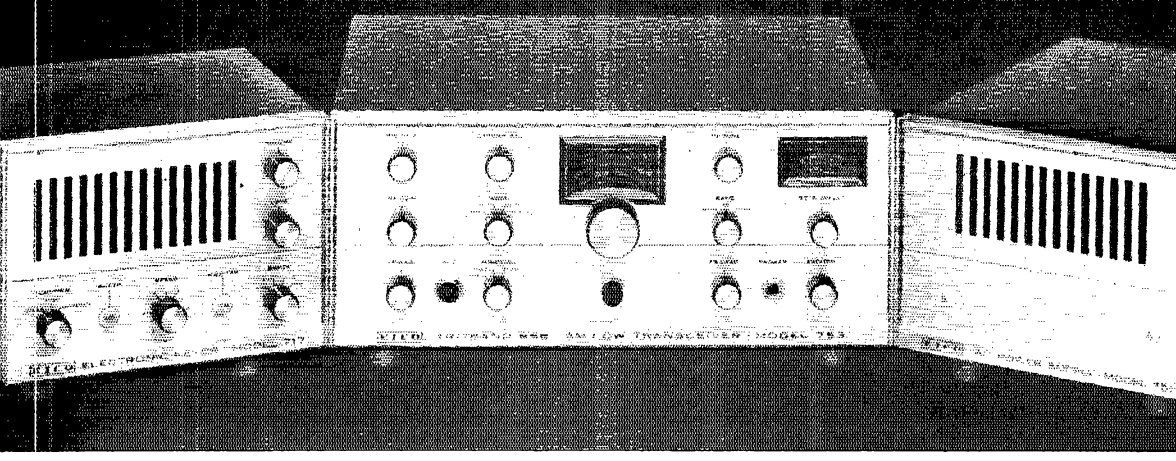
Field Day messages were received by your SCM from WB2KTO, K2ODP, WA2UZH, W2RJ, K2ZSS, W2GLQ, K2GQ, K2HFL, WA2UOO, K2PTZ, WA2IDW. WB2FUW has been making the rounds of the traffic nets. WA2SRK is promoting traffic work among Novices. WB2JWB spent his vacation on a cross-country trip. K2KDQ mobiled to St. Louis. The AREC Traffic Net, 50,360 kc. 7:45 P.M. local time daily except Mon., still is looking for traffic. WB2GFY spent his vacation in EA-Land. W2QNL reports that the BSP Net meets at 1 P.M. Sun. on 3647 kc. This is primarily for hams associated with the Bell Tel. System. WB2LUT spent his vacation on Cape Cod. WB2QGB has a new HQ-10 scope. WB2WWH has a new DX-40 and v.f.o. and is trying to establish a rag-chewers net on 21,300 kc. late evenings. WB2SQC is a new member of the EASN, 3748 kc., 6 P.M. daily (slow speed). WB2BXK has 34 states, 10 on 2 meters. WB2SEZ is a new member of NJN and EASN. W2NIY has moved to Hillcrest Heights, Md. The Gonyagle Net operated FD at the QTH of K2AAM. W2CZM completed a new home-brew s.s.b. rig. WB2UFV has 48 states worked. WA2TEK still is trying to drum up activity for a RTTY net on 3625 kc. following his OBS transmission at 5 P.M. local. WB2HLH has 60 countries worked. WA2RIN got his first taste of 220- and 432-Mc. operation on FD. K2RDX has standardized the coax connectors in his shack. WB2MXZ has a new eleven-element 2-meter beam. WB2QMP has worked 13 counties out of 21 in N.J. using only 3 watts on 2 meters. WB2KLD has 11 states on 2-meter a.m. The Central N.J. V.H.F. Society Net meets on 50.250 and 146,160 kc. Thurs. at 8 P.M. local time. The Monmouth County Radio Amateurs Luncheon takes place the 2nd Tue. of each month at the Colt's Neck Inn, 12 noon. Everyone is invited. W2KJR does the excellent art work on the announcements. K2AGZ has a new 62-SI and soon will be on RTTY. K8DIU is stationed at Ft. Monmouth and operates K2USA. K2DTV is back on the air after an illness. K2YFE is in the Army Medical Corps and has the call KL7FQW, and wants to talk to the N.J. gang on 14,290 s.s.b. K2IPY is stationed at Ft. Monmouth in the Army Nurse Corps. WB2JGD received the WAC award. K2BMI is active again after completing his education. The Irvington RAC will visit ARRL Hq. Oct. 30. OO reports: (June) K2BEV 27, K2AGZ 25, W2TPJ 22. (May) K2BEV 18. Traffic: (June) WB2FUW 405, WB2AEJ 178, K2VNL 158, WB2OHK 113, WA2SRK 64, WB2JWB 41, K2KDQ 39, W2CVW 38, K2ZFI 36, K2EQP 24, WB2GFY 23, W2QNL 19, WA2TAF 9, WB2LUT 7, K2MFX 6, WB2QGB 6, W2DRV 5, W2ABL 4, WB2SQC 4, WB2WWH 4, WA2UZH 3, WB2BXK 2, WB2ICH 2, W2PEV 2, WA2CCF 1, W2EWZ 1, WB2SEZ 1. (May) W2CVW 78, WB2QMP 30, WA2SRQ 14, K2BEV 7, WB2HLH 2.

A 3-band SSB Transceiver Kit for $189.95

An Electronic Keyer Kit for $49.95

A Solid-State AC Power Supply Kit for $79.95

Who gives you ham gear so COMPLETE at prices so low?



Who else but EICO

***Pro* all the way, from concept to execution — that's what ham editors say about EICO. Critical customers agree, and like the low price, too. They've made the 753 kit, for example, the industry's hottest seller. And the new 717 Keyer seems headed for the same fate. Highlights of both give you some inkling why:**

The EICO 753 is a complete 3-band transceiver, offering SSB/AM/CW operation with conservatively rated 200 watts PEP on all modes (rated for maximum efficiency rather than maximum possible input power). A new Silicon Solid State VFO provides full coverage of the 80, 40, and 20 meter bands. Assembly is made faster and easier by VFO and IF circuit boards, plus pre-assembled crystal lattice filter. Rigid construction, compact size, and superb styling make this rig equally suited for mobile and fixed station use. The EICO 753 is at your dealer now, in kit form and factory-wired.

FEATURES: High level dynamic ALC prevents flat-topping even with extreme over-modulation. Automatic carrier level adjustment on CW & AM. Receiver offset tuning (10 kc bandspread) without altering transmit frequency. Front panel selected STANDBY, VOX, or P-T-T operation. Unique ball drive provides both 6:1 rapid band tuning and 30:1 vernier bandspread with single knob. The Model 753 is an outstanding value **factory wired at $299.95**

EICO Model 751 AC Supply/Speaker Console: Provides all necessary operating voltages for Model 753. Incorporates PM Speaker, conservatively rated components and silicon rectifiers for minimum heat and extended trouble-free life. Includes interconnecting plug-in cables. **Kit $79.95 Wired $109.95**

SPECIFICATIONS: Output Voltages: 750 volts DC at 300ma, 250 volts DC at 170ma — 100 volts DC at 5ma, 12.6 volts AC at 4 amps. INPUT VOLTAGE: 117VAC.

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Kit $79.95 Wired $109.95

The ideal accessory for the CW ham— the **fully automatic 717 Electronic Keyer.** It provides self-completing clean-cut dots, dashes, and spaces accurately timed and proportioned from 3 to 65 WPM in four overlapping switch-selected ranges with vernier control of all speeds within each range. Matches EICO 753 in appearance to make it a perfect table-top companion unit.

FEATURES: Output Contacts — 25 volt-ampere dry-reed SPST relay. Built-in adjustable tone and volume oscillator with a 3 x 5 inch speaker for monitoring. Can be used as a code practice oscillator.
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MIDWEST DIVISION

IOWA—Acting SCM, Verlin B. Rowley, KØBRE—SEC: KØBRE. The new officers of the Pleasant Valley High School Radio Club are WAØLZP, pres.; WAØLZO, vice-pres.; WNØOJK, secy. This club has been active for only two years but in that time the club station, WAØHXW has earned WAS, WAC and DXCC. 75 Meter Net reports: QNI 1522, QTC 254, sessions 26. Traffic: (June) WØLGG 2611, WAØDEM 178, WØUSL 99, WAØJUT 55, KØBRE 45, WAØDAG 30, WØKGN 30, WAØDYV 25, WAØAFY 24, WAØJEG 21, WAØGPL 17, WØFDM 14, WAØIYH 13, WAØMHH 11, KØKAQ 9, WØNGS 7, WØBKR 4, WAØJOA 4, WAØGBD 2. (May) WAØJEG 47. (Apr.) WAØJEG 92, WAØDAG 35, KØDYS 12, WØPTL 7.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. RM: WAØJII. PAM: KØJMF. V.H.F. PAM: WØHAJ. A preliminary report on the Topeka tornado from WØNQI, EC Zone 3 Topeka, notes that 8 to 10 thousand informal messages and 450 formal messages were handled. KØJMF reported 142 formal messages. KWN reported for June, QNI 430, QTC 6, not including the Topeka tornado operation. On June 8 the Weather Net was reopened at 1910 CST just after reports were heard of tornadoes hitting Manhattan. Shortly thereafter Topeka was hit and the KWN was used for many hours gathering traffic for Topeka until WØQNI took over as coordinator in the Topeka area. OES WØFII reported a nice log for the June 11-12 V.H.F. Contest. The Hambutchers Picnic at Warsaw, Mo., was a complete success with about 160 registered people. The Central Kansas Radio Club of Salina is in the process of changing its name to Central Kansas Amateur Radio Club, Inc. Lyons, Kans., now has WAØOPO as the call of the Lyons Schools Amateur Radio Club. Salina had about 180 registered at its Hamfest June 5, Zone 10 EC. WØVRZ, reports the Zone AREC Net meets Sun. at 11:30 A.M. CST on 3920. The new EC for Zone 15 is KØUVH, Selden. Renewed: WØFDJ, WØVBQ as ORSs; KØEMB, KØGZP as OBSs. June net reports:

Net	*Freq.*	*Day*	*Time CST*	*QNI*	*QTC*
QKS	3610	Daily	1900	173	83
		Sun.	0800		
KPN	3920	M-W-F	0645	151	52
KSBN	3920	Daily	1830	411	98
KWN	3920	Daily	1800	430	6
KS EC	3920	Sun.	1300	62	5

Traffic: WØOHJ 695, KØJMF 519, KØGZP 389, KØGII 191, WAØMLE 182, WØINH 134, KØHGI 114, KØEMB 102, KØBXF 61, KØKED 55, KØOUH 40, KØMRI 38, WØAVX 35, KØLPE 25, KØMZZ 19, WAØLLC 18, WAØCCW 17, WØFDJ 8.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—WØBUL renewed as SEC, PAM and OPS, WAØCWV as ORS and KØONK as RM. SEC WØBUL received FD messages from WØAIM, WAØAPC, WØBRI, WØBRN, WØCTV, WAØDGG, WØEAO, WØGWX, KØJPJ, WØKDU, WAØMTM and WØRUH. Your SCM received FD messages from KØALC, KØAXU, WØBRI, WØCBL, WØEAO, WØEBE, WAØFLL, WAØFXD, WØGBX, KØLIR, WØMKJ and WØRFU. Congratulations to WAØCMO on receiving a Public Service Award. Mo-SSB Net held extra sessions to assist in clearing traffic for the Topeka, Kans., tornado. Reports show that WAØBHG, KØGZP, KØHGI, WAØHWJ, KØJPS, WØKOL, W5OK, KØONK, KØPSD, KØTCB and WØUYK assisted in the tornado traffic. WAØEMS joined WAØHQR at Boy Scout Camp for FD. WØAIM has a new HQ-170. WAØKNW is moving to Brunswick with the XYL and new harmonic. HC1HL and family visited with KØONK en route to a new assignment in Africa. After passing the Gen. Cl. test KØPEG found the elevator out and had to walk all 31 flights down from the FCC office. Net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2330Z	M-W-F	13	189	22	WØBUL
MoSSB	3963	2400Z	M-Sat.	28	464	132	KØTCB
MoPON	3810	2100Z	M-F	22	226	99	WØHVJ
MTTN	3940	2300Z	M-F	20	180	73	WAØELM
MON	3580	0100Z	Daily	30	187	172	WØWYJ
SMN	3580	0400Z	Daily	15	37	29	KØAEM
QMO	3580	2200Z	Sun.	4	10	20	WAØFKD
MSN	3715	0300Z	Daily	30	38	4	WØONK
MNN	7063	1800Z	M-Sat.	26	40	8	WØOUD
PHD	50.4	0130Z	Tue.(GMT)	4	91	1	WAØFLL
HBN	3880	1805Z	M-F	22	556	193	WAØHWJ
HBN (May)				22	686	130	WAØHWJ

Traffic: (June) KØONK 1139, WAØFKD 342, WØTDR 296, KØAEM 257, KØJPS 172, WØWYJ 162, KØTCB 144, WAØHQR 95, WAØEMX 91, WØHVJ 79, WØOUD 72, WØEEE 61, WAØFMD 48, WAØLYE 48, WØRTO 27.

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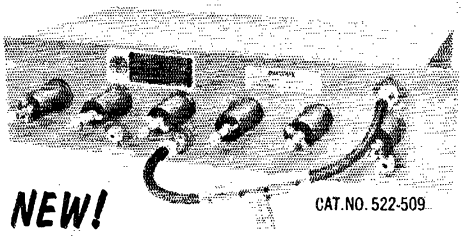

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NEW!

CAT. NO. 522-509 DUPLEXER

CAT. NO. 522-509 Duplexer for 450-570 Mc is an entirely new duplexer providing isolation in excess of 100 db between the transmitter and receiver at the transmit frequency and in excess of 40 db at the receive frequency. This isolation is maintained for transmit to receive separations of 2 to 20 Mc.

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is a second generation antenna growing out of 30,000 STATIONMASTERS and ten years of experience with this type array. The new antenna has all the qualities of its predecessor, plus new features not now available in any antenna made for the land mobile services.

Because of its exceptional bandwidth, the SUPER STATIONMASTER is produced in three ranges which cover the VHF band, 150 to 159 Mc, 157 to 166 Mc, 165 to 174 Mc. A 10 db—10 Mc wide version, CAT. No. 455-509, is available to cover 450 to 470 Mc in two ranges.

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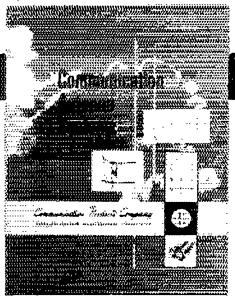

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WØTPK 26, WØBUL 14, KØFPC 12, WAØEIM 11, KØORB 11, KØDEQ 10, WAØCHH 8, WØGQR 7, WAØJLJ 5, WAØFLL 4, KØLGZ 4, WAØJZK 1. (May) WAØHWJ 15.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØJXN. Net reports for June: Nebr. AREC C.W. Net, WAØEEI, QNI 7. Nebr. AREC Net, WØIRZ, QNI 167, QTC 0. Dead End Net, WAØMCX, QNI 212 QTC 20. Nebr. Morning Phone Net, KØUWK, QNI 773, QTC 53. Nebr. Storm Net, WAØKGD, 1st session QNI 931, QTC 43; 2nd session QNI 654, QTC 28. West Nbr. Morning Phone Net, WØNIK, QNI 496, QTC 54. Nebr. Emergency Phone Net, WAØGHZ, QNI 1620, QTC 89. Nebr. C.W. Net, WAØGHZ, QNI 92, QTC 48. Nebraska and Wyoming amateurs teamed up to assist in the hunt for a lost boy at Laramie Peak Boy Scout Camp. WAØCIE/7 was control, with Nebraska stations WAØHRX, WAØEYY and WØGGP on hand. WØPHA, pres. of the Tri City Radio Club has gone to ETV in Alliance. Traffic: (June) WAØGHZ 272, WAØNUK 75, KØJFN 49, WAØBID 39, KØRRL 35, WAØBOK 30, WAØHWR 28, WAØIXD 22, WØGGP 21, WAØGVJ 21, WAØKGD 21, KØQVN 21, WAØIBB 14, WØLFJ 14, WAØJZL 13, WAØLOY 10, KØUWK 10, KØECH 8, WAØLLQ 8, KØVTD 8, WAØIXF 7, WØEGQ 6, KØJNN 6, WØWKP 6, WØAGK 5, WAØEEI 5, WØFBY 5, WØLJO 5, WØNIK 5, WAØBIE 4, KØDGW 4, KØHNT 4, WAØJTU 4, WAØKHE 4, WØVEA 4, WAØLRQ 3, WØBFV 2, WØPHA 2, WØWZR 2, WØFQB 1. (May) WAØGHZ 512, KØQVN 108, WAØNUK 24.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT—SEC: W1PRT. RM: W1ZFM. PAM: W1YBH. Net reports for June:

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	1845	30	286	244
CPN	3880	M-S	1800	30	446	125

CN high QNI: K1TKS and W1RFJ. CPN high QNI: WA1DWF, WA1EEJ, W1GVT, W1YBH 25 each; WA1DEM, WA1GBA 23; K1EIC 20; W1HBH and W1LUH 19; K1DGK 18. Official Observer reports were received from W1EBO, W1ECH and W1EQV. ARRL appointments should be endorsed every year. Check yours now and return for endorsement when due. All appointees overdue for endorsement have been notified. The Shoreline Amateur Radio Club operated Field Day as W1BCG. Its 1966-67 officers are K1VEA, pres.; WA1FWA, vice-pres.; K1VII, secy.; WA1CPB, treas.; WA1DDL, jr. vice-pres.; W1ERM, station trustee. The SCM appreciates mail and expects it from the secretary of each club. K1OQG, EC for Griswold, has an AREC 6-meter net going Tues. at 1900 with WA1DWF as net manager. Operation is on 50.6 Mc. and all 6-meter stations are welcome. W1WHR, new EC for Southington, is actively promoting AREC and doing a good job. K1TKS is working during the summer vacation from Worcester Tech. and is glad to be back on CN with traffic. Congratulations to W1YM for taking the top spot in the c.w. section of the YL/OM Contest. W1BGD rates 200/175 DXCC. W1WEE obtained his WAS certificate. K1AFC has a new tower with a tribander beam. WA1FNJ is using a Squalo antenna on 10 meters. W1ECH's DXCC rating is 262/254. He has a new jr. operator, WA1GWH is relocated from West Coast Sea Duty and now is active from Groton. WA1APY has moved to the West Coast. Congratulations from the Connecticut section to WØNWX, new ARRL President, and our thanks to W6ZH, Past-President, for his outstanding work. Traffic: (June) W1EFW 459, K1LMS 156, K1TKS 128, W1GKF 104, W1BDI 88, K1OQG 87, K1EIC 67, K1EIR 57 WA1DEM 54, W1YBH 40, W1ZFM 36, WA1DWF 32, WA1FNJ 32, W1GVT 29, K1EYY 17, W1CTI 13, W1ZL 12, W1OBR 11, W1QV 10, K1SRF 9, W1BGD 4. (May) K1ZND 207, K1RQO 185, K1YGS 8, W1ZL 8, W1CTI 2. (Apr.) K1RQO 81.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AOG, our SEC, received reports from W1s STX, LVK, K1WVW, WA1BZJ. How about our other ECs? W1s AOG and LVK were on duty at their c.d. headquarters during a bad fire in a warehouse in Medford. W1s BGW, VAH, AYG, K1WJD and K9MAF/1 took part in the May FMT. K9AQP/1 is on 2 up on Pack Monadnock, N.H. I received many FD messages. Sorry to report W1SPL is a Silent Key. EMNN had 12 sessions, 68 QNIs, 27 traffic. The 6-Meter Crossband Net had 21 sessions, 242 QNIs, 18 traffic. EM2MN had 22 sessions, 242 QNIs, 231 traffic. W1NF went to N.Y.C. K1TXX is on 75. W1QT is now a great-grandfather. K2RUR/1 is in Norwood. W3ROQ/1 is in Sharon. W1DMD made DXCC with 75 watts and a long-wire antenna. The Greater Fall River Red Cross has the call W1DP. W1OFV, in MARS, is on the Mass. staff as assistant training officer. K1WVW is on the 6 and 2 Nets. W1DAL

SS-1R

The New 701 Series SS-1R is Greater than Ever

The SS-1R, with its unique approach to receiver front-end design, has been called a major advance in HF receiver art. Continuing engineering improvements now incorporated in the 701 series make the SS-1R greater than ever. For example:

Sensitivity has been improved by 3 to 6 db. Typical production units measure 0.25 μv for 10 db S+N/N.

Sideband Stability is even better; USB and LSB BFO frequencies are now *crystal-controlled* while retaining variable BFO for CW.

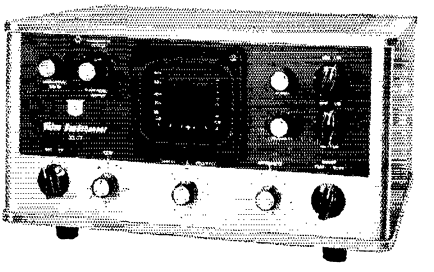
Sideband Quality is clean and distortion-free over a tremendous range of signal strengths (from a microvolt to as much as a volt!). An improved product detector (employing a 6BY6) combined with an i.f. cathode-follower (now a 6AV6) to drive the a.g.c. circuits has increased the already large dynamic range of the SS-1R.

Reliability and Performance Stability have been improved through 1) redesign of a simpler, rugged dial-drum and display mechanism, 2) use of precision glass and ceramic piston trimmers in all critical circuits, and 3) an effective quality – assurance program throughout production and test.

Plus: Crystals for full 10 meter coverage provided.
Improved super-durable sand-blasted finish for the rugged extruded cabinet.
Superior SS-1R Speaker quality.

SPECIAL FEATURES: Freedom from Cross Modulation and Overload • Extreme frequency precision with digital readout in kilocycles. Slow (10 KC per turn) manual tuning rate provides precise tuning of sideband signals • Motor Drive of tuning mechanism for fast traverse of band • 5.0, 2.5 and .35 KC Selectivity with 2:1 60/6 db skirt characteristic • Crystal Lattice Filters • Special Hi Q IF Circuits • Autocalibration of amateur bands to WWV • Choice of AM, USB, LSB or CW modes • Provision for use with the unique SS-1S Noise Silencer and with dramatic new SS-1V Video Bandscanner.

SS-1V, Video Bandscanner. This unique oscilloscope display unit, when used with the SS-1R shows all signals in the band in use, or any portion of the band can be expanded to full screen for detailed examination. Both linear and logarithmic displays are provided. A marker pip constantly shows the exact frequency to which the receiver is tuned. The sharp resolution of this unit permits observation and measurement of two AM sidebands displaced only 2.5 kc. from the carrier. Provision is made for transmitter monitoring or analysis.



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has a CP-35 sticker. W1FJI and WA1BZJ have WAC. K1JGV's SW-350 was hit by lightning. WN1FED is working on WAS. WA1CTJ is copying 22 w.p.m. and going after General Class. K1WVW, our EC for Hopkinton, wants some help from other hams in town. W9GTC/1 is in Arlington. K1PLP now is in Billerica. W1PEX, K1KBO and K1RCD made the BPL. K1KBO reports that KØFQW is going to ET3-Land. W6RVZ and K4CGU were awarded trophies for their outstanding job on Father's Day with W8UDG/8. K1PNB is overhauling his Valiant. WA1DLT worked all 50 states on Field Day. WA1DJC is moving to Gloucester in Sept. K1ZBZ has a Thor 6. portable Clegg 99, portable generator, 70-ft. tower with 2 and 6 beams. K1PNB puts out a very nice bulletin for our Novice Net. WAØGSA/1. at Fort Devens, likes RTTY work very much. WA1DXI has his General. W1SKQ is on several bands. K1OIC completed the NASA course in hand-soldering at Huntsville, Ala. W2-QHQ writes that the M.I.T. Radio Society, W1MX, will sponsor the 2nd Annual Mass. QSO Party on Oct. 1. Appointments endorsed: W1DWY as EC, K1VPJ as OBS. W1LXR was in the hospital for a short time. W1AMO and W1IH flew to Mystic, Conn. with W1HXK. WA1AZR is net manager of the Central New England Phone Net which meets week days 6:30 A.M. to 7:30 A.M on 3842 kc. K1JFQ is seey. The following stations are doing a nice *job*: W1s *UX, IG,* K1s *RMG, VHT, PJQ, PPP, KRX, IVJ, WUD, NTN, YGI,* WA1s, BSX, CDW, DOW. The Capeway Radio Club met at W1EYU's QTH. New Novices are WN1s GIE, GIJ, GIL, GJY, GLE, GLF, GLV, GLW, GLX, GLY. New WA1s: OTJ, ETA, ETB, GII, GIO, GIP, GIQ, GIV, EIV, EOT, DXI, FDK, EHX, EZA, EDH, ETC, GJI, GJP, GJR, FJP, GKB, GKQ, FFY, FOO, FSH, FSI, GKR, GKX, CQI, FPF, GLK, GLL, GLM, GLP, GLQ, GLR, GMB, W1EUJ. back on 432 Mc., has his Extra Class license and won our section award in the Jan. V.H.F. SS, Traffic: (June) W1PEX 1593, K1KBO 1206, W1EMG 186, W1OFK 152, W1ZSS 139, W1UIR 125, K1RCD 122, K1ESG 119, W1CTR 74, K1PNB 66, W1DOM 65, K1CLM 60, WA1DZM 46, K1GTX 46, WA1DLT 43, K1VPJ 42, W1AOG 28, WA1-DED 25, W1EYY 24, K1ETT 13, K1GKA 13, K1OKE 12, K1BGK 9, W1SIV 9, WA1DJC 8, K1YUB 8, WA1DEC 4, K1ZBZ 4, WA1EOT 1. (May) W1JDP 24, K1WJD 21, K1LCQ 14.

MASSACHUSETTS QSO PARTY

October 1-3

All amateurs are invited to participate in the second Massachusetts QSO Party, sponsored by the M.I.T. Radio Society, W1MX.

Rules: (1) Party will begin at 2300 GMT on Saturday, *October 1*, 1966, and will end at 0500 GMT on Monday, October 3. There are no time restrictions. (2) A station may be contatced only once per band. Each phone and c.w. segment shall be considered a separate band. Crossband contacts are not allowed. (3) The general call will be "CQ MASS"; and Massachusetts stations will identify themselves by signing "DE MASS, DE W1MX." (4) Each exchange shall consist of: a QSO number, RS(T), and county (for Massachusetts stations), state, or province. (5) Logs should show: date and time of contact in GMT, station worked, signal report sent and received, QSO numbers sent and received, county, state or province, frequency and type of emission.

Scoring: (6) Count one point for each report received and one point for each report sent and confirmed, for a total of two points for each completed exchange. Massachusetts stations multiply the number of QSO points by the number of different states and Canadian provinces worked to determine TOTAL score. Outside stations multiply the number of QSO points by the number of different Massachusetts counties worked (maximum of 14) to determine TOTAL score.

Awards: (7) Certificates will be awarded to the highest scoring station in each state, province, and Massachusetts county. Additional awards will be issued, if, in the opinion of the Contest Committee, the number of entries from an area warrants them. (8) All logs must be postmarked by Monday, October 24, 1966, and mailed to: M.I.T. Radio Society, W1MX, Box 558, 3 Ames Street, Cambridge, Mass. 02139. Decisions of the Contest Committee are final. Logs cannot be returned.

Suggested Frequencies: C.w. 3560 7060 14060 21,060, 28,060. A.m.: 3990 7260 14,230 21,310. Ssb: 3960 7220 14290, 21,410. Novices: 3735 7175 21,110.

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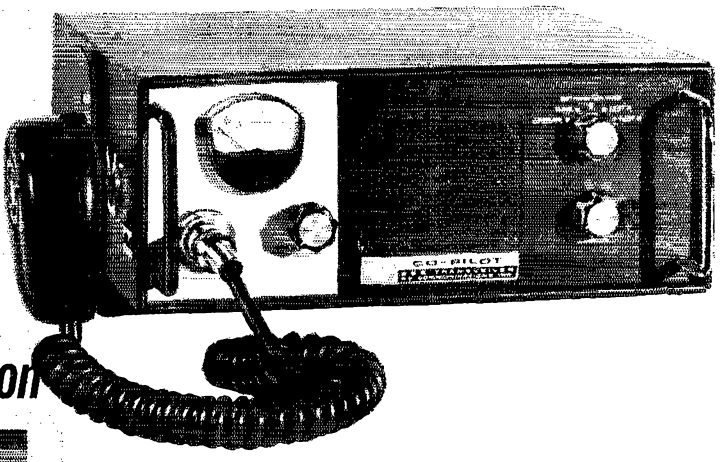
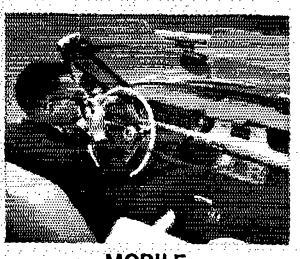
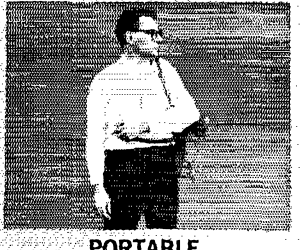




MOBILE

BASE STATION

BOAT



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SMALL SIZE—The Co-Pilot measures 10x10x4 inches and weighs under 12 pounds.

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MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1QIG. PAMs: K1WQI, K1ZVN. RM: K1TZH, V.H.F. PAM: K1OYB. Traffic nets: Sea Gull Net, 1700 to 1800 and 2000 to 2100 on 3940 kc. Mon. through Sat., Pine Tree Net, daily at 1900 on 35906-kc. c.w. The word from K1-MTJ is that he is en route for a new job in New Jersey. Good luck. Glad to have K1UXZ back with us. K1TMJ is running about 100 watts on 2 meters and doing well. W1GRG has his all-band vertical antenna up and going good. Two meters is doing well in many parts of the state. Traffic: K1ZVN 87, K1WQI 55, W1NND 20, W1-1HN 11, W1GU 10.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1SWX/K1DSA—SEC: W1ALE/W1TNO. PAM: K1APQ RM: W1DYE. The GSPN meets on 3842 kc. Mon. through Fri. at 2300Z and Sun. at 1330Z. The VTNH Net meets on 3685 kc. Mon. through Fri. at 2230Z. The Granite State Phone Net Annual Picnic was held at W1KVG's cabins with a total of 65 present. K1APQ was presented with the John Singleton Memorial Trophy for his outstanding faithfulness to the GSPN and its members. Congratulations to K1BCS and W1OC/1 on making the BPL. W1JNC reports that the amateur radio booth at the Concord Kiwanis was a big success. K1YSD copied the Armed Forces Day message on c.w. K1PQV is active on the VTNH Net. WA1CAP has a new TA-33 beam. W1FOG is operating portable from Vestal, N.Y. The following radio clubs were visited Field Day: Manchester Radio Club, Concord Brasspounders, Contoocook Valley Club and U. of N.H. Radio Club. K1MOZ is home from school for the summer. W1NJG is having rig problems, mostly blown filters. K1APQ reports 696 check-ins and 104 traffic for GSPN. W1RCC is mobile with a new Eico. Traffic: K1BCS 278, W1OC/1 152, W1ALE 140, W1-DYE 103, W1MHX 27, K1BGI 24, K1PQV 24, K1MOZ 7, W1SWX 4, K1AEG 1.

RHODE ISLAND—SCM, John E. Johnson, K1AAV —SEC: W1YNE. PAM: W1TXL. RM: W1BTV. V.H.F. PAM: K1TPK. Appointment: W1BTV as ORS. Endorsements: W1BTV as RM, W1FEQ as EC. RISPN reports 30 sessions, 467 QNI, 82 traffic. Field Day reports were received from the following: W1SYE/1, W1CFT/1, W1-DDD/1, K1NQG/1, W1OP/1, W1AQ/1, K1KMV/1, K1-WEW/1 and the Fidelity RC. The R.I. Net will begin a slow-speed net Sept. 15, 1966. The net will meet on 3540 Mc. at 1900 local time. Those interested in joining the net should contact W1BTV, 66 Victory Street Cranston, R.I. W1BTV will have lectures on net procedures and practice sessions for all new members. The NCRC of Newport reports that K1YGY, a member, has recently retired from the Navy. His XYL, K1CUY, was the first lady president of the club. W1WLG, another member, is the newly-appointed Area Coordinator of Education for the Newport area. WA1DRB, of the club, received a plaque from Mayor Shea of Newport, for providing communications between Navy personnel in Antarctica and their families. Traffic: (June) W1TXL 168 W.1BTV 91, K1TPK 77, K1SXY 22, K1YEV 10. (Apr.) W1YKQ 62.

VERMONT—SCM, E. Reginald Murray, K1MPN—SEC: W1VSA. RM: K1UZG. June net reports.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*NCS*
Gr. Mt.	3855	2130Z	Dy x S	507	26	W1VMC
Vt. Fone	3855	1300Z	Sun.			W1UCL
VTNH	3685	2230Z	M-F			K1UZG
VTCD	3990½	1400Z	Sun.	26	9	W1AD
VTSB	3909	2230Z	M-Sa.	565	30	W1CBW
		1230Z	Sun.			

Welcome to WA1GIR in Rutland and WN1GKG in Barre. Hope you all had a good time at International Field Day. Sympathy is extended to K1PPW, whose XYL passed away. K1EQI is back on the air after having lost his receiver in transit. Good to hear W1IZS back in the north country. Your SCM will be operating /VE3 when you read this. The CVARC had the best FD ever. Traffic: (June) K1BQB 259 K.1MPN 13, K1FSY 2. (May) W1-FRT 22.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: K1IJU. C.W. RM: K1IJV. W1-ZPB is busy with summer school at Mt. Hermon and reports that the club station there, W1IPN, is expected to be active starting this fall. The following have applied for membership in the AREC: W1QFB of Hadley, K1-ERT of Boylston and WA1FQN of Palmer. W1QFB has the following equipment, all of which can be run on emergency power: SX-101A, HQ-129X, HT-32A, B & W LPA1 linear 1-kw. amplifier and a Heath Cheyenne for stand-by (among other equipment). K1ERT has the following: NCX-5, NC-303, Valiant II, Ranger I and Lafayette HE-45A. W1DWA, who recently received a promotion at G.E., is now representing WMN on 1RN Wed. W1EOB says his Heathkit SB-200 works fine. The feature at the annual banquet of the Valley Amateur

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QUALITY MATERIAL

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Loading coil not required on 6, 10, 15 and 20 meters. For 40, 80, and 160 meters, loading coil taps are changed manually except if a wide-range pi-network output or an antenna tuner is used; in this case band changing can be done from the shack.

EASY ASSEMBLY

Less than two minutes is all you need to put your vertical together. No special tools or electronic equipment required. Full instructions given.

SIMPLE INSTALLATION

Goes almost anywhere. On the ground, on the roof, or outside your window.

AMAZING PERFORMANCE

Hundreds of reports of exceptional DX operation on both low and high power. You will work wonders with a Gotham vertical.

"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, W2ODII, WA3DJT, WB2FCB, W2YIHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4II, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters.....$14.95

V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters. $16.95

V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters...$18.95

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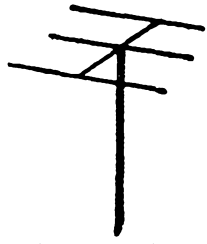
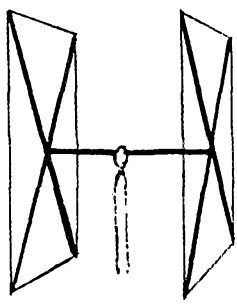


Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is *brand new*; full size (36' of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20	$16	7 El 10	$32*
3 El 20	22*	8 El 10	36*
4 El 20	32*	4 El 6	15
2 El 15	12	5 El 6	20*
3 El 15	16	6 El 6	24*
4 El 15	25*	7 El 6	26*
5 El 15	28*	8 El 6	28*
4 El 10	18	9 El 6	30*
5 El 10	24*	10 El 6	32*
6 El 10	28*		

* 20' boom

QUADS



NEW! NEW! NEW! CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you! Now check these startling prices — note that they are *much lower* than even the bamboo-type:

TWENTY METER CUBICAL QUAD	$25.00
FIFTEEN METER CUBICAL QUAD	24.00
10-15-20 CUBICAL QUAD	35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00

(all use single coax feedline)

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Radio Club was a performance by Mr. Joe Karson, one of the top magicians in the country (he even gave a *special performance for a group* that lingered late). Congratulations to the banquet committee for its very efficient work in scheduling the banquet in a different location on three hour's notice (and getting in touch with all but one who had reservations). The club's new officers are K1YQQ, pres.; K1PTG, treas.; WN1DFH, secy. RM K1IJV reports the West Mass. C.W. Traffic Net handled 74 messages during June with the following stations reporting (in order of activity): K1IJV, K1-WZY, W1ZPB, W1DVW, K1SSH, W1DWA, W1BVR, WA1FNX, W1MNG, WA1DNB, W1NY and K1ZBN. Hope all of you have your rigs in top shape for the coming fall and winter seasons. A *teen-age net meets* Tue. and Thurs. at 7 P.M. on 3880 kc. All teenagers are invited. Traffic: W1DWA 60, K1SSH 48, W1BVR 45, K1-WZY 35, W1ZPB 31, W1DVW 6.

NORTHWESTERN DIVISION

ALASKA—Acting SCM, Daniel R. Wright, KL7ENT—We're back on the job after recovering from a heart attack suffered while on a survey trip above the Arctic Circle. Many thanks to all of the fine people who sent cards and messages care the Army Hospital at Fairbanks. The Anchorage Radio Club has suspended operations for the summer. We'll have a new president as KL7ENT will resume his work at McLelland AFB (Calif.). Field Day brought lots of Alaskan activity. The Northland Amateur Radio Club had eleven members active. Your SCM got many messages originating in the field from others active. It has been a pleasure representing Alaskan amateurs. ARRL Hq. awaits petition(s) from members there naming SCM candidates to represent you.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—Asst. SCM and SEC: Harry Roylance, W7RZY. V.H.F. PAM: K7IOA.

Montana SSB Net	3910 kc.	1800 MST	M-F
Montana Post Office Net	3885 kc.	0900 MST	Sun.
Montana RACES	3996.5 kc.	0900 MST	1st-3rd S.
Missoula Area Emerg. Net	3890 kc.	0900 MST	Sun.

Endorsement: W7RZY as Asst. SCM. In the recent Frequency Measurement Test W7FIS had an average error of 12 p.p.m. and W7LBK had an average of 25 p.p.m. K7YPC has a new SB-34 on the air. K7BON, of Billings, has joined the Intruder Watch. K7OQX, has moved to Virginia. It is drawing near the end of my first term as your SCM. I have tried very hard to keep the ARRL organization going in Montana. One thing I would like is to get more interest in the Emergency Coordinator post throughout the state. I ask all of you to stop and think if your city or county has an EC. If not, try to get one; even better check your own qualifications for the job and if you think you could do a good job write me or W7RZY, our SEC. I hope that those interested in League appointments will get together with the SCM. *Thanks to all who have helped out.* Traffic: W7FL 7.

OREGON—SCM, Everett H. France, W7AJN—SEC: W7AJN. RM: W7ZFH. The Portland area hams held a meeting June 16 for the purpose of hearing Mr. Richard L. Baldwin, W1IKE, Asst. General Manager of ARRL, speak on current ARRL matters. Mr. Robert B. Thurston, W7PGY, Northwestern Division Director, also was present. Field Day reports were received by messages from W7OTV for Tualitin Valley Amateur Radio Club on Skyline Blvd., 12 operators, 11 AREC members; K7VQU/7 on Santiam Pass near Bend, 2 operators; WA7CIK/7 15 miles west of Eugene, few operators; K7-CBP/7 on Hell for Long Flat, 18 operators, 16 AREC members; K7UER/7 of the Portland Roses Club, XYLs, at Mineral Springs, Wash., 5 operators, 3 AREC members; WA7FQD/7 of the Emerald Amateur Radio Society, 10 miles southeast of Springfield, 4 operators. W7DEM reports: WN7FQM is a new ham in the area, the Southern Oregon Radio Club of Grants Pass held its picnic June 19 with 46 hams attending. K7DVK has made DXCC on 20. WN7DWK, 10-year-old ex-Novice, now is WA7-DWK. General Class. W7LNG operated in the V.H.F. Test from Mt. Ashland 7500 feet, 8 contacts; in Field Day from Roxy Anne 3350 feet, 10-2 meter contacts. W7AZD, AREC Net mgr., reports 28 sessions, 331 attendance, maximum counties 12. QST 3, contacts 46. Traffic: W7ZFH 36, K7DVK 15, W7DEM 10.

WASHINGTON—SCM, Everett E. Young, W7HMQ—SEC: W7UWT. RM: W7OEB. PAM: W7LEC. V.H.F. PAM: W7PGY. NTS nets:

WSN	3535	0200Z	Daily	QNI 351	QTC 385	Sess. 30
WARTS	3970	0200Z	Ex-Sun.	QNI 975	QTC 156	Sess. 26
NTN	3970	1930Z	Daily	QNI 877	QTC 760	Sess. 30

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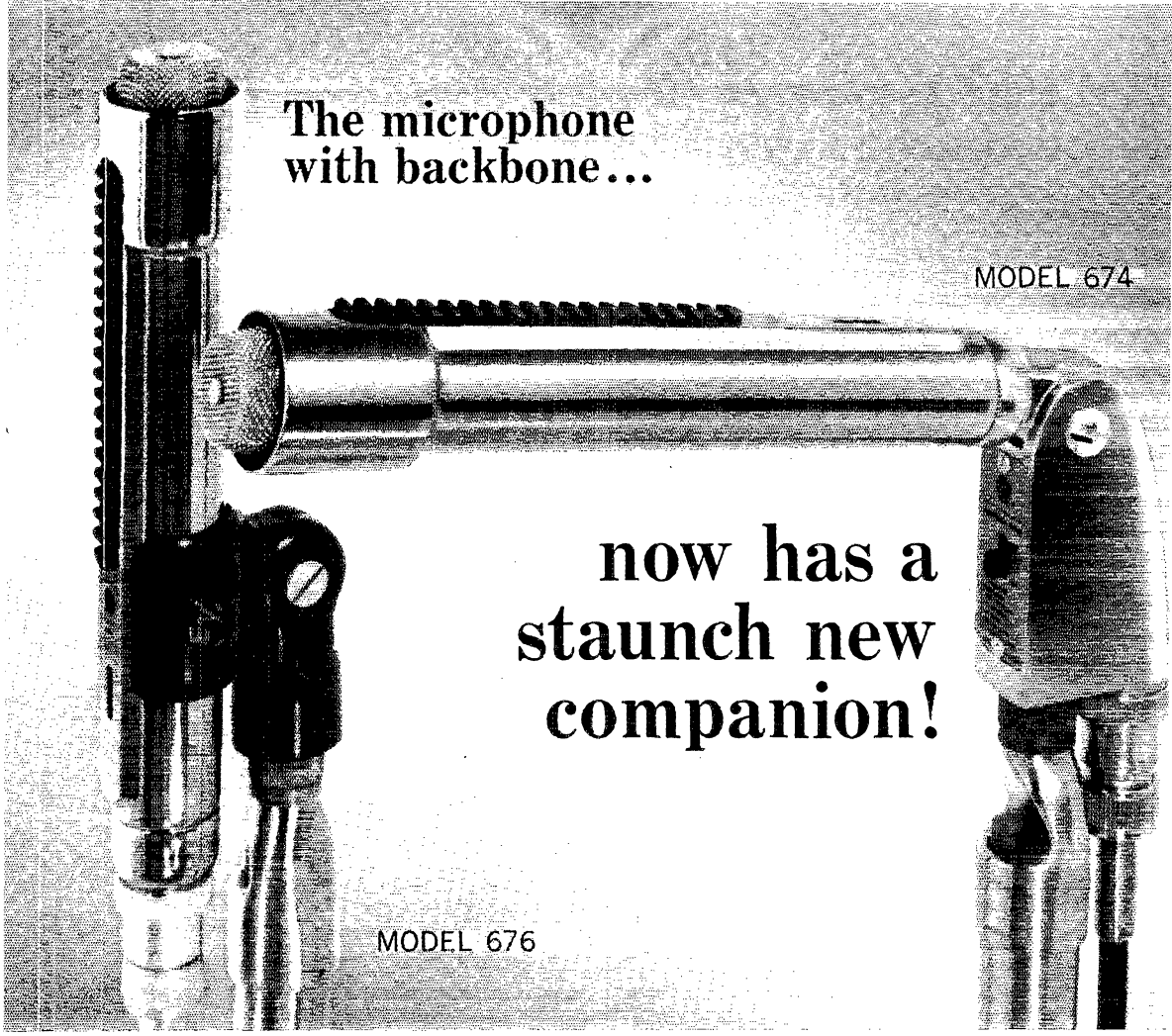

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Troubled with noise pickup or spurious VOX tripping? Most cardioid microphones cancel best at only one frequency—but CV-D* insures a useful cardioid pattern over the entire response range. And its small size means the pickup is symmetrical on any axis.

Bothered by lows that cut your P.E.P.? A recessed switch lets you attenuate bass (by 5 or 10 db at 100 Hz) to stop problems at their source. And there's no unwanted bass boost when you work ultra-close. CV-D eliminates this "proximity effect" so common to other cardioids.

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As for delivering a clean signal, nothing beats the 676 and 674. The exclusive E-V Acoustalloy® diaphragm gets the credit. It's indestructible—yet low in mass to give you smooth, peak-free response with high output.

The Model 676 slips easily into its 1" stand clamp for quick, positive mounting. The fine balance and shorter length of the 676, and absence of an on-off switch makes it ideal for hand-held and VOX applications.

The Model 674 offers identical performance but is provided with a standard mounting stud and on-off switch (which can be wired for relay control). Either high- or balanced low-impedance output can be selected at the cable of both microphones.

Choose the 676 or 674 in satin chrome or non-reflecting gray finish for just $60.00 amateur net. Either one can solve your toughest audio problems. Proof is waiting at your nearest E-V ham microphone distributor's. Or write for free catalog of Electro-Voice microphones today.

An important footnote: There is no time limit to our warranty! If an E-V microphone should fail, just send it to us. If there's even a hint that our workmanship or materials weren't up to par, the repair is no charge—even decades from now! Fair enough?

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WASHINGTON STATE QSO PARTY

Sept. 17-19, 1966

The First Annual Washington State QSO Party sponsored by the Boeing Employee's Amateur Radio Society, K7NWS, will start at 2300 GMT September 17 and end at 0500 GMT September 19, 1966 and all amateurs are invited to participate.

All bands may be used, c.w. and phone (phone classified as both a.m. and s.s.b). Stations may be worked once each band and each mode. Washington stations score one point for each contact (including contacts with other Washington stations). All others score two points for each contact with a Washington station. Washington stations multiply total QSO points by number of different states, Canadian Provinces and countries worked. All others multiply total QSO points by the total of different Washington counties worked. Washington stations send QSO number, RS(T) and county. All others send QSO number, RS(T) and state province or country. General call "CQ WASH". Washington c.w. stations should identify themselves by signing de (call) WASH K. Phone say "Washington calling". Certificates will be awarded to the highest scoring station in each state, province, country and Washington county. Worked Five Bears certificates are also available to anyone working five club members before, during or after the QSO Party. Working club station, K7NWS, will provide gold seal endorsement sticker for either certificate. Suggested frequencies; c.w. 3560 7060 14060 21060 28100, a.m. 3990 7260 14230 21310 28600, s.s.b. 3960 7220 14290 21290 28700, Novices 3735 7175 21110. Logs must show dates, times in GMT, stations worked, exchanges sent and received, bands and modes used, and scores claimed. Each entry must include a signed statement that the decisions of the contest committee will be accepted as final. No logs can be returned. Log sheets and scores must be postmarked no later than October 8, 1966 and sent to: Boeing Employee's Amateur Radio Society in care of Contest Chairman Willis Props, K7RSB, 18415 38th Avenue, South Seattle, Washington 98188.

Washington section amateurs who did not attend the meetings at Richland June 14 and Seattle June 15 missed the answers given by W1IKE, the League's Asst. General Manager, to many questions. RM/OO/ORS W7OEB acted as host at the Richland gathering. W7EJD hosted the Seattle affair. Your SCM, RM and PAM, along with Director W7PGY, tagged along. The 20th Annual Hamfest will be held at Walla Walla Sept. 25. ORS/OPS W7DZX missed his second BPL in one year. EC W7MCW sports a new SBE-34. W7BV is doing fine following surgery. KL7BBL renewed the sked with W7BTB, her QTH Mt. Village. K7QOM heads for Navy active duty with a new SB-100. Richland ARC gained 5 new licensees from its '66 code class. The Rattlesnake Repeater is very active with the following cities: Walla Walla, Kennewick, Richland, Sunnyside, Yakima, Moses Lake and Ephrata. ORS/OPS K7JHA reports a big flash cured the high noise level; Bill turned the r.f. loose on the power line. ORS/EC W7GYF caught VK9TB and VP2SL on C.P. Basin ARC. WA7CYA, turned in a good FD score. W7AMC, ORS/OBS, plugged in the new receiver. W7ZGC shotgunned Clallam County ARC to a new high for FD with 20 members out. W7RXH, ORS/OPS, smokes out the new S/Line and heads for MARS. W7AXT was the first to use a Honda 300 generator for emergency communications and FD. K7JRE is back at Whitman College. W7HMA sends a nice traffic report. OBS K7CCH/7 completed a solid state keyer. The first Annual Washington Section QSO Party, sponsored by the BEARS, will be held Sept. 17-19, all bands, all modes. Mail logs to K7RSB by Oct. 8. K7CTP, OPS, is now mobile with a Swan 350. WA7CSK, with the new Northwest Novice Net (NWNN) is now active on 7170 kc, week days at 0300, Sat.-Sun. at noon. A new call for Tacoma is WN7FNC. Mary, WA7BAY netted 5 new countries. WA7BZO is heard on 20. Mount Baker ARC's recent Annual Banquet was a grand affair. Our sympathy to W7ORK on the loss of his daughter, W7REZ now is convalescing at 4910 South Wilkeson St., Tacoma, 98408. W7CXR recently was honored by men of the Navy's Seventh Fleet for traffic handled from the *Illusive* and *Gallant*. W7PGY, Northwestern Division Director, plans to hold a Walla Walla meeting Sat. afternoon, Sept. 24, of all 5 sections of his division with SCMs, SECs, RMs, PAMs and RN leaders. W7HMQ will conduct a section affair on AREC, NTS, and ARPSC matters Sat. night. Traffic: (June). W7BA 2624,

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Basic pair for all Hams... Novice or General

Receiver Model 2-C $229.00

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Accessories available: 100 kc Calibrator, Q Multiplier, Matching Speaker, Noise Blanker, Crystals for other ranges.

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● **100 Watts Input** (can be reduced to 75 watts for novice) ● **Operates Break-in CW, Semi Break-in CW or Manual CW** with Drake 2-C or other receivers ● **Automatic Transmit Switching** ● **Side Tone Oscillator** built in ● **Antenna Change-over Relay** built in ● **Pi-Network output** with fixed loading ● **Lo Pass Filter** against TVI built in ● **Drop-out delay** of change-over relay adjustable ● **CW Coverage** on 80, 40, 20, 15, 10 Meters ● **Simplified Tuning** ● **Frequency Spotting** without xmtr output ● **Grid Block Keying** ● **Code Practice** in stand-by position ● 13 Tubes and Semi-Conductors ● **Dimensions:** 9⅞"W x 6 3/32"H x 9 3/32"D. **Wt.:** 12½ lbs.
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K7TCY 1263, W7HMA 654, W7DZX 310, W7PI 196, K7-CTP 180, W7APS 117, W7BTB 103, W7OEB 72, K7JHA 66, W7GYF 65, W7HMQ 63, K7MGA 60, K7VNB 50, W7-LEC 29, W7KZ 28, W7AMC 24, W7AIB 19, W7RXH 11, W7AXT 6, K7JRE 1. (May) W7HMA 200 ,K7MIGA 69.

PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—WA6-WNG has activated WB6CRC for the summer months and is active as NCS on PAN and RN6 and is manning several liaison spots as well. W6IDY made the BPL. WA6KLL and W6TYM renewed as OOs. Please note the expiration date on your certificate and drop me a line asking for renewal or cancellation. W6YKS is playing with RTTY machines. W6UZX and W6IDY dropped by for a visit. KØPIV/6 QNIs NCN from Alameda and is a new ORS. WB6RKQ is now WB6FHH again. Our SEC, WA6OLF, has resigned and I am looking for a replacement. I would like to thank Jack for the hard work and time he put into the job. WA6WNG/WB6CRC made the A-1 Operator club. The news is a little short this month because of vacations, etc., mine included.

BAN	0145Z Dy.	146.7 Mc.
NCN	0300Z Dy.	3.635 Mc.

Traffic: W6IDY 833, W6TYM 241, K6LRN 215, WA6-WNG/WB6CRC 118, WA6FBS 40, W6YKS 32, WB6RKQ/WB6FHH 19.

HAWAII—SCM, Lee R. Wical, KH6BZF—Asst. SCM/SEC: Ernie J. Kurlansky, KH6CCL. PAM: WØPAN/KH6. RM: Vacant. V.H.F. PAM: KH6EEM. Join a net today.

Net	*Freq. Mc.*	*Time*	*Days*
Friendly	7.290	2030Z	M-F
50th State	3.895	0500Z	Tue.-Sat.
No Ka Oi	7.290	2230Z	Sat.
Makuli	14.250	0700Z	Nightly (When no DX coming in).

KH6GG coordinates the following:

RACES 40	7.225	1930Z	2&4 Sun.
RACES 10	28.700	1930Z	2&4 Sun.
RACES 6	50.252	1930Z	2&4 Sun.
RACES 2	147.000	1930Z	2&4 Sun.

While on a recent business trip I had the pleasure of visiting the Litton Industries ham shack, WA6UYP. I also had the pleasure of meeting W6EKJ and his XYL. Those who attended the Southwestern Division Convention from Hawaii were WA6MLW/KH6, K8HQR/KH6, KH6CUP, and KH6AIN, K3DIO/KH6 and his XYL have announced the birth of Michelle Elaine, May 16. KH6CIO is up and around after minor surgery. KH6-DEM broke through to the West Coast on 6 meters. Bob uses 500 watts on 50.135 USB. WØPAN/KH6 has worked 99 countries in the past year and has obtained his WAC 2XSSB. WA4SIH/KH6 has been working on 10 meters. KG6AIG has been maintaining his brasspounding activities. The Reverend Tom Cardona, Kona Gospel Chapel, P.O. Box 696, Kealakekua, Kona, Hawaii, would like to get in touch with active amateurs in Kona or Hilo to give him some help. W6EDG, secy. of the Honolulu ARC, writes that the club needs interested hams to come and enjoy fellowship or working in the newly-renovated workshop at the rear of Bldg. 22, Fort Ruger. Traffic: (June) KG6AIG 85, KH6BZF 8, WØPAN/KH6 1, KH6CCL 1. (May) KG6AIG 116, KH6EOQ 12, KH6-CCL 3, WØPAN/KH6 1.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU, W7AAF, WA7ECT and K7RBM each are doing an FB job on NCN for Nevada. The Nevada emergency nets, on 3825 kc. s.s.b., meet at 1900 local time, Mon. and Thurs. More Nevada stations are needed to check in for better Nevada coverage. WA7CFS, keep up the good work. WA7BEU and W7PBV attended the NARA meeting in Reno and enjoyed meeting the gang again and hearing W1ICP give a fine talk on antennas. New officers of the NARA are W6YKN, pres.; W7SRM, vice-pres.; HH2PR, secy.-treas.; W7CX, trustee; K7-WLX, sgt. at arms. Nearly fifty amateurs took part in a fourteen-day search for a missing six-year-old boy in the rugged mountainous terrain west of Las Vegas providing communications for the Clark County Sheriff's Dept., Nellis AFB, Lake Mead Navy Base and Forest Service. K7RKH/7, in Arizona, is working K7ICW on 220 and 432 Mc. K7ICW now has 3 states and 2 call areas on 432 Mc. W7KOI was in the Vermont QSO Party and K7RBM in the CD Party put Nevada on the map. Traffic: WA7-ECT 59, K7OHX 9, W7KOI 8, W7PBV 4.

SACRAMENTO VALLEY—SCM, John F. Minke, III,

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	Model	Input mc	Output mc
2M	301-D	144-148	50-54
	301-E1	144-145	.6-1.6
	301-E2	145-146	.6-1.6
	301-F	144-146	28-30
	301-Q	144-148	14-18
	301-R	144-148	7-11
	301-S	143.5-148.5	30-35
6M	301-B1	50-51	.6-1.6
	301-B2	51-52	.6-1.6
	301-C1	50-54	7-11
	301-C2	50-54	14-18
	301-J	50-52	28-30
20M	301-G	13.6-14.6	.6-1.6
CB	301-A1	26.5-27.5	.6-1.6
	301-A2	26.8-27.3	3.5-4.0
40M	301-K	7-8	.6-1.6
CHU	301-L	3.35	1.0
WWV	301-H	5.0	1.0
Int'l. Marine	301-I1	9-10	.6-1.6
	301-I2	15-16	.6-1.6
	301-M	2-3	.6-1.6
Aircraft	301-N1	118-119	.6-1.6
	301-N2	119-120	.6-1.6
	301-N3	120-121	.6-1.6
	301-N4	121-122	.6-1.6
	301-N5	122-123	.6-1.6
	301-N6	123-124	.6-1.6
Fire Police VHF Marine etc.	301-P1	154-155	.6-1.6
	301-P2	155-156	.6-1.6
	301-P3	154-158	7-11
	301-P4	154-158	104-108
	301-P5	156.3-157.3	.6-1.6
Weather	301-W1	162.55	1.0
	301-W2	162.55	10.7
	301-W3	162.55	107.0
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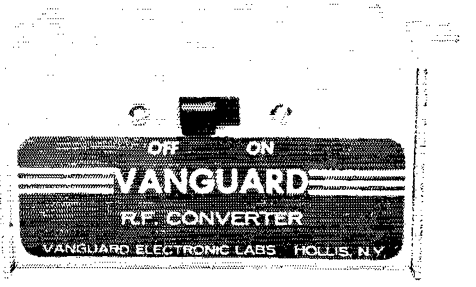

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WA6JDT—SEC: WB6BWB. ECs: WB6MXD, K6RHW, W6SMU, WA6TQJ.

Net	*Freq.*	*Time*	*Days*
SVN	146.28 Mc.	0330Z	T-Sun.
NCN	3635 kc.	0330Z	Daily
YCCD	146.94 Mc.	0200Z	Wed.
SCEN	146.28 Mc.	0400Z	Wed.

Field Day messages were received by the SCM from WB6SHO, W6AK/6, WA6DDO/6, WB6GEO and W6AF/6. W6GDO and W6ZJW participated in the May FMT with excellent results. W6GDO has increased his 432-Mc. DX to 493 miles with K7AUO/7 in Oregon. WA6CXB was too busy cooking for W6AK/6 during Field Day to do much operating. WA6FWU has returned from vacationing in Florida. W6ZJW is going on 20 meters after 20 years of operating on 40 meters. Hope your bandswitch turned easily, Dick. WB6PHQ made 114 QSOs during Field Day Class C operation. The Nevada Co. Net meets at 1100 Sat. and Sun. on 52.525 Mc. with the new club call for K6ASU. The group now has 8 members in the AREC including W6ZUZ, WA6NRD, K6RPN, WA6QFS, WA6NRC, WA6EWX, WB6JGK and K6VKR. K6RHW is the EC. When your SCM was at the old QTH he had K6EYE as a next-door neighbor (antenna 25 feet away). At the new QTH it is W6GML (but no antenna). Traffic: (June) W6LNZ 69, WA6TQJ 67, K6IKV 21, WB6EAG 8. (May) WB6QZL 37.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD. SEC: W6KZF. During the June FD activity W6PW and W6MLK were active in San Francisco, W6SG and W6JTP in Marin, WB6AGP and W6LFJ in Sonoma County, WB6SBS in Mendocino County and the Humboldt Radio Club operated from Kneeland Peak. K6SAA went to FO8-Land to help celebrate Bastille Day. WB6KHI has added RTTY operation to his setup. W6KVQ was elected EC for the Mission Trail Net. WA6JUV reports frustration in trying to work another station in the section during the last V.H.F. Contest. K6TZN has a Hy-Tower vertical in place at his Weott QTH. W6HSA and W6AVX were interviewed on KPFA on the San Francisco Radio Club's Field Day action. WA6IVM placed first in the 7-Mc. part of the All-Asia Contest—getting his notice through the JARL. New AREC members are WN6SRM and WB6QAT. K6BAQ lost his mobile coil in a collision on the freeway with a pigeon. At a recent Western Region Red Cross Disaster meeting W6MLK, the club station of the HAMS, in San Francisco, was singled out for commendation. W6JWF, W6GHI and W6GGC attended the preparedness meeting. W6CYO finds 20 meters open early in the morning to Asia. WA6ROJ moved to the East Bay section with his new QTH in St. Helena. The Section Net continues to meet Mon. and Fri. with WB6JOX holding down N/C from Eureka with a powerful s.s.b. signal. Check in at 1830 local time on 3900 kc. WB6GVI has moved to a new QTH. WB6IUD lost the power in his plane while over the Coast Range and shed the wings by flying between two trees. Ira and his passenger emerged with only minor injuries. W6IFO had his SB-34 lifted from his car while in Sacramento. The Northern California Net still is looking for more check-ins from the section. WB6AIS continues to improve after major surgery early this year. W6BIP was active in the July CD Party. W6GGC and XYL Rose made a bus trip through Canada and the east in April and May. K6BU came out of hibernation to attend the Marin Club meeting in July. Anyone in the section wishing a copy of the *San Francisco Section Courier* should drop a line to the SCM. A new OPS is WB6KHI in San Rafael. Traffic: (June) W6KVQ 236, W6WLV 225, K6SAA 45, WB6GLD 30, WB6GVI 12, WB6KHI 12, WA6AUD 11, W6BWV 11, WB6IMO 11, W6CYO 10, W6BIP 8, K6TWJ 7, WA6IVM 4, K6TZN 2, WB6FZH 1. (May) W6WLV 184, W6FAX 10.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—The Central California Single-Sideband Assn. held its stag night dinner at Stella's in Visalia, with 24 in attendance June 17. WB6OQE is on 75-Mc. s.s.b. regularly. WA6HMP is on 2 meters. W6EYO has moved to Visalia. W6UHN has a Swan 350. WA6TQL, on his recent trip had difficulty keeping a sked with the boys back home. WA6FUF has moved. W6COB is going on s.s.b. W6RRN is the proud owner of an Eico VOM. WB6IGD, WA6ZLP, WA6FUF and K6AXV participated in the V.H.F. Contest. W6TO operated at Kearney Park during Field Day with good success. W6ZU operated from Delano High School during FD. W6DJX operated 30 miles east of Bakersfield during FD. W6BXN operated at Hatfield State Park, in Merced county during FD. WB6GIT is building a linear amplifier. WA6OWE got his linear working. The Central California S.S.B. Assn. boasts 28 members. K6KRN, K6RGZ, WA6CUZ and K6ROU operated from Mill Creek above Fresno for FD and reported that "fresh air was good." W6TRP is

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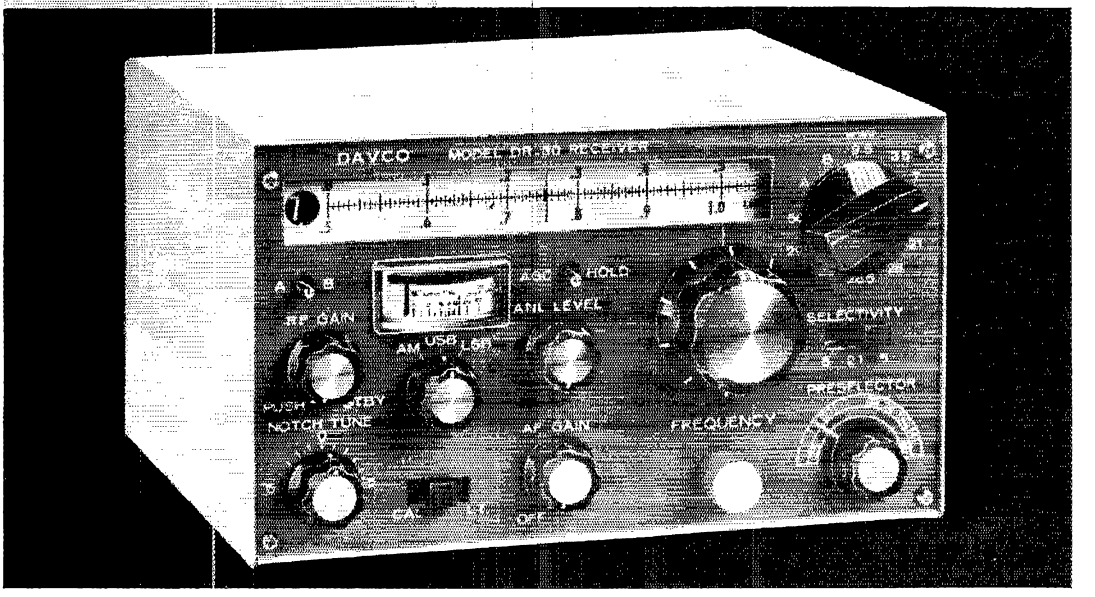

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mobiling on 40 and 75 s.s.b. W6JUK operates mobile with a Galaxy V. WA6TZN visited in Fresno during his leave from the Navy. WB6FRM is vacationing from BYU. WA6YPM is playing around with f.m. equipment. Now that summer is over, vacations are done with, how about sending me some activity reports? Traffic: W6ADB 328, WB6HVA 132, WB6PCQ 83, WA6TZN 30.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM, Ed Turner, W6NVO. SEC: WA6HVN. RM: W6QMO. The SCM received eight messages from stations in the Field Day Test this year. From the crowded conditions on the bands and the number of stations who give S.C.V. as their section, there were many, many more. Speaker at the June meeting of the PAARA was W6DEF, EC for Redwood City/Menlo Park area and NTS traffic expert. Members looked forward to a report on Bay Area Rapid Transit for the July meeting. June activity for the SCARS was the planning for Field Day. The new club officers for SPARK are WA6JAO, pres.; WA6QQI, vice-pres.; W6UQW, secy.; W6BIP, treas. The club meets at the cafeteria building at Philco. The SCCARA June meeting featured a talk on DX by W6UMI. W6ZRJ again is NCS for NCN Wed. W6SAW is very QRL with Navy MARS traffic but finds time to keep up his OO operations. WA6TZN/6 operated in the section for two weeks but is now back at service school in San Diego. K6YKC reports a need for East Bay outlets on NCN. W6MMG reports that the Aeronautical Radio Group operated Field Day from Skyline Blvd. using the call W7KW/7. WB6IZF reports for the King City area. Ed is active in EC and OES work. W6OH is active from Carmel on MTN. Frank is OPS. K6GK reports poor conditions on 40 meters. W6RSY made the BPL. W6YBV uses a TBW on NCN and RN 6. WA6CVU is active as ORS from Cupertino area and works NCN, RN6 and PAN. W6DEF visited ARRL Headquarters. Hal reports that K6MPN pres. of SCARS, is laid up with a heart attack. W6HC has his kw. final on, and now he needs a good antenna to go along with it. K6GK reports for operation of W6UW. SCCARA Red Cross station, and says that he handled 3 transmitters at Field Day at various times for the group. SCCARA Field Day was at Mt. Hamilton. W6VZT reports that the Santa Clara County RACES Field Day was at Montabello School and the group worked 650 stations with one transmitter. WB6NXK works NCN and PCN. W6QMO mailed numbered radiogram sheets to all ORSs in S.C.V. as part of her RM job. W6AIT is more active on NCN until school time in the fall. W6AUC is active as OO and on several nets. Traffic: W6RSY 1853, W6YBV 372, WA6CVU 260, W6DEF 61, W6HC 50, W6QMO 46, W6ZRJ 43, W6SAW 29, W6AIT 26, W6AUC 19, W6OH 15, K6GK 14, W6UW 12, WB6NXK 9, WA6TZN/6 6.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK. RMs: WA4ANH and K4CWZ. PAMs: W4AJT and WA4LWE. V.H.F. PAM: W4HJZ. K4TTN says he was very much surprised to see that he made the top ten in the CD Party. WA4ICU is at Governor's School this summer and will not be doing much netting until it's over. WA4KWC worked FD with the Buncombe County ARC and reports 6 meters was open to 2-, 5- and 6-Land with good signals. WA4ANH says he finally worked Salisbury on 2 meters and had a nice chat with K4YYJ and K4MHS. W4WUW has moved into his new home and has his 80- and 40-meter antennas up and is back on the air. Albert W. Parker, W4BAW, New Bern, a beloved old-timer, this state's oldest Emergency Coordinator, an amateur poet and philosopher and an outstanding amateur, has passed on.

Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
NCN(E)	3573 kc.	2330Z	Daily	189	K4CWZ
NCN(L)	3573 kc.	0300Z	Daily	119	WA4ANH
THEN	3865 kc.	0030Z	Daily	103	K4ODX
SSBN	3938 kc.	0030Z	Daily	61	WA4LWE
QTC TFC	7215 kc.	1800Z	——	249	WA1FGD/4

Traffic: (June) W4LEV 3384, WB4BGL 214, W4EVN 195, W4IRE 161, K4BUJ 81, K4EOF 56, K4CWZ 47, WA4UVH 39, W4UWS 39, K4EO 36, WA4UFQ 34, WA4NUO 32, WA4CFN 23, WA4ANH 21, WA4FJM 20, W4BNU 19, WA4VTV 14, WA4KWC 7, K4ZKQ 6, W4AJT 5, WA4ICU 3, K4TTN 2. (May) W4OTE 192, K4GNX 24, WA4LWE 23, WA4VTV 20.

SOUTH CAROLINA—SCM, Clark M. Hubbard, K4LNJ—SEC: WA4ECJ. Asst. SECs: W4WQM, WA4EFP. RM: K4LND. PAM: WA4RUB.

SCN	3795 kc.	Daily	0000Z 300Z	
SCSBN	3915 kc.	M-F	0100Z. S-S 0000Z	June Traffic 172
SCSN	3795 kc.	Daily	2330Z	

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North Augusta and the low country radio clubs participated in the QSO Party Aug. 13 and 14. Certificates will be awarded. The Greenville V.H.F. Society operated on top of Sassafras Mountain during the V.H.F. QSO Party. Those operating were K4GWY, WA4HTV, WA4STI, WA4VZK, WA4SSP, WB4BVF and WA4LTS. Forty-six states were copied on 50 Mc. June 1 by WA4LTS. Operations reports on Field Day were received from the Anderson, Rock Hill, N. Augusta, Aiken, Greenwood, Greenville, Charleston, and Columbia radio clubs. Nearly all operated under emergency power and conditions. The SCSBN roster has been released by K4BMI and W4WQM. Traffic: W4PED 79, WA4QKQ 63, K4LNJ 53, WA4LDM 37, W4NTO 35, K4OCU 28, WA4ICF 19, W4JA 17, WA4AMM 8.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—RMs: W4SHJ, K4LJK, WA4EUL. PAM: K4SCL. Too *many* vacations along with hot weather make for a short report, but if you worked W8GSJ in the CD Party it was W4DVT in his Michigan retreat. The reports of usual FD pitfalls and good times are too numerous to list. The PVRC Reunion turned out 95 on-the-air members scattered all over the world. K4ASU is going to town with DX and traffic from a new location. W4ZAU is leaving the section for studies but will return. K4ITV is the latest addition to the A-1 Operators Club. Newcomers to s.s.b. are W4KMS and K4SDS. W4WRC recently was married to the cousin of K8KBT. Election of Division Directors is approaching; consider your choice carefully but by all means vote. Traffic: W4RHA 401, W4SZT 191, WA4OHZ 150, WA4EUL 147, W4NLC 142, W4DVT 121, W4OWE 100, W4ZM 96, WA4UMX 87, W4BWF 78, K4LJK 75, K4KNP 44, K4SCL 38, WA4DAI 34, K4ITV 33, K4FSS 32, K4ASU 26, W4KFC 26, W4KZC 17, WA4TNS 17, W4ZAU 16, K4SDS 12, W4BZE 10, K4LMB 10, W4MK 10, WA4QOC 10, K4PIK 7, W4SHJ 6, WA4FEY 4, K4VCY 4, W4JXD 3, W4KX 3, W4TE 3, W4JUJ 2, K4YEE 2.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM —SEC: W8SSA. RMs: K8TPF, W8LMF. PAMs: K8CHW, W8IYD. C.W. Net Mgr.: WA8GRE. Nets meet on 3570, 3890, 3903 and 3905 kc. W8IRN of South Charleston, received the Outstanding Amateur of the Year Award at Jackson's Mill. Kanawha Radio Club won the '65 ARRL Field Day award. W2JE, of QCWA, presented the Charter for the Central WVA Chapter to W8PZT, pres. Those present were W8AKQ, W8BOK, W8CDV, W8CLX, W8DYB, W8EHA, W8ESQ, W8HZA, W8JM, W8PZT, W8QR and W2JE. K8YQG has moved to Weirton. W4KFC, W8PQQ, W8IRN and K8YBU conducted a DX forum at the Mill. K8CHW reports for WVN Phone 22 sessions, 443 stations, 68 messages. W8IMX now provides an outlet for Wierton traffic on WVN C.W. W8MLX is the new chairman for the Red Cross Disaster Service, Charleston area. K8CUZ and W8FVU are new OOs. To K8BIT, Gen. Chairman of the state convention and his committees, thanks for a job well done. Traffic: WA8POS 147, W8CKX 62, W8HZA 57, K8BIT 40, WA8QND 36, W8GCL 14, WA8KCO 10, K8TPF 8, W8MQB 6, WA8NDY 5, WA8RQB 5, K8WMQ 5, K8SDH 2, K8WWW 2, K8CFT 1, K8CHW 1, WA8CRW 1, WA8GGI 1, W8KUZ 1, W8UHK 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crumpton, KØTTB—Asst. SCM: A. E. Hankinson, WAØNQL. SEC: WØSIN. WAØNQL has written this month's report. Congratulations to the Colorado Springs group on a well-conducted Division Convention. Many favorable comments have been noted. Some highlights other than the scheduled program was the presentation of citations to KØYSK and WØGVT by ARRL and in cooperation with the Governors Committee. The citations were for personal heroism in physically saving lives in the June '65 flood. K7NHL, 12th Region Net Manager and Asst. SCM for Arizona, conducted the traffic meeting. KØMZN, from Pueblo, and WA2WBA/Ø, two top-notch traffic-handlers are both leaving the section; Del to Rapid City, So. Dak., and Marty to parts unknown at this time. The Arapahoe County AREC is progressing rapidly in converting ARC-1 units for 2 meters. Plan now for the Simulated Emergency Test this fall. The Denver Radio Club and the Hamsters are active in the Denver area. No reports were received from any other clubs in the section, so my condolences to all the club secretaries who have broken their arms. The High Noon Net and Columbine Net are active and well-organized but more check-ins from remote areas are always welcome. The High Noon Net reports an average QNI 22, average QTC 7 per session. Traffic: KØZSQ 75, WØSIN, 43, WØHEP 14.

NEW MEXICO—SCM, Bill Farley, WA5FLG—Well, Field Day was a lot of fun again this year. The Mesilla Valley Radio Club went up to the cool pines in Cloud-

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SM2 MIKE	27	SX71	117	HK1B KEYER	27	HP10 DC SUPPLY	27
DRAKE 1A	99	SX117	229	GONSET GR211	47	DOW TR SWITCH	6
DRAKE 2B	199	SX122	199	SUPER 12 CONV	29	SWR BRIDGE & NTR	12
DRAKE TR3	399	SX140	79	MONITONE	19	100KC XTAL CALL	9
DRAKE TR4	519	SR160	219	ELMAC PMR7	57	RF Z ANT. BRIDGE	14
DRAKE R4A	349	HT44	239	NCX5	399	R46B SPEAKERS	7
SWAN 240	217	PS150-120AC	89	NC155	119	KNIGHT VTVM	17
SWAN 350	349	PS150-12DC	77	NC300	139	P&H DD1 SCOPE W/ tone oscillator	57
SBE34	339	B&W LPA1 LINEAR	129	HR050TIR & COILS	147	TRIPLETT 3414	47
SB2LA LINEAR	209	CHALLENGER	69	HW30 2ER	44	HICKOK R20 VTVM tube,trans ckr.	37
THOR 6&AC	199	TR SWITCH	19	HEATH HR10	67	HEATH A111 STERO	27
GLEGG 99ER	77	RANGER	107	GR54	37	FISHER FM90X TR	79
EICO 722VFO	37	RANGER II	149	GR300	229	HAMMARLUND SPKS	7
EICO 730	37	KNIGHT VFO	32	SENECA	177	24 HOUR CLOCK	8
HE45A	57	T150A	79	TX1	139		
OLSON 6	79	R100A	77	DX60	67		

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croft. The Alamogordo bunch went to White Sands National Monument. Up in Los Alamos all kinds of rare ones were worked. Your SCM visited in Albuquerque and spoke at the Saturday morning breakfast. While there I presented the PICON award to WA5ALY. This was indeed a pleasure. Your SEC, K5HTT, also was present and has finally lined up someone to act as EC for that area. Incidentally, the meeting of the heads did take place in the Tiki Kai after all. K2YAE/5 is now on from White Sands Missile Range so let's get on 2 meters and work some really rare ones. WN5POG and W5BLJ are really working the rare ones on 2. Your SCM would like to hold a state-wide convention and swapfest so any club that could help or could run the affair should write to him. Many thanks to Lew McCoy, W1ICP, Novice Editor of *QST*, for a very interesting speech in Alamogordo. Traffic: WA5DUH 82, K5HPJ 64, K5VXJ 50, W5UBW 37, W5WZK 26, K5ONE 22, W5DMG 13, K5HTT 12, WA5FLG 11.

UTAH—SCM, Marvin C. Zitting, W7MWR/W7OAD—Asst. SCM: Richard E. Carman, W7APY. SEC: W7WKF. Section nets: BUN meets daily on 7272 kc. at 1930Z; UARN Sat. and Sun. on 3987.5 kc. at 1500Z. During Field Day the Bountiful RC operated W7OSQ/7 on Bountiful Peck, the Ogden RC was on Little Mountain operating W7NPU/7 and the Utah RC (Salt Lake City) was on Wolf Creek Pass with W7LRA/7. WA7DXD, Salt Lake City, also was very active during Field Day. W1IKE, of ARRL Headquarters, gave an interesting talk on current League activities at a special UARC meeting. Utah amateurs attending the Division Convention in Colorado included W7WKF, WA7AIA, W7BAJ, W7OCX and W7VSS. W7POU is recovering from an operation. K7RAJ reports that he is getting the radio equipment in top shape. This will be my last report as SCM. Thanks to the many amateurs who have given their support to make these reports possible. Traffic: W7OCX 137, W7MWR 12, WA7AUW 5.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: W7YWE. RM: W7BHH. PAMs: W7TZK, K7SLM. OBSs: W7TZK, K7SLM, K7ZHT, WA7DNZ. Nets: Pony Express, Sun. at 0800 on 3920; YO Mon., Wed., Fri. at 1830 on 3610; Jackalope Mon. through Sat. at 1215 on 3920. K7QGV is busy on the c.w. bands. WA7BFV vacationed in Iowa the latter part of June. Marshall, ex-W7NVI, dropped in at Field Day quarters for an enjoyable visit. He is now in California and plans to become more active in the near future. The Rocky Mountain League Officials have an informal get-together on 3990 Tue. at 1830 MST. Everyone is invited to drop in if they have questions about ARRL, etc. The frequency is still tentative. Traffic: WA7CLF 100, K7SLM 74, W7HLA 16, W7BHH 14, W7TZK 7, K7AHO 6, K7LOH 4, W7BKI 2, K7HHW 2, W7ION 2, W7NKR 2, K7POX 2, K7RFL 2.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—Asst. SCM/SEC: William C. Gann, W4NML. RM: WA4BXA. PAM: K4WHW. The first Alabama QSO Party seemed to have created a lot of activity. K4KJD, K4GHX and K4JSL are on the hospital list. June net reports (times in GMT):

Net	*Freq.*	*Time*	*Days*	*Sess.*	*Ave. Tfc.*	*Ave. QNI*
AENB	3575 kc.	0100	Daily	31	5.0	5.6
AEND	3725 kc.	2400	Daily	30	1.5	4.9
AENH	50.7 Mc.	0200	Sun./Tue.	7	.28	20.0
AENM	3965 kc.	0030	Daily	30	4.43	39.7
AENO	50.55 Mc.	0115	T/T/Sat.	15	1.0	11.0
AENR	50.52 Mc.	0115	Wed./Fri.	8	0.0	20.13
AENT	3970 kc.	2230	Daily	32	1.2	6.09

The SEC received traffic from seven FD groups. There was a good Alabama turnout for the V.H.F. QSO Party. It's time to start planning for the Oct. SEC. New equipment: K4NKT, a TR-3; WA4EXB, an HW-12. Get your Form 1 in by the first of each month. K4KJD made his third BPL. Congrats, Billy, and hurry out of the hospital. Traffic: WB4BMO 194, WA4EXA 186, W4NML 142, K4KJD 132, WØHXB/4 83, K4AOZ 78, WB4APL/4 73, K4BSK 71, K4HJX 59, WA4UXC 30, K4WOP 25, WA4EEC 24, W4HON 16, K4NSU 14, K4WHW 14, WA4FYO 13, W4GRG 9, WA4DGH 7, K4CZZ 4, K4UUC 3, WA4WLD 3, WA4AWW 2.

CANAL ZONE—SCM, Mrs. Lillian C. Smith, KZ5TT—SEC: KZ5MV. New calls during June: KZ5AQ, KZ5EE, KZ5HT, KZ5US and KZ5CBN. The CZARA's annual transit of Gaillard Cut took place July 8, with approximately 80 hams and XYLs aboard from the CZARA, Crossroads and Panama radio clubs. Successful Field Day operations were reported by the CZARA, USAFSO MARS and USARSO MARS, despite a severe wind and rain storm June 25. KZ5MV reports that v.h.f. (2 meters)

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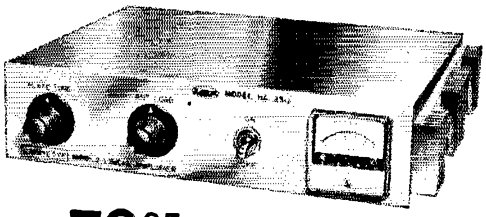

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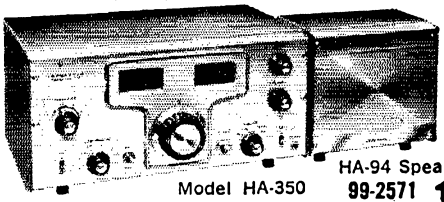

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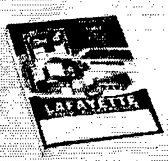

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recently proved very valuable by providing communications for a remote radar site when lightning knocked out telephone lines. Increased c.w. activity on 15 and 10 meters is reported. KZ5DM and KZ5GE are vacationing in the States; KZ5DM is operating mobile from a new trunk camper. Traffic: KZ5JC 64, KZ5MV 44.

EASTERN FLORIDA—SCM, Albert L. Hamel, K4SJH—SEC: W4IYT. RM C.W.: W4LUV. RM RTTY: W4RWM. PAM S.S.B.: W4OGX. PAMs: W4SDR, W4TUB. V.H.F. PAM WA4BMC. Once again news items for this column are scarce. I believe that this is mainly because most traffickers are using radiogram reports only and not following up with a mailed Form 1 which provides space for such little items that could appear here. A radiogram or postcard will bring you a half dozen Form 1 cards. Would appreciate your using them. *Please note*: A recent survey showed that we have a maximum capability of 180 traffic reports monthly. We are averaging 65. How come? If you don't know what it is all about ask your net manager—or your RM or PAM. *Be proud of what you are doing.* W4LUV, Mgr. of QFN and RM C.W., announces that a c.w. training net is being considered. Any comments? K4BNE and K4BY lost their antennas during "Alma." W4BKC mentioned that K4KRG, Orange County EC, is leaving us for three months but they are amply covered by able assistants. That's the way to run an AREC. Traffic: (June) WB4AIW 945, K4EVY 607, W4TUB 445, WA4BMC 367, WA4NEV 358, WA4SCK 347, W4DFU 300, W4FPC 214, W4LUV 128, K4BNE 125, WA4DEL 102, W4SDR 91, W4OGX 78, W4FP 67, K4KDN 67, WA4OHO 62, W4EHW 61, WA4RQR 61, K4SHJ 59, WA4PWF 45, WA4JYB 43, K4DAX 39, W4NUH 34, W4IYT 33, W4VDC 33, WB4CAP 32, K4BY 30, WA4CIQ 27, K4EBE 26, W4TJM 26, WA4BGW 24, W4SMK 24, W4HFR 22, WA4SHJ 21, W4GUJ 20, W4KRC 19, W4VPQ 19, W4MVB 18, W4BKC 16, K4ENW 16, W4IE 12, W4DVO 11, K4TQL 10, WA4IVE 9, W4ILE 8, W4LMT 7, W4NFD/M 6, WB4CQJ 3, W4BAV 2, K4MTP 2. (May) W4OGX 75, W4VWL 70, K4IWT 68, WA4PDM 68, W4GUJ 48, W4IYT 42, W4IEI 29, K4EBE 11, WA4MOL 9, K4IEX 6, W4KRC 6, WA4QLZ 3.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP. SEC: W4DDY. RM: W4CZN. PAMs: K4PKK, WA4JSU, W4KR. WA4WDE. W4LRR reports community objection to his power may result in court action. WA4UET has a new Swan 350. WA4ARV made 74 10-meter contacts on Field Day. The Griffin Annual Ham Picnic will be held Sept. 10 at Dundee Lake. K4YZE sponsored Cobb County Field Day again this year. W4HYW participated in the CHC, N.Y. QSO Party and Field Day. He received a c.w. certificate for Armed Forces Day. WA4LLI received a certificate award from the Navy for work during Hurricane Alma on Navy MARS. Steve retired from the Navy June 30.

Net	*Freq.*	*Time (GMT)*	*Sess.*	*QNI*	*QTC*
GSN	3595	0000 & 0300	59	591	193
GSSN	3975	0100	Not reported		
GTN	3718	2200	31	260	62
G. Teen Net	3855	1600 Sat. 2130 Wed.	9	57	21
Cobb Co. AREC	145.8				
NEGEN	52.250	1730 Sun.			

WA4UYT is working on surplus v.h.f. gear. W4FQX enjoyed the Swan 350 portable while on vacation. W4FFE (Athens Club) checks into GSN with a 1-watt rig. Welcome to K1IIK/4, at Fort Gordon. Traffic: W4PIM 170, W4FOE 134, W4CZN 100, WA4POM 68, W4TFL 58, WA4JSU 49, K4NFP 46, K4YZE 34, K4BAI 31, W4DDY 31, WA4JES 28, W4HYW 26, W4RZL 17, WA4LLI 14, WA4OVS 14, WA4UYT 11, W4FQX 10, WA4WKZ 10, K4UUM 9, K1IIK/4 8, WA4WDE 7, WA4FUN 6, W2TPV/4 3, WA4BVD 3, K4SES 2.

WEST INDIES—SCM, Albert R. Crumley, Jr., KP4DV—KP4WT again leads all known traffic-handlers since she is the only one reporting by card. KP4CMP now is active from U.S. Coast Guard Base and reports that KP4CNO and KP4CNK have returned to the continental mainland and that KP4CNW is back on RTTY again! KP4BFI operates from Coast Guard Hangar on San Juan Naval station. KP4DV is very QRL with CAP summer activities and leaves "info-gathering" to son KP4BJU, who is home for the summer vacation from Georgia Tech. The PRARC holds regular meetings now for both the directors and members. KV4BV, John Newman of Saint Thomas, V.I., reports he is trying to organize a V.I. amateur radio club to stimulate interest in his area. KP4DV and W3ZA met with Director Bolvin, W4LVV, at Fort Lauderdale, Fla., June 24. KP4CK/CL, of the PRARC, invites P.R.-V.I. hams to attend PRARC meetings. Traffic: KP4WT 254, KP4DV 4.

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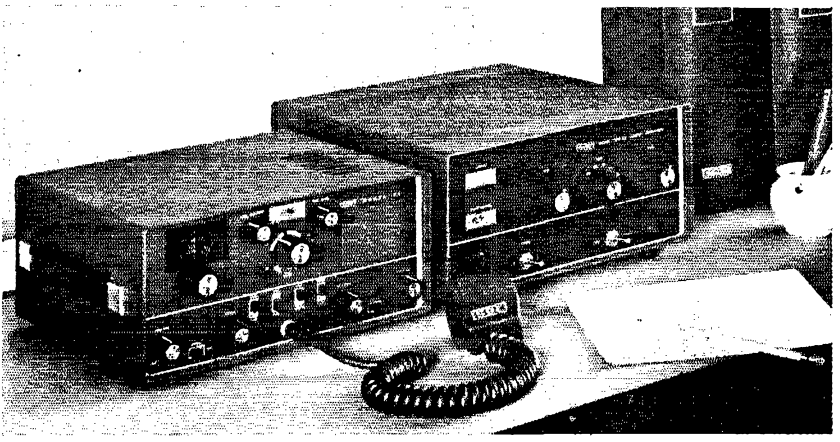

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WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE. PAM: WA4FIJ. RM: W4BVE. Section net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
WFPN	3950 kc.	2300Z	Daily	31	750	207
QFN	3651 kc.	2230/0300Z	Daily	60	—	—

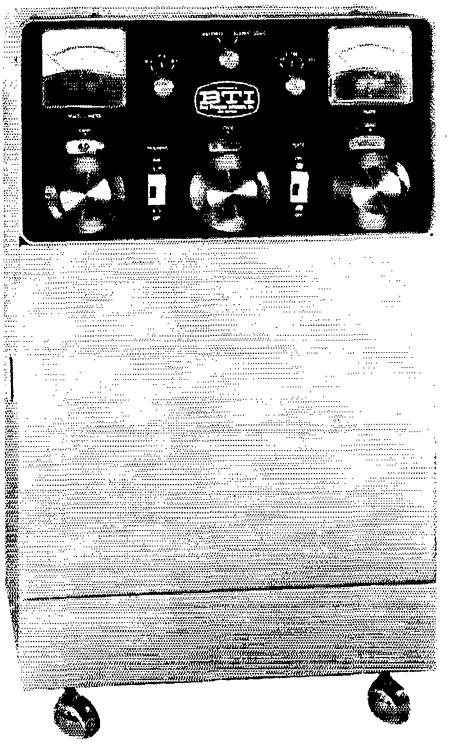
Hurricane ALMA traffic was handled with ease by Nets Bravo and Charlie. Pensacola: The PARC had 9 operators out for FD on Bayou Grande, near K4SOI's QTH. Ft. Walton/Eglin: The Bowlegs Festival 2-meter transmitter hunt drew a record 13 entries. Winners in order were WA4EVU/WA4WAX, W4RKH and W4AQN/W4AMRD. In the July hunt W4RKH was so well hidden that only the team of WN4CNS/WA7ABH found him without assistance. WA4DYN and WA3APO joined the 2-meter gang. WN4API is QRL school work. W4SRX tried a new FD site and topped last year's score. New EARS officers are WA7ABH/4, WA3BVI/4 and W4RKH. Milton: K4NMZ received WAS and WAC awards. Defuniak Springs: W4CDU is active on 75 meters. Panama City: WA4JIM went mobile with an HW-12. The PCARC operated FD from USNMIDL with 7 operators. K4VFY has a summer job as radio operator with an oil exploration ship in the Gulf. Panacea: W4LDT is associated with the Marine Research Labs at nearby Alligator Harbor. Traffic: (June) W4BVE 114, K4NMZ 108, WA4EOQ 87, K4VFY 29, K4BSS/4 18, WA4JIM 13. (May) K4BSS/4 112.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colvar, W7FKK—SEC: K7NIY. PAM: W7CAF. RMs: K7NHL, K7TNW. Section nets: Copper State on 3878 kc. nightly at 0230 GMT; TWN on 3570 and 7060 kc. nightly at 0300 GMT; Arizona PON on 3845 kc. Sun. at 2230 GMT. The new officers of the V.H.F. Club are K7VYR pres.; W7RVY, vice-pres.; K7UJV, treas.; K7YFD, secy. Congratulations to K7NHL on making his first BPL. To receive this award requires many hours of traffic-handling. Thanks, Bob, for the fine job you are doing with TWN. It is with deep regret that we note the passing of ex-W7RMB. W7AYY, K7NII and K7TES are active as OESs and are doing fine jobs in the reporting of their activities. Fine reports were received from OOs K7OIX and K7RUR. Traffic: K7NHL 607, K7RUR 7, W7FKK 6.

LOS ANGELES—SCM, H. G. Garman, W6BHG—Asst. SCM/SEC: W. R. Calkins, W1KUX/6 RMs: W6BIIG, WB6BBO, W6QAE. PAMs: K6MDD, W6MLZ, W6ORS. BPLers in June: W6WPF, K6EPT, WB6BBO. W6GYH still is on vacation in the eastern part of the U.S. WB6BBO is now operating 2-meter phone traffic. SoCal Six may vote again as to whether to join in with the NTS. EC WA6TYR is organizing the AREC in the Long Beach area. WA6TWS has seven rigs but only one works. WB6QMF is sporting a new HT-20 and building a sideband exciter. W6TXJ is very busy with USO third-party traffic. K6ASK is trying to improve his two-meter antenna system. WB6MQF is enjoying NCS and liaison duties on SCN. Final exams and summer school are hampering WB6KVA's activity. W6MLZ had a ball Field Day—79 contacts. WB6GGL fell off the roof while helping W6HIM with his antenna. WA6KZI completed a solid state 7-Mc. receiver for portable and mobile c.w. use. He also finished a new antenna for 21-Mc. c.w. operation. WB6BBH reports No. 1 son, Ken, still at Ft. Gordon in teletype school and a holdover. No. 2 son, Fred, still BM/3. W6NKR operated on Field Day from the Orange Section, 8600 feet up on Butler Peak. K6ZPE is on all bands, 3.5 through 144 Mc. K6UMV damaged his Tri-band beam during Field Day. W6PCP was on vacation. W6DQX, ex-K9ELT, is active in SCN with a new antenna. WB6BOW had his first QSO on 432 Mc. May 31 with K6GOM. WB6EED has 100 countries confirmed for DXCC. WB6GHB has a pair of 432-Mc. walkies operational with mikes and headsets for each unit, a 27-element 432-Mc. beam, CPO and a throat mike to give one walkie m.c.w. capabilities. WA6RTF completed radioman's "A" school (20 week course) in 6 days with a 95 + average. WB6JQU is building a new 60-ft. tilt-over tower out of aluminum. W1KUX/6 is very busy with AREC, Astronet and West Coast Emergency Net. WB6PIO worked his first JA on Field Day. W6PUZ participated in the June V.H.F. Contest under the call K6IBY approximately 10 miles south of Corona and worked 29 stations, 15 sections on 432 Mc. Best DX was W6GD/6, about 250 miles. WB6QEL has now worked 25 countries including rare VR4CR. He also reports a new net; the 40-Meter Amateur Radio Chess Club. Write WB6OFG or W6VDF for details, or check in Wed. aat 2000 local time on 7275 kc. W6SRE just got his two-meters going. The following should help those residing in the Southwestern Division to know what ARRL section they are in: Arizona Section—All counties in the

58. 90.9 21.



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State of Ariz. Los Angeles Section—Los Angeles County only. Orange Section—Inyo, Orange, Riverside and San Bernardino Counties. San Diego Section—Imperial and San Diego Counties. Santa Barbara Section—San Luis Obispo, Santa Barbara and Ventura Counties. In the officer election recently held the Citrus Belt ARC elected W6OHE, pres.; WB6ETE, vice-pres.; WA6YIL, secy. (reelected). The Eight Ball Net (EBN) meets Mon. through Fri. at 1615Z and Tue. through Sat. at 0230Z on 50.500 kc. The Southern California Net (SCN) meets daily at 0300Z on 3600 kc. By reason of personal work load and travel, and not being able to do justice to SCN, W6QAE has resigned as SCN Net Mgr. and K6IME has succeeded him. SCN, Southern California Net, operates at section level. NTS: comprising 4 sections of the Southwestern Division, ARRL, namely, Los Angeles, Orange, San Diego and Santa Barbara sections. Traffic: W6WPF 2550, K6EPT 2119, WB6BBO 620, K6MDD 363, WB6QNY 322, W6QAE 278, W6MLF 258, K6IOV 248, WB2MZG 99, WA6WKF 92, WA6TYR 75, WA6TWS 71, WB6QMF 70, W6TNJ 62, K6ASK 54, WB6MQF 44, WB6KGK 41, WB6KVA 39, W6BHG 36, K6LJ 33, W6MLZ 24, W6FD 22, WB6GGL 21, WA6KZI 21, WB6AEL 20, WB6BBH 18, K6CDW 13, W6NKR 11, K6UMV 10, W6USY 8, WB6GXI 6, W6PCP 6, W6DQX 5, W6AM 4, WB6KIL 4, WA6UCR 4, W6OI 3, W6QJW 3, W6DGH 2, W6HUJ 2, W6ORS 2, WB6RWF 2.

ORANGE—SCM, Roy R. Maxson, W6DEY—Field Day stations: WB6AES, WB6ASQ, W6TJ, WB6NRK, K6SYU, W6ZE. WB6IDJ, W6ULI, W6BAM. K6IME is the new net mgr. of SCN. W6AMO is on 20 with a quad and DX-100 looking for DX. WB6MVU is working on a transistorized v.h.f. converter feeding into a pocket radio. WA6TAG reports new AREC members are WA6WFW, WA6VUQ and WB6MDN. WA6OQM made the BPL three consecutive times. WB6LCO arrived home from FD to find the trash truck had caught and toppled his antenna. WA6IDN and WB6PXH are building a radio astronomy observatory with the help of some Cal Tech scientists. If interested in this field of u.f.o.s. contact WA6IDN, Bruce A. Johnson, 16971 Orange Dr, Yorba Linda, Calif. 92686. SoCalSix Net June report by WB6JFO: 62 sessions, 820 QNI, traffic 356, visitors 171. The net meets twice daily, 0200 and 1900 GMT, on 50.4 Mc. WB6SLG/6 is operating portable at El Mirage dry lake in connection with a low-level turbulence study. The investigation was undertaken by determination of the rate of separation of neutrally buoyant helium-filled balloon clusters. Traffic: W6ZJB 1082, K6MCA 510, WA6ROF 415, WB6JFO 260, WA6OQM 179, K6IME 59, W6WRJ 27, WB6NGE 26, WA6IDN 24, KOYVN/6 21, WB6MVU 12, WB6SLG/6 12, WB6LCO 11, K6ZPE 11, W6PQA 10, WA6VUI 6, K6GMA 5.

SAN DIEGO—SCM, Don Stansifer, W6LRU—WB6TKB, ex-WN6OFY, is a new Technician in Rainbow. K6RYI has moved from Fallbrook to the San Diego area. The Palomar Radio Club has the outstanding monthly newspaper for the section. It is edited by W6YZV. OES K6BTO now has a cavity signal generator for use on those v.h.f.s. OBS WA6QAY continues to put out Official Bulletins daily on 7110 kc. at 2100 GMT. WA6OSB reports an average of 10 or more check-ins on the 2-Meter F.M. Net, which meets Sun. at 8 P.M. local time on 146.840 Mc. He also reports a new ten-element 6-meter beam. The new Net Manager for SCN, the c.w. Southern California traffic net which meets daily on 3600 kc. at 0300 GMT, is K6IME in Tustin. Stations interested in traffic-handling on c.w. in any area of Southern California are welcome. WA6TAD has a new Polycom 6-meter rig and reports working W1, 2 and 3 with it during Field Day. Vice-Director W6ECP has been a mainstay in handling San Diego traffic on c.w. during the summer from SCN with both W6BGF and W6LRU out of town. Traffic: K6BPI 9691, W6YDK 8848, W6VNQ 849, WB6JUH 595, WB6GMM 541, W6EOT 350, W6ECP 39, W6LRU 31, WB6NMT 18, WA6TAD 12.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN/WOCUG—SEC: WB6NDP. RM: W7WST/6. The following clubs sent Field Day reports: Simi Valley ARC—7 operators, Ventura and Santa Clara ARC—11 operators, Estero ARC—8 operators and the Satellite ARC—11 operators. The Simi Club used Pine Mountain, which has an elevation of 7510 feet, and I had the pleasure of spending Sunday with them. The Ventura Club used Dennison Park and the Satellite Club used Orcutt Hill. W6ORW reports he is on RTTY and keeps a sked with W7SPB (his father). W6NY has purchased a hilltop antenna site and expects to start building the shack soon. K6GV is building a new linear. Would you believe it has 20 tubes? Traffic: W6ORW 12.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: W5PYI. PAM:

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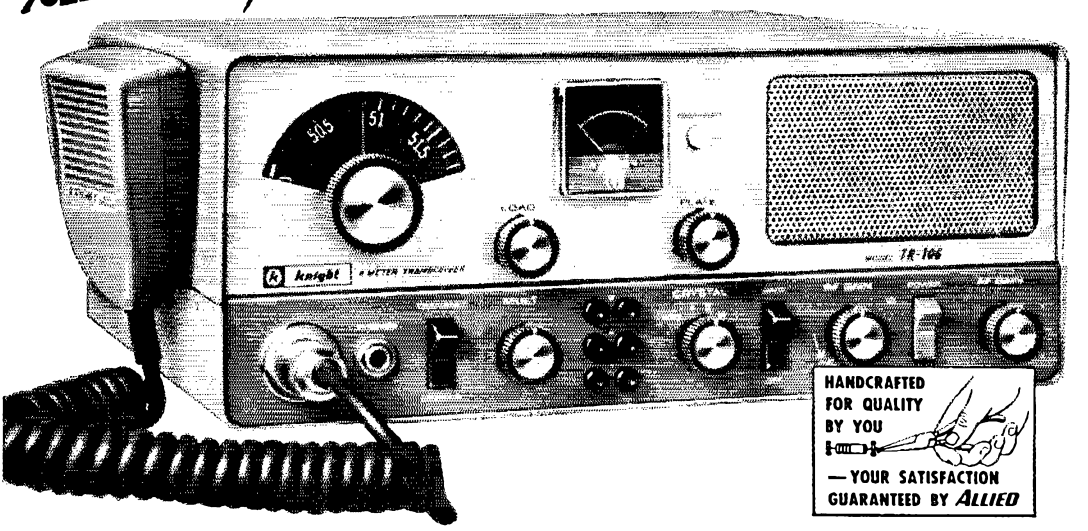

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W5BOO. RM: W5LR. For the information of all concerned the name and address of the SEC is James M. Cotten, W5PYI, 208 Oak St., Weatherford, Tex. 76086. With Field Day behind us maybe we can get back into the swing of things and handle a bit of traffic. I was disappointed with the number, or lack of, Field Day messages received. What easier way can you add 25 points to your score than by sending a Field Day message? FD messages were received in proper form from W5AW, WA5BNK, K5BTZ, K5DMM, W5FC, W5GZG, W5GUP, W5NGL, W5OYC, W3PWK/5 and W5ZDN. I am sure that there were others operating Field Day who overlooked the Field Day message. K2GKK/5 has a new NCX-5. K2EIU/5 had his quad broken up in a recent thunderstorm. WA5AGH is active on the NTTN and will act as net control in the absence of K2GKK/5 during his vacation. Dallas ARC hams are going RTTY. WA5BNK, WA5DAF, WA5BFB, W5LR, K5BQA and W5IT have joined the ranks of the written word. K5FHY has been appointed secretary of the Dallas ARC. The DARC reports fine results from Field Day with 1100 contacts and WAS and received good newspaper publicity. The KC Club of Ft. Worth reports 1500 contacts in the United States and a few foreign stations. WA5AGH is doing a fine job as Asst. NCS and net manager of NTTN. Traffic: K2GKK/5 65, WA5AGH 52, K2EIU/5 25, K5LZA 18, W5LR 9.

OKLAHOMA—SCM, Daniel B. Prater, K5CAY—Asst. SCM: Sam Whitley, W5WAX. SEC: K5DLP. RM: W5QMJ. PAM-75: WA5BTQ.

Net	*Freq.*	*Times*	*Days*	*RM-PAM*	*QNI*	*QTC*
OPEN	3850	0800 CST	Sun.	W5PML		
STFCN	3850	1745 CST	M-Sat.	WA5BTQ	360	70
OLZ	3682.5	1900 CST	M-Fri.	W5QMJ	71	127
SSZ	3682.5	2145 CST	M-Fri.	W5QMJ	82	93

Enid amateurs were kept busy Sun. evening, June 5, after a tornado hit Enid. The AREC net was activated on 3850 and 146.830. The RACES Net on 147.15 also was very active. Enid, Tulsa and Oklahoma City amateurs assisted with welfare and public interest information. W5DRZ is back on 75 meters after his transfer to Skiatook, Okla. A new Novice in Tulsa is WN5PSS. WN5PRY is a new Novice in Oklahoma City. W5BTZ and W5JRK purchased new TR-4s. W5CBY-W5CCK, Art and Ila, lost their tower during the tornado in Enid June 5. W5QMJ is operating 2 meters again with a 100-watt transmitter and an antenna up 70 feet. Oklahoma County RACES 6-meter f.m. frequency is 53.42 Mc. WA5GGN also is working 2 meters. Traffic: K5TEY 1166, W5OK 294, W5QMJ 112, W5MFX 44, K5ZCJ 34, K5DLP 25, K5LMG 11, WA5MDN 7, K5OCX 7, K5CBA 5, WA5FXG 3, WA5DZP 2, W5EHC 1.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5ZPD. RM: K5ANS. Congratulations to WA5AUZ, who made BPL for the third time. Sid has been working hard to get better participation in the TEX Traffic Net. K5GDH, EC Travis County, is very busy with Texas State RACES and says handy-talkies on 2 meters are going great around Austin. WA5ELE, Margaret Parsons, is NCS on the 50.4-Mc. RACES Net Control training program with K5GDH assisting when he is not on duty at the Fire House. K5LQJ reports a new Co-Ed Hunters Net on 2 meters around the Texas A. & M. Campus. K5LQJ is doing some operating at club station W5AC. Good openings on 15 meters are reported by WA5MIN, who says that after 16 hours of operating Field Day he sure was glad to hit the sack. W5ABQ reported some traffic even during his "summer slump." W5JCL puts out a good paper, *Key Clicks*, from Orange ARC. W5TFW, Jefferson County EC, enjoyed the West Gulf Convention. K5HZR, Bexar County EC, reports that K5TEY handled lots of traffic into Topeka, Kans., during the tornado disaster. Lee says the 7290 Traffic Net members are doing a good job. We agree, Lee, and I feel that K5HZR being manager of the 7290 Traffic Net might have something to do with it. W5DAA, Kleberg County EC, reports a good Field Day with K5CGO, K5AVS, WA5CQD, W5ZMK and K5FVR on 50 through 3.8 Mc. using the civil defense power plant. WA5AUA, OES in Portland, reports initial tests indicate satisfactory results with the new sixteen-element 6-meter and 32-element 2-meter beams. K5HMF, Brazoria County EC, was out to lunch when the newspaper came by and took pictures of the Field Day set up. Edward, 11-year-old son of K5HMF, stood in for his Dad; also in the photo were W5KSQ and Harold Sanders, call unknown. Traffic: WA5AUZ 669, K5GDH 185, W5KLV 166, K5HZR 153, W5VGE 148, K5PEV 99, W5AC 66, W5NRJ 39, W5ABQ 29, K5ZSC 12, W5AIR 8, W5TFW 3.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC:

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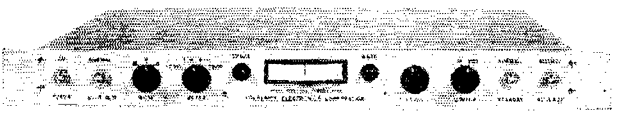

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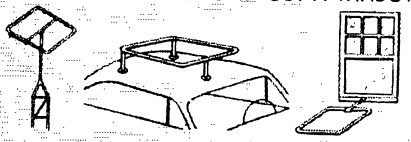

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ASQ-20	20 Meter,	100" Square	32.50
ASQ-40	40 Meter,	192" Square	66.50

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VE6FK, PAM APN: VE6ADS, PAM S.S.B.: VE6ALQ. ECs: VE6SA, VE6SS, VE6AFJ, VE6HB, VE6XO, VE6XC, VE6AFQ. ORS: VE6BR. OPSs: VE6HM, VE6SS, VE6RA, VE6ADS. OOs: VE6HM, VE6NX, VE6TY, VE6AKV. OBSs: VE6HM, VE6AIF. OES: VE6DB. Our SEC reports things are running fine and he expects to have more tests this fall after the holiday season is over. OOs report that some do not take to kindly to the reports sent to them and others are very thankful. Fellows, you should be more thankful than some of you are as these fellows are using their time for your benefit. Southern AREC now has a new EC in VE6AFQ. He is new to this type of work and needs all the help he can get from you. DX must be falling off these days as we heard VE6ABP on 75 meters recently. How about that, Margaret? Another minus for the past two years. VE6SF, has joined the boys again. Election time for your SCM is drawing near so look around, fellows, as March will be here before you realize it. Traffic: VE6HM 81. VE6XC 80. VE6FK 40. VE6ALQ 10, VE6SB 10, VE6TG 9. VE6PZ 5. VE6FV 2, VE6APV 1. VE6US 1.

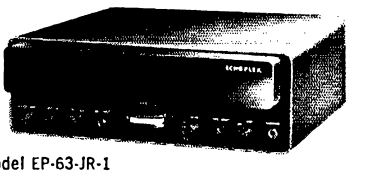
BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—It sure is nice to hear so many 2-meter stations from Vancouver Island and we have been informed that we can now travel most of B.C. and be able to work someone. VE7UR and VE7US operate on 147.330 and 146.760 Mc. with 50 watts into three-section colinear vertical. Mobile 5V is converted to 12 volts and works the same as the above frequencies. HW 12-C is modified to HA-14 on 75 meters, also 100 watts s.s.b. in the car. VE7AC reports the fruit orchard is going to make him almost QRT 'til fall. Where are the British Columbia amateurs for 1965 1549—1966 1635? We do not have them in the AREC nor do we hear them. VE7BLO entered the E class in the Field Day activity and made 63 contacts. We wonder if the story of MV Blythe Spirit and the Point Grey ARC will ever be told—such as hydrogen balloons holding up the antennas and the skipper shooting them down at the end of FD. By the number of SCM messages B.C. was out in full strength. We are sorry to report the passing of VE7JY, an XYL. VE7SJ is in the hospital because of a serious heart attack. The BCARA Picnic will be held in Royal City in August. VE7PF and party still are working hard on their relay station for 2 meters. Traffic: (June) VE7BHH 127, VE7-BLS 12, VE7BLO 11, VE7AC 8. (May) VE7BLS 26.

MANITOBA—SCM, John Thomas Stacey, VE4JT—SEC: VE4OL. PAM: VE4JQ. RM: VE4QX. OBS: VE4-QJ. OESs: VE4HI, VE4RE. OO: VE4JW. OPS: VE4EF. ORSs: VE4EI, VE4LG, VE4NE. ECs: VE4EO, VE4GM, VE4HB, VE4HF, VE4IG, VE4IW, VE4JC, VE4JT, VE4JQ, VE4LG, VE4LU, VE4NW. Field Day reports show that Flin Flon ARC, Winnipeg DX Club and WARA were active. VE4RE and VE4YW were active in the V.H.F. Contest and VE4MA/5 also was heard in there. VE4EP has a new SB-34 and VE4GN is sporting a new SB-100. We welcome a new amateur to Brandon, VE4RW, a product of the high school ham course. ARRL appointees are reminded that certificate endorsement must be obtained from the SCM to keep your appointment current. Please check the date and send me the certificate when due. Your help in our traffic nets would be appreciated. The phone net is on 3760 at 7 P.M. local time, the c.w. net on 3635 at 0100Z. Both deserve your support and our RM is most anxious to increase the c.w. net membership. Net reports for the month: Phone Net, sessions 22, QNI 208, QTC 13. C.W., sessions 30, QNI 149, QTC 165. Traffic: VE4JT 166, VE4-LG 103, VE4NE 64, VE4QX 61, VE4EI 48, VE4JA 20, VE4XN 18, VE4QJ 10, VE4LQ 6, VE4JQ 4, VE4GN 3.

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCMs: A. E. W. Street, VE1EK, and R. P. Thorne, VO1EI. SEC: VE1MJ. VE1AAX is now acting as NCS for the Atlantic Provinces Net (APN). Tex also reports that there are now 19 stations on the roll and more are needed. Time and place? Daily at 2000 (Atlantic) on 3653 kc. A study of Field Day messages received at this office would indicate that most clubs forgot to take along Operating Aid 9A or neglected to use it when making up the FD message! VE1LI is now active with a new Swan-350. VE1AQT reports new calls in the area include VE1s ASM, ASP, ASV, ASX, ATA, ATC and ATE. Congratulations to WA4YGS and his XYL on the arrival of a new harmonic. VO1AQ has a new tower, beam and linear. VO1DI has a new s.s.b. mobile. VO1-MY is completing a new home-brew linear. VE1ALL has rebuilt his modulator. VO1s GO and GP are eagerly awaiting the day when hydro authorities find a few more feet of transmission line and they can cease operating from auxiliary power. Traffic: (June) VE1AAX 12, VE1-OM 11, VE1ABS 6. (May) VE1AAX 19, VE1ABS 8.

ONTARIO—SCM, Richard W. Roberts, VE3NG—

ECHOPLEX...



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From all reports Field Day this year was one of the best. ECs are reminded to drop a line to their SEC, VE3EUM, as to their local activity during FD. I had a card from VE3XF from Hong King; he was en route to Yokahama, Tokyo and Hawaii. The Ottawa ARC has applied for permission to hold an Ontario Division ARRL Convention in Ottawa in the fall of 1967. Many new groups were worked or heard on Field Day. Perhaps many small efficient groups might be more productive in an emergency than larger ones, but, under a single control. Discuss this and advise your SEC. VE3HW, PAM 2 meters, is rapidly recovering from his third and final operation. He worked Field Day as a single operator from his hospital bed using a Twoer with dipole taped to the window blind. The Peel ARC entered Field Day for the first time, having been in operation as a club for only nine months. VE3BII has received her bronze BPL Medallion. I believe there are only four or five of these in Ontario. The late Tom Harding, VE3DRF, was awarded his posthumously. The South Waterloo ARC is sending a delegation to the convention at the Falls. VE3GG is in the Branson Hospital. Cards would be of great assistance. Mike is in his 80s. I would like to thank all the holders of various appointments within our Ontario section for sending in their certificates for renewal as promptly as they have. Traffic: VE3CYR 138, VE3DPO 100, VE3NG 96, VE3-DBG 74, VE3DMU 50, VE3EBH 46, VE3GI 40, VE3ATI 36, VE3BUR 35, VE3DVE 35, VE3BTV 34, VE3EAM 33, VE3NO 30, VE3BWM 21, VE3DU 20, VE3AUU 19, VE3HW 18, VE3FGV 17, VE3DGB 15, VE3YN 15, VE3-VD 8.

QUEBEC—SCM, J. W. Ibey, VE2OJ—SEC: VE2-ABV, RM: VE2DR. Many thanks to VE2DR for an active and fruitful nine years as SCM. As your new SCM, I hope I am worthy of the same respect and reports from amateurs all over this large section. Much good fishing, Bill, and the best of amateur radio to you. VE2BE is home and on the air after a spell in the hospital. VE2EC sends his usual excellent report. He keeps regular 80- and 2-meter skeds. VE2AAE hams from his "autogyro" and VE2ANK has a weekly sked with ZL1KG. VE2BG still is old faithful of the PL Net on 3790 kc. The bilingual RTQ does a fine job covering the section each night on 3580 kc. VE2BGJ, working in VE6-Land for the summer, may soon be heard from there. Many VE2 groups were active during Field Day and the bonus traffic received from many of them was much appreciated. Greetings to newcomer VE2DCJ and ex-VE3FCQ, now VE2CF. VE2WM is trying to get a 2-meter net going in the northeastern part of the section. VE2BZH reports the 2-meter net in the western Montreal area is very active. The Trans-Canada Net functions well Sun. at 1800Z but no reports of traffic density. Good publicity coverage was given Field Day via MARC and local TV and radio outlet. Traffic: VE2DR 92, VE2OJ 92, VE2BRD 48, VE2WM 38, VE2EC 31, VE2ALE 28, VE2CP 17, VE2AGQ 13, VE2AJD 12, VE2NT 4, VE2BRT 2, VE2BGJ 1.

SASKATCHEWAN—SCM, Mel W. Mills, VE5QC—The Regina Amateur Radio Association is to be congratulated on a job well done. The banquet was very well handled with the breakfast by the city a most pleasant surprise on Sun. morning. Even with the odd shower the Field Day events went well. The annual ARRL meeting was well attended and interest was expressed in a c.w. net. Anyone interested? SCM VE5-QC chaired the meeting with a report on AREC activities by SEC VE5CU. The SARL Annual Meeting was very active with the annual fee being raised to $2. The SARL will now receive the benefit of car plate commissions. The new SARL president is VE5BO, of Prince Albert, CKBI-TV; new vice-pres. is VE5TX, of Saskatoon. The hamfest next year will be sponsored by the Prince Albert Club. The "QC" Field Day trophy again was taken by the University of Sask. Club, VE5US, Saskatoon. The ART Driver Proficiency award was well placed going to the QSL Bureau Manager of many years, VE5OP, of Moose Jaw. Thanks to the Regina gang for a most enjoyable time.

All-Too-Silent Voice of the Booster

(*Continued from page 9*)

but essential to the growth and progress of any organization. However, we should not forget — as W4LQC says so well — that disagreement on any one issue, or the ill-informed complaints of a small group with an axe to grind, must not be allowed to undermine the purpose and strength of the League.

Thus, while welcoming constructive criticism, let's not permit confusion, misinformation and irresponsibility to lead us astray. Let's not allow the "disgruntled few" to be the only voice that is heard. Let's speak out loudly and clearly of our "pride in our society," so that those outside may have a true picture of who and what we are, and be inspired to join the roster in pursuit of our mutual aims. QST

Hamfest Calendar

(*Continued from page 71*)

for brochure. Lincoln Cundall, W2QY, 69 Boulevard Pkwy., Rochester, N. Y. 14612.

Washington — The Walla Walla Valley ARC will hold its 20th annual all-family picnic and hamfest Sept. 24 and 25 at Jefferson Park in Walla Walla. Saturday activities include the annual meeting of ARRL officials. Saturday evening will be open house at the picnic site. Sunday's program includes W7DP museum display, swap shop, contests, games and awards. The annual meeting of the MINOW gals will be on Sunday. Lunch will be served at 12:30 and will be potluck; coffee and punch furnished. Registration 9:00 A.M. to noon is free. Talk-in frequencies are 3.920, 29.6 and 146.760 Mc. For more information contact Pat Stewart, W7GVC, 1404 Ruth Ave., Walla Walla, Wash. 99362. QST

FAMILY MEMBERSHIP

For families where two or more members are interested in amateur radio and the League, the ARRL By-laws now provide that, after one individual has become a member of the League at the regular dues rate ($5 in the U.S., $5.25 in Canada) additional members of that family may join the League for a special dues rate of $1, with all rights and privileges appropriate to the grade of membership held, except the receipt of additional copies of *QST*, subject to these conditions:

1. There must be an immediate family relationship — i.e., husband or wife, brother or sister, father or mother, son or daughter.

2. All Family Membership must be concurrent — i.e., expire in the same month.

3. The initial membership fee is the standard $5 in the U.S., $5.25 in Canada, plus $1 for each additional family member.

Please note: Prior to May, 1966, the Family Member privilege was available only where all participating were licensed amateurs. An amendment to the By-laws now makes it possible for relatives (as defined above), licensed or not, to be Family Members.

Correspondence from Members

(Continued from page 81)

others where possible and to provide a friendly and clean hobby for those interested.

I am sure this is the intent of many hams around the world but apparently many have forgotten the purpose of amateur radio as well as the manners I assume their parents taught them at one time or another. Perhaps there are even some who just don't care whether they act as civilized people or "good hams" while on the air. Perhaps they should be reminded that when they operate on any amateur frequencies they are exposing themselves as representatives of this great country of ours to people around the world . . .

. . . Apparently some good-hearted ham set up portable operation on the island of Haiti, operating with the call HH9DL. I monitored this particular station and suffered with him in spirit as he tried to give literally thousands of hams a chance at a Haiti contact in an orderly and logical method of taking one call area at a time. Apparently there are many fellows on the air who do not like this system or any other for that matter if it means they must "wait in line."

I have heard many "pile ups" for DX contacts which were insurmountable, mainly because of inconsiderate and sloppy operators who didn't even wait to see if the station might be transmitting before they called. Pile ups are to be expected but this particular situation was without a doubt the most disgraceful and sickening pile of sarcastic, impolite, crude and ignorant so-called amateur "operators" I have ever heard in my 20 years of exposure to amateur radio. The sarcastic remarks, out-of-sequence calls and general harrassments came from every call area in the country.

At one time I thought of giving HH9DL a call but as things grew worse I decided against it because I would be ashamed to be part of such a situation. If these people think such exhibitions are going to further the cause of amateur radio they, and all of us, will be thinking about it with cool rigs and no frequencies left . . .

This incident is one of many I have heard lately. I feel I must, as a member of the fraternity, express my disgust, horror and personal shame . . . I challenge all to evaluate their operating procedures and manners and to adjust them accordingly. — *H. Glenn Boyd, WA9RQY, Fort Wayne, Indiana.*

QST

IARU News

(Continued from page 79)

OA4O DXPEDITION

Under the auspices of the Lima Light and Power Company, the Radio Club of Peru (RCP) was to have undertaken a DXpedition to the Andes on August 20–21, to study conditions and propagation at an altitude of 16,000

feet. Using the club call, OA4O, c.w. and s.s.b. operation was planned on several h.f. amateur bands. Amateurs contacting the station would receive a colorful folded QSL, map and expedition data, provided OA4O receives confirmation of contact. QSLs should be sent to the Radio Club Peruano, Casilla Postal 538, Lima, Peru.

9G1 BACK ON THE AIR

9G1ED, secretary of the Ghana Amateur Radio Society, advises that the ban on amateur transmissions in Ghana, in effect since March 5, was lifted July 8. We congratulate the society on their successful efforts toward this end. QST

V.F.O. Stability

(*Continued from page 21*)

ratings. It is to be expected that there will be some variation between units, even of the same type.

The Miniductor-type coil showed marked superiority to coils of the same inductance wound on either ceramic or low-loss bakelite forms. Slug-tuned coils are worse than equivalent coils without slugs, since the iron has a rather poor temperature coefficient. Slug tuning offers a convenient way of adjusting the inductance, but this is only a minor advantage in a home-built v.f.o. Miniductor-type coils can easily be pruned, and the pruning needs to be done only once. Furthermore, the Miniductor has the highest Q, around 150 at 5 Mc. as against 50 or less for the slug-tuned coils, which is a definite advantage in oscillator design.

Components not directly in the tank, such as R_1, C_4, C_5, and RFC_1, have an almost negligible effect on the frequency. The frequency change amounted to only a few cycles when hot air from a hair dryer was funneled directly on them. Similar treatment of the tank components, L_1, C_1, C_2 and C_3, showed frequency changes 10 to 30 times greater. This is purely qualitative, as there was no means available for measuring the temperature rise in an individual component, but the comparison is believed to be useful.

Internal Heating of Components

Temperature rise from internal heating can be minimized by using components amply rated for the job. The only resistor of any consequence in an oscillator circuit of this type is the grid leak, and since the r.f. and d.c. voltages across it are low — of the order of a few volts — the dissipation normally will be no more than a hundredth of a watt.

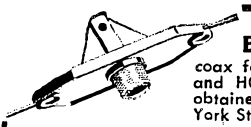
It is possible that r.f. heating of the tank circuit may be a factor in some oscillators. With the components and type of operation discussed here, a calculation based on the tank-coil Q and the measured value of rectified grid voltage showed the tank dissipation to be less than 3 milliwatts in the most severe case. It was impossible to identify any drift as having resulted specifically from heating caused by the r.f. current flowing in the tank. QST

(Part II will appear in an early issue of *QST*.)

Silent Keys

IT is with deep regret that we record the passing of these amateurs:

K1ATI, George A. Regan, Rumford, R. I.
K1CAP, Walter P. Raarup, Darien, Conn.
W1EHH, Harry H. Day, Leominster, Mass.
W1EWT, John V. Ferri, Cranston, R. I.
W1KNJ, Earle B. White, Belfast, Maine
W1RSZ, Raymond H. Elliott, Concord, N. H.
W1SPL, Albert J. Cahoon, Lexington, Mass.
W1THD, Amos Goyer, East Longmeadow, Mass.
W1VL, Gordon C. Macintosh, West Chatham, Mass.
WB2ACX, H. B. Williams, Saranac Lake, N. Y.
WA2CCX, Charles Eberhard, Wood-Ridge, N. J.
WA2EJW, Robert W. Barnes, Johnson City, N. Y.
K2HGN, Emily E. Reese, Yonkers, N. Y.
W2ND, Charles A. Younger, River Edge, N. J.
K2QKK, Robert J. Short, Ogdensburg, N. Y.
WB2SIQ, William G. McTeer, Ossining, N. Y.
K2TGK, Curtis P. Bight, Kingston, N. Y.
WA3AFZ, Robert Babbendreier, Clarksville, Md.
W3JPR, Lawrence J. Kern, Slatedale, Pa.
W3KTE, James J. Garland, Conneaut Lake, Pa.
W3QGI, Arthur George Hinkle, Fernwood, Pa.
K3SMA, H. H. Marsh, Jr., Pittsburgh, Pa.
W4AFB, Crutcher W. Dunlap, Memphis, Tenn.
W4BAW, Albert W. Parker, New Bern, N. C.
K4CSE, Haven W. Betts, Sturgis, Kentucky
W4KDS, Oliver S. Keay, Titusville, Florida
K4KWT, Newton A. Beeton, Roanoke, Virginia
WA4OXG, Ralph L. Brooks, Bristol, Virginia
W4RFI, Joseph W. Lanford, Greenville, Ky.
W4SRD, Lionel K. MacMillan, Annandale, Va.
W4TWR, Cary L. McDaniel, Brooksville, Fla.
K5COZ, Helen L. Eggleston, Corpus Christi, Tex.
W5DIQ, DeWitt H. Holder, New Orleans, La.
WA5EBT, Carl J. Bostic, Greenville, Miss.
K5IIU, George L. Holler, Edinburg, Texas
W5KUT, W. C. Spence, Vicksburg, Miss.
ex-K5PRP, Richard C. Pinkerton, Raleigh, N. C.
WA6MJN, Richard F. Rito, Northridge, Calif.
WA6MOS, A. Frank Maguire, La Canada, Calif.
WA6OYS, Bruce D. Meredith, Martinez, Calif.
W7FEL, Robert V. Burke, Port Angeles, Wash.
WN7FMR, James A. Black, Camas Valley, Oregon
ex-W7RMB, Earl O. Watkins, Tucson, Arizona
W8EFN, William C. Alberts, Lansing, Michigan
W8IAM, Aldo Crisante, Mingo Junction, Ohio
WA8OLF, William E. Countryman, Lewiston, Mich.
W8QPT, Anna May Hall, Ludington, Michigan
W8RER, Teddy R. Baughey, Hillsdale, Mich.
ex-9ATW, Carl Walter Loeber, Washington, D. C.
K9CZW, Joseph Sefrhans, Rockford, Illinois
W9ELV, Carroll W. Hoshour, Roselle, Illinois
W9KSE, Nancy S. Hefle, Cedarburg, Wisconsin
W9TQL, William J. Nolan, Winfield, Illinois
W9ZUS, Charles E. Gutke, Glen Ellyn, Illinois
WØBKW, Chester D. Hedlund, Hastings, Neb.
WØHEA, Robert G. Macdonald, Shawnee Mission, Kan.
KØMAC, Charles Schilling, Leavenworth, Kan.
KØMXD, Bernard J. Vroman, Davenport, Iowa
KØSAF, George W. Cobley, Des Moines, Iowa
KØTWI, Michael Pribyl, Hutchinson, Minn.
CX2AJ, Jose E. Somaruga, Montivideo, Uruguay
G6QB, L. H. Thomas, Hastings, Sussex, England
KH6BD, Merton H. Mack, Waianae, Oahu, Hawaii
KP4BEA, Robert B. Roach, San Juan, Puerto Rico
VE3BKB, C. J. Snell, Chatham, Ontario



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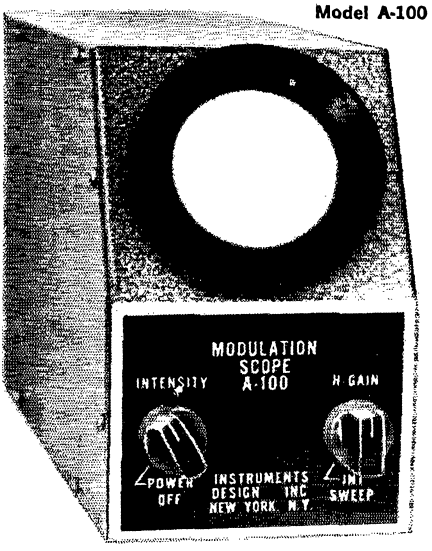

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Turn to Page 155

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The function of the ARRL QSL Bureau system 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 4½ by 9 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. **Changes are shown in heavy type.**

W1, K1, WA1 — Providence Radio Ass'n., W1OP, Box 2903, Providence, Rhode Island 02908.

W2, K2, WA2, WB2 — North Jersey DX Assn., P.O. Box 505, Ridgewood, New Jersey 07451.

W3, K3, WA3 — Jesse Bieberman, W3KT, **RD 1, Valley Hill Road, Malvern, Pennsylvania 19355.**

W4, K4, WA4, WB4 — F.A.R.C. — W4AM, P.O. Box 13, Chattanooga, Tennessee, 37401.

W5, K5, WA5 — **Hurley O. Saxon, K5QVH,** P.O. Box 9915, El Paso, Texas 79989.

W6, K6, WA6, WB6 — San Diego DX Club, Box 6029, San Diego, California 92106.

W7, K7, WA7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.

W8, K8, WA8 — Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.

W9, K9, WA9 — Ray P. Birren, W9MSG, **Box 519,** Elmhurst, Illinois 60126.

WØ, KØ, WAØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minnesota 55921.

VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.

VE2 — John Ravenscroft, VE2NV, 135 Thorncrest Ave., Dorval, Quebec.

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

VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.

VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Saskatchewan.

VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.

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

VE8 — George T. Kondo, VE8RX, % Dept. of Transport, P.O. Box 339, Fort Smith, N.W.T.

VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newfoundland.

VO2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.

KH6 — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii 96701.

KL7 — Alaska QSL Bureau, **Star Route C, Wasilla, Alaska 99687.**

KP4 — Joseph Gonzalez, KP4YT, Box 1061, San Juan, Puerto Rico 00902.

KV4 — Graciano Belardo, KV4CF, P.O. Box 572, Christiansted, St. Croix, Virgin Islands 00820.

KW6 — Jack A. Chalk, KW6EJ, P.O. Box 415, Wake Island 96930.

KZ5 — Ralph E. Harvey, KZ5RV, Box 407, Balboa, C. Z.

SWL — Leroy Waite, 39 Hanum St., Ballston Spa, New York 12020. QST

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(Please see the other side of this page for an application for membership in ARRL and 12 issues of QST)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

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(1) Advertising shall pertain to products and services which are related to amateur radio.
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LOUISVILLE KENVENTION October 15th Kentucky Fair and Exposition Center. All under roof. Grand Banquet, Technical Forums, Giant Indoor Trade-O-Rama (bring your goodies). Booth exhibits, C.W. Contest, Homebrew Contest, New, different. Registration $2.00 at door. First Class women's program and luncheon requires advance registration $3.00. Deadline October 8th. P.O. Box 20094, Louisville, Kentucky 40220.

PEORIA Hamfest September 18, Peoria, Illinois. For details see Sept. QST Hamfest Calendar. Advance Registration $1.50. Write: Ferrel Lytle, W9DHE, 419 Stonegate Rd., Peoria, Ill. 61614.

LOUISVILLE Ham Kenvention, Oct. 15, 1966. Technical forums, exhibits, banquet, Giant indoor Trade-O-Rama (bring your goodies). Ladies Program (Advance Registration only). Details P.O. Box 20094, Louisville, Ky. 40220.

FREE: New York Radio Club cordially invites New York City area hams and SWLs to its regular monthly meetings Second Monday of each month at George Washington Hotel, 23rd Street and Lexington Avenue, promptly at 8:00 PM. All are welcome. W2ATT, New York Radio Club.

OLD Timers and antique radio collectors! See Hamfest Calendar for information on Annual Meet.

MOTOROLA used FM communication equipment bought and sold. W5BCO, Ralph Hicks, Box 6097, Tulsa, Okla.

WANT Callbooks, catalogs, magazines, pre-1920 for historical library. W4AA Wayne Nelson, Concord, N.C. 28025.

WANTED: all types of aircraft or ground radios. 17L 618F or S388, 390, GRC, PRC, 51 JRVX. Collins linear amplifier. Type 294; Especially any item made by Collins Radio, ham or commercial. Also large type tubes and test equipment in general. For fast cash action contact Ted Dames W2KUW, 308 Hickory, Arlington, N.Y.

SELL, swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Landsdowne, Penna.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts; 617-598-2530 for the gear u want at the price u want to pay.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Canton, Chicago 6, Ill.

SX101A for sale. Asking $195.00. Will deliver locally. W2TIW, 0-52 28th St., Fair Lawn, N.J. 07411. Tel: (201)796-2936.

TOPPING All offers for any piece of aircraft or ground radios, tubes or test equipment. In a hurry? Cash-in-advance arranged. Turn those unused units into money. Air Ground Electronics, 64 Grand Place, Kearny, N.J.

TUBES Wanted. All types, highest prices paid. Write or phone Ceco Communications, 120 west 18th St., N.Y. 11, N.Y. Tel: 242-7359.

WANTED: For personal collection; QST, May 1916, W1CUT, 18 Mohawk Dr., Unionville, Conn.

INTERESTING Offers galore! Ham's trading paper. Next 12 big issues, $1. Sample copy free. "Equipment Exchange—Ham Trader", Sycamore, Ill.

WANTED: Teletype equipment, R-388, R-390A. Cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101. Tel: (617-742-0048).

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QSLS: Moyers Printing, 846 Rising Sun, Telford, Penna. Samples. stamped envelope.

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SUPERIOR QSLS, samples 10¢. Hamsco, Box 773, Hobbs, New Mexico.

QSLS, finest, YLRL's, OMs, samples 10¢. W2DJH Press, Warrensburg, N.Y. 12885.

QSLS, SWLs, XYL-OMS (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fabulous, DX-attracting, prototypal, snazy, unparagoned cards (Wow!) Rogers KØAAB, 961 Arcade St., St. Paul 6, Minn.

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MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, WARP. Purchase Radio Supply, 37 E. Hoover St., Ann Arbor Michigan. Tel. NOrmandy 8-8262.

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WE Buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y.

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NOVICE Crystals 80-40M, $1.05 each. Also other freqs. Free list Nat Stinnette, W4AYU, Umatilla, Fla. 32784.

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SELL: Eimac 4X250B tubes. Guaranteed gud condx. $6.50 each. $10.00 paid prepaid in U.S.A. Send check or m.o. Everett Stidham, Jr., W5JLQ, 722 So. 30th. Muskogee, Okla.

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EXCESS Gear and parts. VAC variables, variable coils, tubes, meters, transformers, 2 KW linear, diodes (HV), etc. Stamp for complete list. W6MCS, Rte 1, Box 666, Arroyo Grande, Calif.

COLLINS 30L-1, $330.00. Delivered within 150 miles. K2OGA, Robert J. Miller, 245 Scudder Avenue, Northport, L.I., N.Y.

SINCE 1937. QSLs by W1LMS, Sheehan Press, 23 West Street, Stoneham, Mass. 02180. Samples 10¢. Catalog, 25¢.

BUILD A Codetyper. Transistorized electronic computer-typewriter for Morse teaching or keying your rig with FB fist. For schematic, parts list and technical dope, send $2.00 to Computronics Engineering, Box 6606, Metropolitan Station, Los Angeles, Calif. 90055.

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FOR Sale: SB-100, SB-200, SB-300. Wanted: any kit to wire and repair, preferably Heathkit. Most Heathkits in stock. Business ref. on request. Lan Richter, 131 Florence Dr., Harrisburg, Penna. 17112.

WANTED: Model #28 Teletype equipment. R-388, R-390A. Cash or trade for new amateur equipment. Alltronics—Howard Co. Box 19, Boston, Mass. 02101 (617-742-0048).

NATIONAL NC-190 receiver, in excellent mechanical and electrical condx. Like-new appearance, $75.00. No trades! P. G. Balko, W1KHW, Hillcrest Road, New Canaan, Conn.

WANTED: NC-240D receiver. K9SQV, 2793 Whippoorwill Drive, Green Bay, Wis.

GALAXY V and Galaxy 2000 + linear. Save dollars on this fine combination. Full 2000 watts PEP on all bands! Complete with solid-state supplies and speaker console. Finest kilowatt transceiver set-up on market today. Like new, used less than 8 hours, original cartons and in mint condition—clean and bright! A real buy at 25% off published prices! This deal includes VOX and xtal calibrator. List price $1,004.30! Special sale at $750.00! Guaranteed perfect and ready to operate. Call or write K3MVP, 8258 Brittany Place, Pittsburgh, Penna. Tel: 366-0277.

COLLINS KWM-2, 516F2, $765.00; 312B5, $235.00; 30L1 plus four new 811A's, $365.00; Hallicrafters SX-62A, $225.00; B-T/TV amplifier, 8 channels, $25.00; B-W TR switch, $12.50; Vibroplex Champion deluxe, $15.00; Johnson 1250 mmf, 3000V variable, $7.50. Want: Collins filters 75S3B, FL8295/172A. Gommo, 37-20 75th, Jackson Heights, L.I., N.Y. 11372.

EICO 753 SSB transceiver with matching power supply. Practically new. Make offer. Dick Stutsman, Rte. 1, Box 602-H, Lakeland, Fla. 33803.

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NCX-5, in factory-sealed carton. First certified check for $475.00 takes it. Express collect. Lester Carpenter, 635 South Hobson, Mesa, Arizona.

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SACRIFICE: Viking 11/122 VFO, best offer over $95.00, perf. condx, FW SX-140, $55.00; SX-111, best offer over $149.00; 14 AVQ, $22.50. All in excellent condx. Will ship. WA9OMD.

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DRAKE 2B receiver, xtal calibr., matching Q multiplier and speaker. Excellent condx. $175.00 St. Louis. A. E. Metzger, WAØRRV, 10110 Drew Terr., St. Louis 26, Mo. Tel: TAylor 1-1313.

NCX-5 owners. Join group exchanging ideas, correcting problems of NCX-5. Send SASE. W2MDL, 217-20, 130 Ave., Laurelton 13, N.Y.

TWO Meter Transceiver, Heath HW-20, DX-60 and HG-10. Like new. Malmedal, WAØJTB, 427 Delaware Way, Sterling, Colorado.

SB-34, like new. $285. W7CBP, Donald Andersen, CMR, Box 816, Shaw AFB, S.C.

WANTED: "Measurements Model 59" grid dip meter. Fritz Haab, 8116 Us Wuerenlos 1, Switzerland.

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QSTS. Jan 1945 complete thru Dec. 1965, plus some 1966 issues. Sell as a single lot only, 50¢ per copy. W6GHU, 933 3rd St., Hermosa Beach, California, 90254. Fone: (213)-374-2070.

ATTENTION, Southwest Division! For sale, mint condition: Collins 75S-3, $475.00; 32S-3, $620.00; 30L-1, $375.00; station control, $120.00; AC power supply, $75.00; Central Electronics 100V No. 814, $355.00; Hallicrafters T-O keyer with paddle, $55.00; Model 18 teletype complete with table and accessories, $140.00. Electrocom converter FSC-250, $320.00; AFSK TK-100, $50.00; Heathkit Monitorscope, $50.00; 5" laboratory oscilloscope, *$110.00; Signal Generator*, $40.00; battery eliminator, $35.00. Discount 10% group sales three or more. Call or write Iversen, WA6ZCQ, 1312 Michelotorena St., Los Angeles, Calif. 90026. Tel: 213-663-1581.

LOW Price: Valiant I, $125.00; SX-43, $50.00; NC-183-D w/Central Electronics Slicer, $60.00; DB-23, $25.00; T-150 wired, not tested, $75.00. BC-342 w/QF-1, $40.00. RF sig gen. $15.00. Pick up at W2NRD, 2339 Redwood, Scotch Plains, N.J.

WANTED: Military, Commercial, surplus, airborne, ground, transmitters, receivers, testsets, accessories, Especially Collins. We pay cash and freight. Ritco, Box 156, Annandale, Virginia. Tel: (703)-560-5480 Collect.

HT-37, for sale, top condition: $250.00. H. Robinson, WB2BEE, 3 Devonshire Drive, White Plains, N.Y. Tel: 914-WH8-7712.

FM Gear: G-E 450 Mc. transceivers, $45.00; G-E 150 mc. transceivers, $45.00; walkie-talkies, $35.00; Motorola FM80D, $35.00; FMTRU-140D, $45.00; BC-603 receiver, $20.00; FM xmtrs for 6 meters, $10.00; Link 6 meter base station, $45.00; Higley, 82 Lower Main St., Matawan, N.J.

SELL: Viking II, VFO, $90.00; HQ-129X, spkr, $90.00; PCLP pre-amp, $25.00. Good condition, make sked, any band. WA8-QZT, 2248 E. Wallings, Brecksville, Ohio 44141.

SBE-34 transceiver. Practically new, all AC and DC power supplies, self-hamming, both mobile and fixed. Leaving country and first $285.00 takes it, including New-Tronics mobile ant. 20-40-75 coils, plus mike. K7DZI, 345 S E 30th Place, Portland, Ore. Tel: 236-4366.

POSI-CHECK Extra Class, Amateur Extra and General Class FCC type exams, complete in detail and style, even to the IBM type answer sheets! A very good aid to learning and a must in preparation for FCC Amateur Exams. General Posi-Check consists of 297 questions and explained answers for only $2.98—Extra Class, 115 questions and diagrams with explained answers, $2.00. 138 of the 297 questions in the General Posi-Check apply directly to Extra Class also. Get both for only $4.50 postpaid. Posi-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322.

FOR Sale: KWM-2 and PM-2, 3 years old with spare set tubes. Never mobile, $725. 30L1 one year old with spare set tubes, $325.00. All for $1000. Vern Rush, RR #4, Columbus, Ind.

WANTED: Instructograph with tapes. Cash. Bob Burns, 128 S. Lincoln Ave., Mundelein, Ill.

HEATH HO-13 spectrum monitor wired by engineer for 455 kc., parts included for other IF frequencies, $65.00. WØICR, Rte 1, Box 357, Parker, Colo. 80134.

SELL: 4-400A, $20.00; brand new B&W model 850A, $40; in exclnt condx.

DX-60, $40. Exclnt KW xfrmr, 3000V at 1 amp 220V primary, #40; CDR TV rotator, brand-new, $30.00. WA7BNM, Bruce Horn, Box 402, Coos River, Coos Bay, Oregon.

SELL: Heathkit Twoer, PTT, squelch and mike, $40.00; BC-221, AC power supply, $55.00; Triumph 830, 3" scope, $30.00; Johnson T-r switch model 250-39, $20.00. Vibroplex "Ex Vibro-Keyer," $13.00; B&W 850-A coil, $30.00. Will ship prepaid in USA. Frank Ferris, 120 Williams Terr., Warner Robins, Ga., W4TYZ.

WANTED: SB-10. State price and condition. Hugh Hogue, WA9AZE, Sparta, Wis.

WRL's Blue Book saves you money! These prices without trades: KWM-2, $675.00; NCX-3, $197.10; Galaxy 300, $161.10; NCL-2000, $399.60; HT-37, $233.10; HX-20, $152.10, Globe King, $179.10 up. 75S-1 $278.10; SX-117, $206.10. PMR8, $67.50; HQ-170C, $197.10; 2A, $161.10. Hundreds more, free list. WRL, Box 919, Council Bluffs, Iowa 51501.

SWAN 400, 406, and 420 VFOs, 117B AC and 412 DC power supplies, RC-1 (without cables), $610.00. Radio Industries Loudenboomer MK-11A KW amplifier, matching power supply, $290.00. All equipment, hardly used, in excellent condition. 300W multi-match modulation transformer. Joe Locascio, K5-CIT/6, Apt. C-2, 1485 North Beale, Marysville, Calif. 95901.

FOR Sale: TA-33 beam; E-Z Way RBS-40G tower; E-Z Way GPKS40 groundpost; C-D TR-44 rotator; disassembled: inspection invited. Purchased new in October 1964. $250.00 cash. Shipping not included, sry. WB2QQE, Rev. J. E. O'Brien, St. Agnes Church, 417 Sackett St., Brooklyn, N.Y. Tel: 212-624-2248.

WANTED: Drive unit for Boehme Automatic keying-head, Type 4-E, Series B. State price and condition. H. R. Stewart, Box 57, Point Reyes, Calif. 94956.

DRAKE TR-4, RV-4, AC-3, like new condx: $600 or your best offer. WA4HAH, 230-22nd St., S.W., Birmingham 11, Ala.

FOR Sale: TR-4, AC power supply, MS-4 speaker and cabinet, one month old, guaranteed perfect condx. $600; HW-12 80% assembled, DC power supply, speaker, PTT mike, $175.00; AM-2 SWR, works perfectly, $10.00; EV-729 Sr., modified, $10.00. Sell separately. You pay shipping. All inquiries acknowledged. W. R. Bowen, 1124 Seneca Lane, Pampa, Texas 79065.

FOR Sale: HQ-110C, $89.00; DX-40, VF-1, B&W balun, $34.95; 6M converter (BC), $10.00. H. Smith, K4JCX, Box 162, Oak Ridge, Tenn. 37830.

COMPLETE Station: DX-60, 120W, $65.00; HR-10 with HRA-10 cal., $80; HG-10, $32.00. Realigned, all new tubes and manuals. Also SX-110, $100; Eico 710 GDO, almost new, $35.00. Joseph E. Gaudet, K1CLM, 61 Adele Ave., Haverhill, Mass. 01830.

FOR Sale: 32S-3 #11, 107 and 516F-2, $625.00; 30L-1 #12,097, $400.00; NC-183D and spkr, $150.00; 75A4, #4089, 3 filters, spkr, $425.00; HW-32, $100. James Craig, 172 White Birch, Portsmouth, N.H. 03801.

BROADCAST Station for sale or trade for amateur gear of equal value. Gates BC-250-GY, 250 watts AM. Never unpacked. Make offer. Write or call 324-3178 after 1800 hours: Gene Markos, K9JFE, 1720 N. Jackson, Litchfield, Ill.

KITS Wired. Heath SB, HW series, etc. 40 years' electronics experience. Full time devoted to quality work and exceptional service. Lowest prices. Bill Fuss, W8LPF, 1407 Earhart, Akron, Ohio 44320. Tel: (216)836-8800.

SELL: CQ, QST, Handbooks, old IRE Proceedings, any quantity. Buy: Old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif.

Sale: SP-600JX w/manual, rack mount, in good condx., unmodified, $250.00. BC-779 w/p.s. and manual, fair condx, make offer. GRC-13 Navy transceiver w/110-24-12 v. p/s and cables, gud condx, 2-12 Mc., make offer. BC-611-F walkie-talkie, good condx., operational, make offer. Gonset Super 12, in mint condx., w/new tubes, $30.00; ART-13, orig. equipment, unmodified, $25.00; APR-4 rec. w/3 tuning units, good condx., $50.00; BC-342 rec. w/manual, good condx., $30.00. Want 30-50 Mc. 6 or 12 VDC FM rec., prefer xtal control and Gonset Superceiver, unmodified w/manual. Will consider trade for above. Walter J. Martin, PO., Box 622, Georgetown, Tex. 78626.

ANTIQUE Receivers, speakers, prior 1925, SASE for list. Viking II, VFO, $115.00; SX-100, $125.00. Both mint condx. QSTs 1946 to 1963, $30.00. Esmond Volz, WØBAF, 3812 Hoffmeister, St. Louis, Mo.

GONSET GSB-100 SSB CW AM exciter, $180.00. WB6FHH, 545 Blair, Piedmont, Calif. 94611.

SP-600-JX-1 receiver with manual, $275.00. Valiant F/W, $200. HQ-145C with speaker, $160.00. Want KW power supply. K1NLW, Glenn Edson, 16 Monticello Dr., Paxton, Mass. 01612.

SELL: Link 2051B frequency meter, modified for 4 frequencies and 7.5 Kc deviation, complete with transformers and cables. 30 pounds of new Model 15 teletype parts in factory packages. L. A. Stapp, 2903 Ash, Hays, Kansas!

QSTS, 1919 to 1950. Other old magazines. Mrs. Conrad Beardsley, 119 Wythburn Road, South Portland, Maine 04106.

FOR Sale: Complete station in perfect condition. Includes: Heathkit DX-60A transmitter, HG-10 VFO, and HD-11 Q-multiplier. Also, Mosley CM-1 receiver and Heath HM-11 SWR meter. All with manuals and instructions. Everything for $275.00 straight. Will ship. Contact Joe Kelly, WAØMBT, 1609-13th Ave. So., St. Cloud, Minn. 56301.

CLEANING Out: Receiver (100-1750 kc) with 3" scope, $35.00; ARR-15 (1.5-18.5 mc), see p. 78 June 1965 73, $40.00; Ferrite memory, 26 x 22 matrix, $12.00. Scope tube 7BP7, $2.00. Jim Cooper, W2BVE, 834 Palmer Ave., Maywood, N.J. 07607.

FOR Sale: Swan 350 VOX, opposite Sideband, xtal calibrator, Swan 117AC, spkr/p.s., Swan Mark I linear w/tubes. All used less than 25 hours. Total price: $750.00. W4KGR, J. R. Reagan, 2333 Elizabeth Ave., Winston-Salem, N.C. 27103.

RTTY Model 15, like new, complete with 17 x 14 x 12 grey Hammertone cabinet housing Twin Cities converter, Autostart, FSK, AFSK, filters, two input impedances, 1D keying button, local loop supply, full metering and tuning eye indicator. Matching teletype Co. table. Presently in operation 6M AFSK. $150.00 complete. TA-33 beam $75.00 with instruction sheets. Richard Stroud, W9BRN, Box 168, Liberty Center, Ind.

HANDBOOK Nuvistor 2M converter w/ARC-5/P.S./Spr., $30.-00; Hy-Gain 18 AVQ, $35.00; LF, ARC-5 w/P.S./spkr, $20.00. Stenorette w/asse., $100. HW-12 w/mic/AC HB PS, $120. 811A - 3B28, $2.00 ea. WA5ENP, 218 Karen Dr., Lafayette, La. 70501.

SWAN 140, HP 20 AC and 12 volt solid state supplies. Hustler Whip. All cables. Like new, $100. WB2NDW, 10 Great Hills Road, Short Hills, N.J.

COLLINS Mechanical filter, 455 kc IF, 2.1 kc bandpass, new, never used. Trade for unmodified B&W 850A or 852 pi-network inductor. James Livers, W9HSP, Mooresville, Indiana.

SELL: Heath HX-10 "Marauder" SSB transmitter, $265.00 f.o.b. Columbus. Excellent condition. R. W. Mowery, K8OYR, 3591 Clearview Ave., Columbus, Ohio 43221.

COLLINS 75A3 xtal calibr, 7360 product detector speaker. Hallicrafters HT-37 6146B finals 1/4 more output. Excellent working condx, $550.00 F.o.b. both. Sell separately. K4DPV, Hickson, 472-39th Ave., St. Pete Bch, Fla. 33706.

VHF-Gonset two-meter sidewinder, AC supply, $275.00; Gonset 2-meter Comm IV, $175.00; Clegg Thor Six AC-Mod, $175.00. All in excint condx., with manuals. F.o.b. Waco, Texas. W5-POG, 2252 No. 43rd St., Waco, Texas 76710.

FOR Sale: Antique radios, mint condition. Grebe Mod CR14, National 1-10, Fada Type 192A, Collins B, Kennedy Type 430, Freed-Eisemann Mod. NR7, Atwater Kent Models 20 & 48 and Crosley Mod. 50. Heathkit HO-10 signal monitor and MI-11 depth sounder. Also frontier ADF-200 direction finder. All new condx. Make best offer. W8EOX, 1839 Port Clinton Rd., Fremont, Ohio.

OVERSEAS Bound, original owner selling: NCX-3 with built-in crystal calibrator and incremental tuning; NCX-A, Topaz Inverter 500XL DC supply, 14AVS all-band antenna, 80m. coil, 14RMK roof-mounting kit. All like new for $325.00, certified check. TSGT Vittorio Polito, W8CTS, 414th CSSQ, Box 3629, Oxnard AFB, California.

TB-500 Hornet Triband beam and rotor, $35.00, or will sell separately. Richard Hennis, 3409 Sevier Drive, North Little Rock, Ark.

EICO-753 transceiver with transistor modified VFO, $200; 752 DC supply, $60.00. WB2NMN, 1 Quaker Ridge Road, Brookville, L.I., N.Y. 11545. Tel: 516-MA6-0819.

COMPLETE Built-in Station: DX-100, HO-170AC, new Dow-Key relay, all enclosed in console atop large specially-made desk. Includes built-in speaker, T-R switch, also: homebrew 6M rig with P/S, new Drake 20000LP filter, mike, new 4-element beam, SWR bridge, coax, all in excint condx. Definitely will sacrifice. Best offer. Write or call: F. Dal Modesitt, WA9OVV, Rte. 6, Box 801, Terre Haute, Indiana.

SELL Trade, Jennings vacuum condensers, two variable UCSL-2000, $50.00 each, fixed W-100, JCS-250, Amperex VC-50, $10.00 each, BC-221N freq. meter, $60.00, new 304TLs, $20.00; Kenyon 10765 2 1/2 kw mod. tran., $25.00. Make offer: National XCU-300 100 kc. xtal cal., Ameco preamplifier PCL, Johnson T-R switch 250-39, Thordarsons: T20C61 complete splatter choke clipper assembly, TIIM74 40 watt Multi-Match mod. tran. Par-Metal deluxe 7 ft. enclosed relay rack, Mosley TW-3XJR ant., new, Metrodynamics CPH comp. preamp, Merit A-3121 30-watt driver, 300 ohm to Class B grids, Hadley D-596 new 30 watt universal driver. Joe Harvath, W6GPB, 522 Third St., San Rafael, Calif.

FOR Sale: Clean Hallicrafters SX-100 and matching speaker, $120.00. F.o.b. S.A. W5EDX, 645 East Woodlawn, San Antonio, Texas 78212.

COLLINS KWM-1 mobile mount, cables A-C supply. New-Tronics Hustler antennas. Hallicrafters HA-6, new. Best offers. All or individually. All inquiries will be answered promptly. Will trade. D. E. Cahur, K8YVA, 2583 E. 128, Cleveland 20, Ohio.

SELL: Complete mobile: KWM-2, noise-blanker, AC and DC supplies, mounting bracket, microphone, Hustler ant, 80M, 40M, 20M, 15M antennas and mount, package deal: $900.00. HT-32A, new power transformer, $275.00: Loudenboomer linear, less power supply, $125.00: Heath HO-10 monitor scope, $50.00; Ham-M Rotor, $75.00: Telrex 3-el, 15M beam, optimum, $100.00. Eldico keyer, EE-3, $25.00; Cush Craft 2-M 11-el. Beam, $5.00. Homebrew KW supply, silicon, variac controlled, $75.00. NC-303, calibrator, $200.00. F. O. Bartholomew, K2EFA, 15 Avonbrook Dr., Blackwood, N.J.

FOR SAle: In mint condition! HT-32A serial #3321009 with instruction book, carton, $325.00; HT-33A Mark I linear, serial #269344, brand new, PL8295/172 with instruction book, carton, $325.00; anyone buying HT-32A and HT-33A gets 2 Dow-Key relays, cables, interconnecting wires ready for hook-up for $650.00. Johnson VSWR coupler and indicator, $25.00; brand new Ham-M rotator in carton, $95.00; 100 ft, 8-conductor cable, $7.00; 100 ft, foam RG/8-U coax, $11.00; all three items for $105.00. Pair 304- TL Eimac tubes with sockets, make offer. Certified check or money-order, f.o.b. Sil Thompson, W2BIF, 134 Plainfield Ave., Edison, New Jersey. Tel: (201) 985-1755 after 6:00 PM.

FOR Sale: Hallicrafters HT-32B, HT-33B, SX-115, with Dow-Key relays for transceive operation. Heath HX-10, RX-1, HM-15 rf pwr meter, Shure 488A mic, TO-104 mic: Johnson KW Matchbox, Sencore PS-127 scope, Vibroplex keyer and bug, Telex MR-4 headphones, Rohn 70 ft. crank-up tower with Hy-Gain TH6-DX ant, Hy-Gain 18HT: mod. 19 RTTY with TM. Write for further info and prices. Bill Newman, WA4OKH, Box 1008, La Grange, Ga. 30240.

SELLING: General Electric 2-meter FM 117-volt base stations. Crystalz for 146.94 Mc. 50 watt output. Half microvolt receivers. $195.00. Moomaw 2-Way, Rte. 2, Staunton, Virginia 24401. Phone 703-886-1618.

FREE Copy of totally new ham publication. Send QSL or postcard today. Nothing like it before! Ham's Market Newspaper, Box 13934, Atlanta 9, Ga.

APX-6 1296-Mc. transceiver, clean, untouched, 100 percent intact with all tubes. Best cash offer, or will consider swap for 35-mm camera, 7 x 35 binoculars, or what have you. WICER, c/o ARRL.

WANTED: Johnson SSB Adapter or Heath SB-10. W3ADE, Elicker, 2260 Boas Street, Harrisburg, Penna. 17103.

KNIGHT T-60 and Lafayette HA-90 In xcint condx. Best offer over $47.00. K3WPN, Dave Rabenhorst, 12507 Davan Dr., Silver Spring, Md. 20904.

MOHAWK Receiver, in excint condx, with manuals, trimmers, speaker, $160.00. Also 100-watt all-band AM homebrew. John Siau, College of Forestry, Syracuse, N.Y. 13210.

FOR Sale: HQ-170, like new, $200. Will ship prepaid. W3FGU, Jack Lane, Box 335, Hopwood, Penna. 15445.

SEPTEMBER Specials! Drake R4A or T4X, $335.00; Drake TR-4, $480.00: Swan 350 or Galaxy V, $365.00; SBE, $330.00; SB2LA, $220.00; Ham-M, $85.00: Hy-Gain 204BA 20-meter, $79.95. Used HQ-180, $165.00; Heath HX-20, HR-20, $175.00. Evansville Amateur Radio Supply, 1306 E. Division, Evansville, Indiana. Tel: 812-HA-422-4551.

HALLICRAFTERS S-120. Beautiful condition, $45.00 plus shipping. Deal. WA3DYW, 1021 Nora Dr., Silver Spring, Md. 20904.

SELLING Eico 753 Triband transceiver with solid state VFO and factory assembled power supply. Worked 48 states and 6 countries. $275.00. WAØKQU, Ronald Dohmen, 208 East Main St., New Prague, Minn. 56071.

COLLINS 312B-5, never used, still in warranty, $225.00. F. S. Eggert, 11833 Wisconsin, Detroit, Mich. 48204.

SELL: Drake 2B receiver with crystal calibrator. Excellent condition. $160.00. K5OPL, 5734 Hyacinth Ave., Baton Rouge, Louisiana 70808.

HALLICRAFTERS SX-111, matching speaker, manual, excellent condition, one year old; $145.00. J. Sublin, 1123 E. Upsal St., Phila., Penna. 19150.

WANTED: Excellent HQ-180A or HQ-180. State condx., purchase date and price. Edward Yadzinski, W3ZLB/2, 1075 Elmwood Ave., Buffalo, N.Y.

COLLEGE Expenses: 2B, $160.00; HT-44 with PS-150, best offer over $300.00. Shipped collect. Gari Berliot, 2634 Fairfield Place, Madison, Wis. 53704.

GUARANTEED A-1 Reconditioned equipment on trial approval at very attractive prices. Terms. Central 200-V, Collins 75S-1, 75S-3, 75S-3B, 32S-1, 30L-1, Drake 2-A, 2-B, R-4, TR-4; Gonset GSB-100, GSB-201, G-50, Hallicrafters SX-111, SX-101A, SX-117, HT-44, HT-32B, HT-37, Hammarlund HQ-110, HQ-170, HQ-180, National NC-190, NC-300, NCX-3, NCX-5, NCL-2000. Much other equipment. Write for lists. Henry Radio Company, Butler, Mo.

SALE: HRO-60, xtal cal., six coil sets, matching speaker, $200; Viking Valiant with relay, $150.00; Morrow MBR5 rcvr. Morrow MB560A xmtr, Morrow L.V. and James 1050 H.V. power supplies 12VDC, mike, whip load 6 coil, mount slides, cables, $130.00. Lettine 2 meter xmtr, Gonset Tuner, Gonset, audio amplifier, power supply, and speaker, mike, relay, SWR bridge meter and filter $125.00. Vibroplex Blue Racer Deluxe, $10.00; Eico Signal Generator No. 315, $20.00. Joseph Faulstich, 7524 Belair Road, Baltimore, Md. 21236.

TR-4, $495.00; AC-4, $83.00; DC-3, $123.00; RV-4, $68.00. Factory sealed boxes. Warranty, naturally. Sell separately. Mel Palmer, K4LGR, Box 10021, Greensboro, N.C. 27404.

FOR Sale: HT-37, $240.00; Drake 2-A with Q-multp, $170.00. Both in A-1 condx. Ship extra. WA4ULQ, 2109 Manuel St., Raleigh, N.C.

WANTED: HX-30, state age, condx., and price. For sale: Hallicrafters SR-34AC 6 & 2 meter transceiver and accessories. Complete VHF station except for antennas. In mint condition. $160.00. WB2OYK, 448 Union Avenue, Rutherford, N.J.

SELL: B&W LI000A amplifier in excellent condition. 80-10 meters. Can deliver within 150 mile radius, but if picked up will include unused 813 and 816 spares. T. Pederson, 5138 Pepin Place, Madison, Wisconsin 53705.

GOING Transceiver: sell Hallicrafters SX-71, Heath DX-100, SB-10, Gonsets with AC-DC power supplies and cables G66B, G77, RCA long-wave receiver 6 bands, 15 Kc-1750 Kc. All in mint condx, with manuals best offer over $50.00 each. Fred Lingel, 6 Wirthmore Lane, Lynnfield, Mass. 01940.

FOR Sale: Jennings Variable Vacuum Capacitor, 10 to 300 mmfd 16 kv test with Groth dial: $40.00. 75A-4, 500 cycle filter, $40.00. Hallicrafters HA-1 keyer, $45.00. W2HC, 129 Harvard Street, Westbury, N.Y. 11590.

CLEGG "22'er" for sale, 3 xtals, halo, all for $200.00 K8IFH, 5334 S. Vassar, Grand Blanc, Michigan.

VIBROPLEX Original deluxe, brand new, make offer. Bob Ensminger, 704 Vine, Lodi, Calif.

FOR Sale: Swan 240 Transceiver with Swan 12 VDC pwr. supply, Clegg 22'er, all in original cartons and in mint condx. Reasonable. W9AFT, H. E. Wright, 3857 No. 86th St., Milwaukee, Wis.

FOR Sale: HY-Gain 18HT, $60.00. W1YZL, 45 Chandler St., Haverhill, Mass.

SACRIFICE For college: Heathkit DX-40. Also RME Electro-Voice dual conversion Model 4350 communications receiver. Best offer on either. Dixon Kerr, 180 20th St., Cleveland, Tennessee. Satisfaction guaranteed.

HEATH Seneca, $110.00; HY-Gain DB62, $16.00. Home brew 90-watt modulator multimatch output, $35.00. W2WHK, 210 Utica St., Tonawanda, N.Y.

DRAKE 2B, w/2AC and 2AQ, FB condx., $190.00. DX-100B, fine c.w., needs work fone, $70.00. Andy Faber, WA2BWS/3, 1531 N.H. Ave., N.W., Wash., D.C. Tel: 234-5844.

WANTED: HP-13 DC supply. L. Julien, K9DFY, 711 S. Euclid Ave., Villa Park, Ill.

2 Meter FM: 1 G-E base and 1 Motorola mobile on 145.35. $200/pr Liebl, W9NYS. R 2, Medford, Wis. 54451.

WANTED: Transceiver, Drake, Swan or Hallicrafters. Also 2B receiver. Good condition. Reasonable. Fred Williams, 54 Nassau Road, Huntington, N.Y.

COLLEGE Expenses: Must sell Gonset GSB-100, SSB-CW-AM transmitter, $215.00 or best offer. Original owner, no scratches, works perfectly. W7HYK/2, Bob McConnell, 595 Taylor Road, Piscataway Township, N.J. 08854. In N.Y.C. area, call (201)-249-8439.

SELL: Johnson Valiant II factory wired, Hammarlund HQ-170. $400.00 for both, or will sell separately. W9OPL, 9513 N. Karlov, Skokie, Illinois. Tel: OR4-5848.

COLLEGE Expenses: Must sell station including AR-88F, $185.00; DX-40 with VFO and plate modulator, $55.00; Hallicrafters S-72, $45.00; Gonset Tribander, $18.00; also ARC-5's, ARC-3 receiver, TBX-8, BC-433F, Q-multiplier, 150-watt amp., microphones and more. Write: H. Chapin, WB2DAZ, 64 Nautilus Ave., Northport, Long Island, N.Y., 11768.

EICO 753K, SSB transistor VFO matching AC, $220.00; Twoer, DC supply, $45.00; Matchbox 250-23, $38.00; Matchbox 250-23-3 excellent, $75.00; Collins 516F2 AC supply, $70.00; Collins ant. relay 115DC new, $8.50; list of misc. parts, SASE. all f.o.b. KØARV, 2925 Wildwood Ct. N.E. Cedar Raoids, Iowa.

COLLINS 75S-1 with Waters Q-multiplier, 32S-1, 516F-2, $700.00 complete. F.o.b. 3103 Grand, Des Moines, Iowa. O. D. Goodwin.

WANTED: Linear amplifier, and late model SSB transceiver (or transmitter). W1ONM, P. Boudreau, 10 Forbes Ave., Burlington, Mass. 01803. Tel: (617)-272-9095.

HEATHKIT KW Kompact with AC and DC supplies. Excellent. $275.00. WA2FSD, 11 Burbury Lane, Great Neck, N.Y. Tel: 516-482-7857.

COMPLETE Station: Knight R100A, Eico 720 xmtr, Hy-Gain vertical antenna and extras, $150.00. G. Stevenson, P.O. Box 402, Southampton, L.I., N.Y.

BARGAINS: DX-40 75-watt phone-c.w. transmitter, Heath VFO, key, filter, wavemeter, phones, mike with stand. Packard: $58.00. Gonset GSB-100, little used, $170.00. Signal Generator, $12.00. 810's, $5.00 each. Eico scope, $30. Homebrew compreamplifier with photocopied book, $10.00. Vergne, K2KGU, tel.: (212) 666-8513.

FANTASTIC Ham location 1000 ft. hilltop 180° unobstructed view of Pacific Ocean. Antenna OK. 2-story 3 bd.rm. 2 dens, den converted to station, radial wires under poured patio slab. Beam goes: shop, 2½ baths, 2 yrs. old. B. Ward, WB6DLQ, 3149 Altalaguna Blvd., "Top of the World", Laguna Beach, Calif. Tel: (714)494-6110.

TRADES Wanted. Need GDO, set good walkie-talkies, aircraft type headset with microphone, commercial stereo tapes, stereo speakers, Sonoy miniature TV, Nikon telephoto lens. Have very large Lionel O guage electric train (will break up). W9PWV, 821 Waveland, Lake Forest, Ill.

HEATH SB-100 transceiver with HP-23 AC power supply and SB-600 speaker, $420. SB-200 linear, $170.00. HD-10 keyer, $30.00. SB-110 6-meter transceiver, $275. HP-13 DC power supply, $40.00. Built by Heath engineer. All in top condition. Shipped express collect. Certified check only. K8ZVF, 1911 State, St. Joseph, Michigan.

NEW YORK State, secluded hilltop location 20 miles south of Buffalo, spacious 4-room log cabin with bath, fireplace, screened outside dining room, toolhouse, over 2 acres surrounded by 160 acres of woods and farm. TVI free. Complete with 113 ft. Telrex Big Bertha rotating mast equipped with largest 40,20,15,10 arrays, plus another 70 ft. tower. Prime DX and contest location. Appraised 1964 at $13,500 prior to erecting the $8200 Big Bertha. Will sell all for $14,900 or will consider best offer! K2GXI, 120 Yorktown, Buffalo 14226. Tel: 839-3335.

SELL: NC-300, calibrator, speaker, HG-303, relay, lowpass, $250.00. All in mint condx. Edward J. Laposki, Jr., 1491 Overlook, Alliance, Ohio.

HALLICRAFTERS HT-32 SSB transmitter with manual, $225.00. Johnson Viking I and 122 VFO, $65.00. R. Lewis, W4HXW, 3012 Kirk St., Miami 33133, Florida. Tel: 443-4904.

32S-3, 516F-2 with spkr, $600; HT-45, less power supply, $200. Hy-Gain 3-el. 15 mtr. beam, still in carton, $30.00. 3-1 mech. filters 75A-4, $35.00 each. 41000-A linear vac. vari. B&W coil 4000 volt solid state power supply, 50 mfd. 10 K filters, extra 1000-A, $350.00. Raymond C. Farwell, W4BJ, 370 N. E. 147 Terrace, Miami, Florida, 33161.

NC-303 with xtal calibrator, excellent condition. Peerless 300W Multimatch mod. trans. Best offer. Wanted: SX-115. Floyd Martin, Rte. 2, Sterling, Va. Tel: (703)430-2499.

SACRIFICE: KWM-2 mint condition, $659. "Factory installed" noise blanker, $69; mobile supply, $49.00. Mobile Mount, $64; A.C. supply, $65.00; 30L-, $319.00. Heath HO-6 monitor scope, $59.00. Hy-Gain full size 3-el. 20 M beam, $35.00. Fred Breidbart, 1725 Broadway, Brooklyn, N.Y. Tel: GLJ-2222.

CRYSTAL Calibrator, Hammarlund XC-100, $10.00. Sold receiver. WAØNQM, 4181 Chartley, Bridgeton, Mo.

NCX-3 perfect condition, $200. WA3BTL, 898 Washington St., Throop, Penna.

QST-CQ-73 Magazines, 25¢ each. SASE for list. K2POA, 29 Boone St., Bethpage, L.I., N.Y.

SAVE One-Third on a new NCX-5, NCXA, NCL-2000. Only $995 on a cash deal. Also Lampkin 105-B freq. meter with CB channel curves, unused since factory overhaul, only $175.00. Gene Hubbell, W9ERU, 6633 East Palo Verde Lane, Scottsdale, Ariz. 85251.

DRAKE TR-3 w/AC-3 P/S and RV-3 remote VFO, $525.00. Loudenboomer linear KW w/P/S, $300. Hallicrafters HA-1 keyer, bug, 60 ft. E-Z Way tower, rotor, quad. Like new. W2GIM, Kessel, 455 Oakridge Dr., Rochester, N.Y. 14617.

TRIBANDER Transceiver, SR-160, like new, and never used matching DC mobile supply, $205.00. Posklensky, 565 E. 55th St., Brooklyn 3, N.Y. Tel: NA-9-2004.

SALE: KWM-2, 516F-2 AC supply, Mosley V-4-6 vertical with 80-meter coil. All for $600. Ben Judd, K5QWR, 716 Harris Ave., Austin, Texas.

DRAFTED. Need money. Hammarlund HQ-110/clock. Used only 8 hours. Like new, $150.00. Watkins, 1520 Sheridan Ave., Bronx 57, New York.

FOR Sale: 40 ft. E-Z Way light-duty crank-up and TR-44 rotor with 150 ft. control cable. $90.00. Vernard Rush, RR #4, Columbus, Indiana.

SELL: AR-22 rotor with cable ($25); 20 meter 3-el. beam from ARRL Handbook ($15). Kent Zimmerman, WA1CIZ, Weston Road, Weston, Conn.

SELL: Drake 2B and calibr., like new, $175.00. WØKLG, Dassel, Minn.

GONSET 2-el. Triband beam, AR-22 rotor, 40 ft. TV tower, 50 ft. RG/8-U $50.00. Pick up deal only. K5ESW, Ferguson, 4012 Richmond Ave., Shreveport, La. Tel: 861-3643.

COLLINS 75S-1, $290.00. F. J. Darke, Jr., 13C Hampton Arms, Hightstown, N.J. Tel: 609-448-4014.

SELL: Drake TR-4, AC power supply, matching speaker, $550.00; Henry 2-K Linear, $575; TR-4 and linear are only 5 months old. Also, Ham-M rotator $70.00; Hy-Gain full size 20-meter Monoband beam, $35.00; two Dow-Key relays, $15.00; various tubes ranging from 6146s to 4CX350s, over 140 tubes in all, for $30.00. Duke Flannagan, W4JEY, 32 Aumond Villa, Lake Forest Drive, Augusta, Georgia. Tel: 736-7934.

DRAKE TRA like new, w/used AC3 spkr. and power supply. First m.o. or certified check for $485. Pemberton, W9YJH/4. 2221 Hillside Dr., Henderson, Ky.

FOR Sale: DX-100B in excellent condx, $95.00. WB2NQK, Robert Coulehan, 13 Allen St., Dobbs Ferry, N.Y. N.Y. 10522.

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SELL: Central 20A, 100 W final, Drake 1A receiver, $175.00. Melody audio amplifier, speaker, $30. Stan Thayer, RD #5, Irwin, Penna. Tel: 824-8665.

FREE Four crystals Novice, General with my DX-20, 50W c.w. In like-new condition but few scratches, $35.00. Howard Ball, 2700 Grand Concourse, Bronx, N.Y. 10458. Tel: 212-LU-4-0316.

XYL Sez "Clean house!" Three pages exceptional gear. SASE. W4API. Box 4095, Arlington, Va. 22204.

SELL! HRO-60, SX-100, DX-35, WIJKS.

COMPLETE Heath Sideband station: HX-10 xmtr, HR-10 rcvr, TA32JR beam. Acces., $350.00. K1WPR, 7 Linden Ave., Belmont, Mass.

4X250B, $10.00 pair; 4X150A, $5.00 pair; 4CX250B, $12.00 pair used; new $20.00 pair p.p. 4-125 new, $10.00 pair, 4-65 new, $7.00 pair, 811 new, $5.00 pair, all above guaranteed, 50¢ extra for glass tubes shipping. C. M. Pruett, Star Rte. C, Flamingo Bay, Ft. Myers, Fla. 33901.

NEW And used amateur parts. Send for list. Mikes repaired. J & J Electronics, Box 146, Canterbury, Conn.

COLLINS KWM-2 615F2 supply. Late model. Immaculate, $800. B. Kasmir, W2VBX, Tel: (201) 947-4873.

COLLINS 75S-1, Heathkit DX-60, practice key, cable antenna. All in very good condition. $300.00 or best offer. Ron Clifton, 10380 Carrollton Ave., Indianapolis, Ind.

TRADE Model CC50 Tecraft, 6 meter converter for TV antenna rotor. K3BYJ 111 Elm Ave., Morrisville, Penna. 19067.

DISCOUNT Priced on demonstrator models: SB-34, $339.00; SW-350, $369.00; Galaxy V, $369.00; TR-4, $539.00. Big Specials on reconditioned, guaranteed used equipment. Valiant, $119.00; SX-111, $135.00; VHF-1 Seneca, $149.00; T-150A, $75.00; HQ-170, $189.00; NCX-5, $399.00; SX-117, $239.00, HT-44, $249.00. Send for complete listing of equipment. Top trade-in for your present gear. Guaranteed specials. SB-300, $199.00; SB-33, $189.00; Ranger $79.00; HW-12, $109.00; SW-140, $129.00; NCX-3, $229.00; SW-240, $219.00; new Swan TCU, $39.00; 100-V, $359.00; GSB-100, $189.00. Call or write today for your ham, hi-fi, CB and business radio needs at discount prices. Bryan, W5KFT, Edwards Electronics, 1320-19th St., Lubbock, Texas. Tel: 806-P02-8759.

B&W 6100 Deluxe SSB transmitter with extremely effective RF envelope clipper-filter, perfect, $395.00. Collins KWS-1, very clean. Pick up. $575.00 prepaid. W4ETO, 13315 108th Ave. North, Seminole, Fla. 33540.

P&H Electronic linear amplifier Model LA-400C, $150.00; Johnson Ranger II transmitter, $175.00; TV-1000-LP low-pass filter, $10.00 (new); Micro-Match Model No. 261, 262, $30.00 (new); Johnson Viking 6-2 Meter converter (receiver), $30.00; Vibroplex bug key, chrome, $15.00; Eico Signal Generator, wired, Model 315, $50.00. Gonset Super 12 (to attach to car radio for listening) $15.00; Squalo antenna (new), $8.50 (no shipping). Mrs. Eleanor M. Willcox, 39 Woodbine St., Auburndale, Mass. 02166. Tel: LA-7-8506.

DRAKE 2-A with speaker and calibrator, $150.00. John Smith, 1160 Reed Circle, Columbus, Ohio.

FAMOUS W3DZZ beam with Hy-Gain balun, complete with drawings and instructions, worked 260 countries. No ship, disassemble and take away, $100 or best offer. 201-226-4471 W2PXR, North Caldwell, N.J.

WANTED: Drake T4X transmitter and AC-3 power supply. Give rock-bottom price. Laver, W2TWK, 750 Azalea Dr., Rockville, Md.

S-36A Hallicrafters and National HFS receivers wanted. Quote price. Don Maxwell, 718 Regency Drive, Charleston, West Virginia 25314.

EXCELLENT S-85 with S-meter and crystal calibrator. $70. K9DFL, 1501 Plass, Tokepa, Kans.

HALLICRAFTERS HT-37, mint condition. $245.00 or make offer. Jim Bollinger, 106 Boyd Ave., Peoria, Ill. 61604.

DX-100 unmodified excellent condition. $100.00. K9GRI, 2101, W. Rohman, Peoria, Ill.

HOSS-TRADER Ed Moory needs cash to buy hay for his ponies. Following demonstrator equipment with full factory warranty: NCX-5, $509.00; TR-4, $489.00; Swan 350, $349.00; Galaxy V, $345.00; R-4A, $329.95; NCL-2000; $519.00; KWM-2, $895.00; 75S-3-B, $489.00; 30L-1, $419.00; SB-34, $329.00; New Ham-M rotor and demo Mosley TA-33 beam, $169.00; Demo Ham-M rotor, $89.95; T4-X, $339.00. Package Deal: New NCX-5 and demo NCL-2000, regular price $1370.00. Cash price: $995.00. Another package deal: New Swan 350 and Swan Mark I 2000 watt linear display model, regular price, $963.00. Cash price, $775.00. Reconditioned Gear: SB-33, $189.00; 32S-3, $499.00 TR-3, $379.00. Terms, cash. "Ed Moory" Wholesale Radio, Box 506, DeWitt, Arkansas. Phone WHitney 6-2820.

DRAKE R4A, new, with warranty and National speaker, $319.00. Other gear on hand. N.Y.C. WA2OVG. Phone: (212)691-4711.

TELETYPE Model 28 KSR, $250.00; Sylvania TV camera, complete, $200.00; Collins VFO's. Write for list. Richard E. Mann, 430 Wilmot Rd., Deerfield, Ill. 60015.

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SUPPRESSOR DISSIPATION	25 W

TYPICAL CLASS AB_1 LINEAR AMPLIFIER MEASURED VALUES IN TWO TONE TEST

DC PLATE VOLTAGE	4000 V
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DC SCREEN VOLTAGE	500 V
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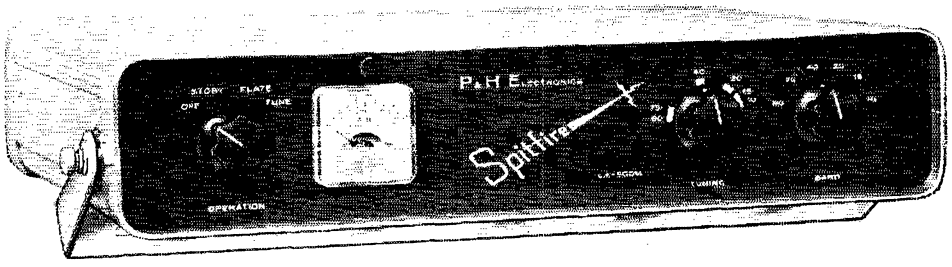

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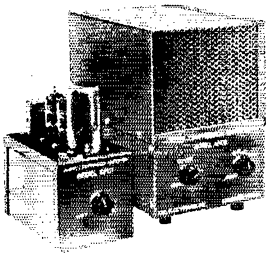

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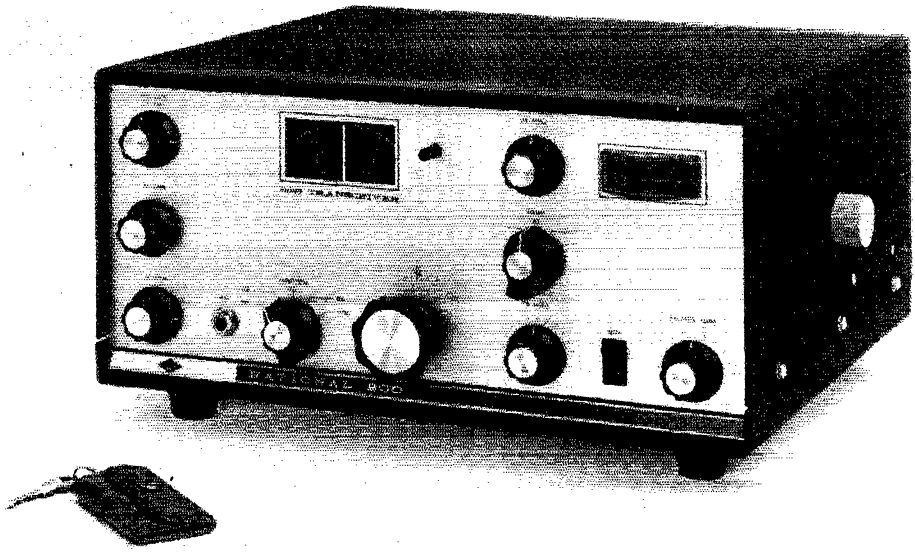

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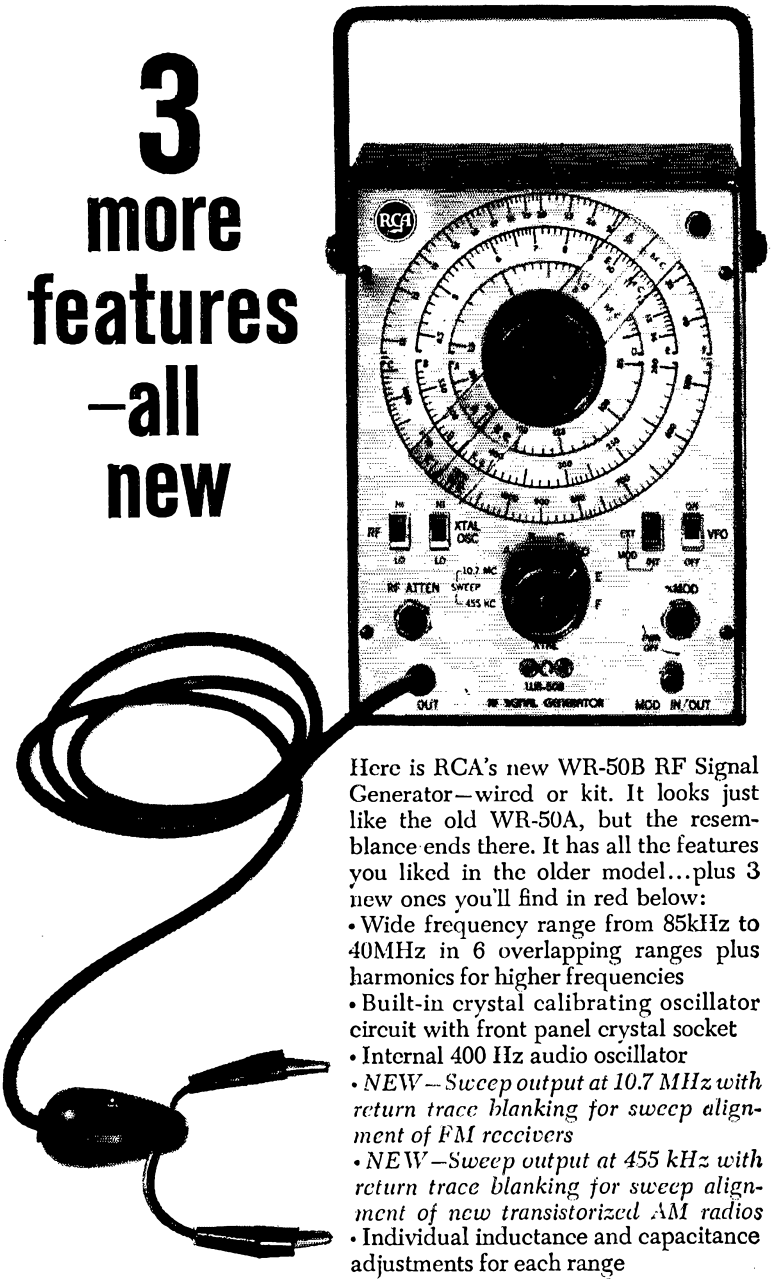

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