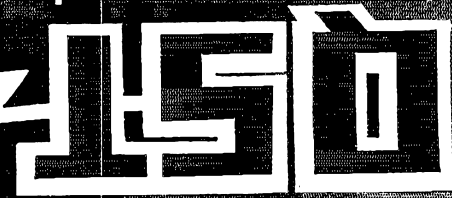


THE MIGHTY 10

devoted entirely to



March 1960
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55c in Canada

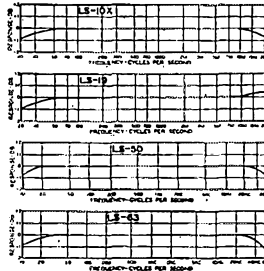
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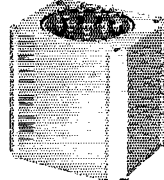


LS-10X Shielded Input
Multiple line (50, 200, 250, 500/600, etc.) to 50,000 ohms... multiple shielded.

LS-19 Plate to Two Grids
Primary 15,000 ohms.
Secondary 95,000 ohms C.T.

LS-50 Plate to Line
15,000 ohms to multiple line... +15 db. level.

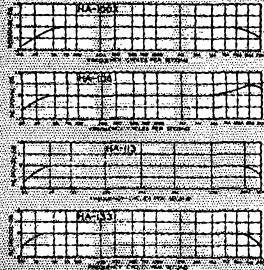
LS-63 P.P. Plates to Voice Coil
Primary 10,000 C.T. and 6,000 C.T. suited to Williamson, MLF, ul-linear circuits.
Secondary 1.2, 2.5, 5, 7.5, 10, 15, 20, 30 ohms. 20 watts.



CASE LS-1 LS-2 LS-1
Length 3 1/4" 4-7/16" 5-13
Width 2 9/16" 3 1/2" 5"
Height 3 3/4" 4-3/16" 4-11
Unit Wt. 3 lbs. 7.5 lbs. 15 lb.

HIPERMALLOY series

This series provides virtually all the characteristics of the Linear Standard group in a more compact and lighter structure. The frequency response is within 1 db. from 30 to 20,000 cycles. Hipermalloy nickel iron cores and hum balanced core structures provide minimum distortion and low hum pickup. Input transformers, maximum level +10db. Circular terminal layout and top and bottom mounting.



HA-100X Shielded Input
Multiple line to 60,000 ohm grid... tri-alloy shielding for low hum pickup.

HA-106 Plate to Two Grids
15,000 ohms to 135,000 ohms in two sections... +12 db. level.

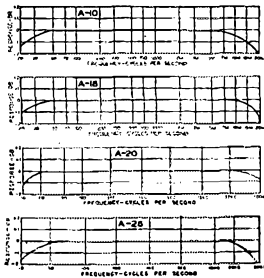
HA-113 Plate to Line
15,000 ohms to multiple line... +12 db. level... 0 DC in primary.

HA-133 Plate (DC) to Line
15,000 ohms to multiple line... +15 db. level... 8 Ma. DC to primary.



ULTRA COMPACT series

UTC Ultra Compact audio units are small and light in weight, ideally suited to remote amplifier and similar compact equipment. The frequency response is within 2 db. from 30 to 20,000 cycles. Hum balanced coil structure plus high conductivity die cast case provides good inductive shielding. Maximum operating level is +7db. Top and bottom mounting as well as circular terminal layout are used in this series as well as the ones described above.

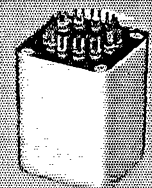


A-10 Line to Grid
Multiple line to 50,000 ohm grid.

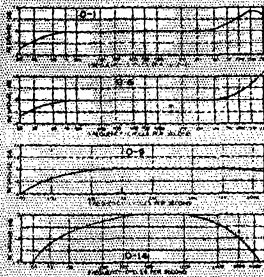
A-18 Plate to Two Grids
15,000 ohms to 80,000 ohms, primary and secondary both split.

A-20 Mixing Transformer
Multiple line to multiple line for mixing mikes, lines, etc.

A-26 P.P. Plates to Line
30,000 ohms plate to plate, to multiple line.



A CASE
Length _____
Width _____
Height _____
Unit Weight _____

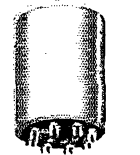


D-1 Line to Grid
Primary 50, 200/250, 500/600 ohms to 50,000 ohm grid.

D-8 Plate to Two Grids
15,000 ohms to 95,000 ohms C.T.

D-8 Plate (DC) to Line
Primary 15,000 ohms, Secondary 50, 200/250, 500/600.

D-14 50:1 Line to Grid
Primary 200 ohms, Secondary 5 megohm for mike or line to grid.



OUNGER CASE
Diameter _____ 7/8"
Height _____ 1-3/4"
Unit Weight _____ 1 oz.

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- Employs digital techniques. Advanced circuitry assures constant ratio of dot-to-space-to-dash over entire speed range.
- All timing circuits electronic—not affected by relay variations. Dots and dashes are self completing.
- Employs four dual-purpose triodes, two voltage regulators, two neons, three semi-conductor diodes. Transformer-operated.
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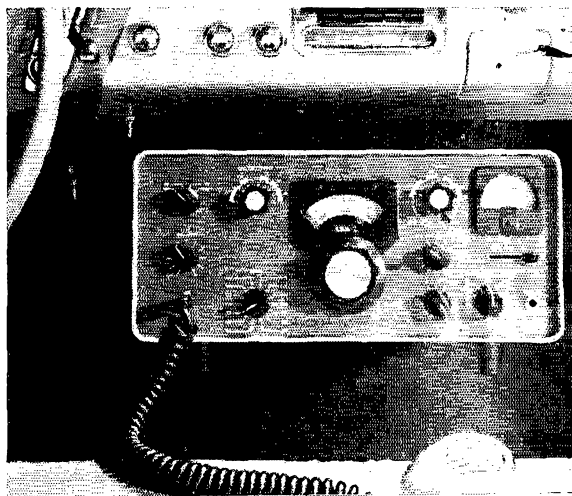
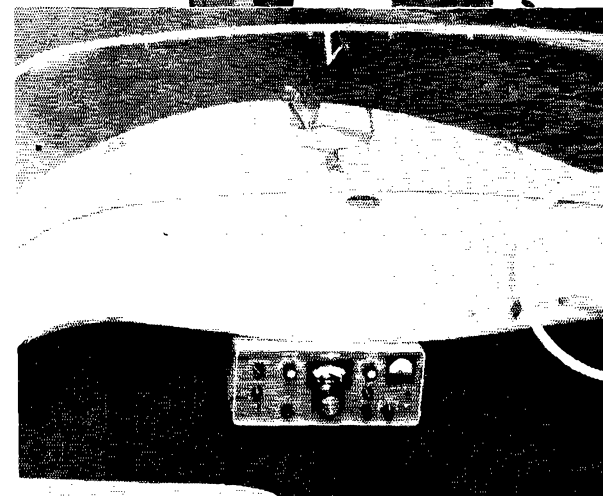
The KWM-2 is easily moved between mobile and fixed station installations. It slips into mounting brackets beneath the instrument panel of your car or boat. It even mounts in the passenger compartment of an airplane. The KWM-2 instantly and automatically connects to the power supply, antenna selector and car radio speaker.

With 175 watts PEP input or 160 watts on CW the KWM-2 gives you outstanding frequency stability and over-all reliable communication on 14 200-kc bands from 3.4 to 30.0 mc.

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Visit the Collins exhibit at the annual Single Sideband Dinner, March 22, 1960, Hotel Statler Hilton, New York City.





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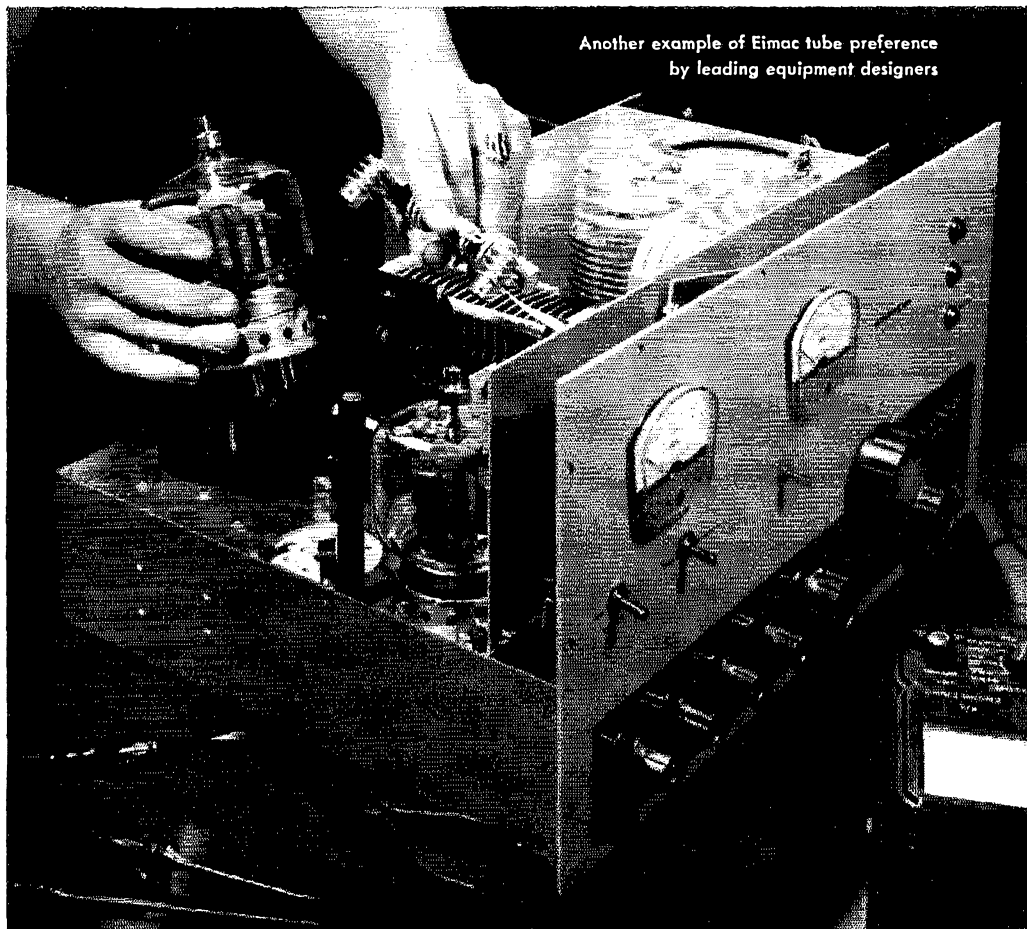
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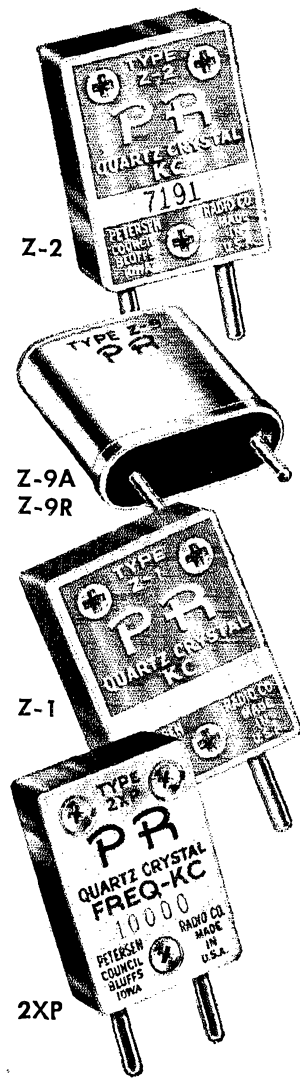
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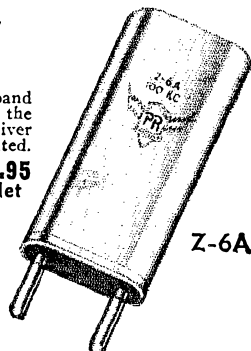
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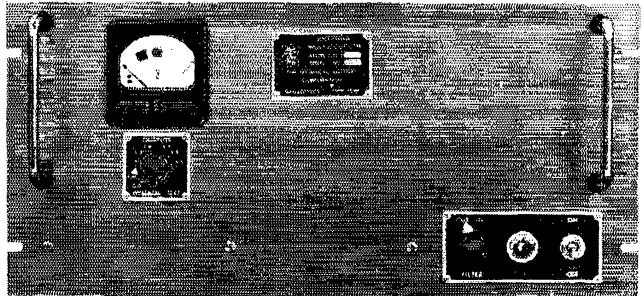
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

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

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

All general correspondence should be addressed to the administrative headquarters at West Hartford, Connecticut.



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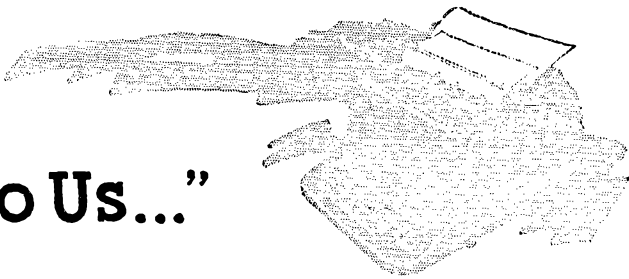
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"It Seems to Us..."



GENEVA — FINAL REPORT

As we reported briefly in January *QST*, it's all over. We have a new set of international radio regulations continuing — in this hemisphere — all the privileges we have had under the Atlantic City regulations. And our reaction is: "Whew!"

Beginning on page 55 is the story behind the simple statement above. We hope you will find it thoroughly absorbing. It tells of the proposals which threatened us, and something of the hard work and skillful negotiating necessary to defeat those proposals. It applauds our friends and identifies those countries which would have reduced our space. It graphically illustrates the effectiveness of three years of careful planning and study by government and "industry" (including us) users of radio and — most of all — the effectiveness of the teamwork of the entire U. S. delegation.

We are sorry only that we have to qualify the good news with the phrase "in this hemisphere." Elsewhere amateurs did not make out quite so well. While there were notable exceptions, in too many countries it appeared that amateurs had not "done their homework" in advance of the conference. Some foreign delegates did not know much about amateur radio; they had not been convinced of the extent to which hams can be important to the welfare of their country. In some cases, apparently, amateur societies and clubs had not made any contact at all with the people responsible for forming their government's position.

In contrast, the amateurs of the United States and Canada are united in a strong effective organization. Our League has been careful to maintain good relations with both governments, not just at conference time but on a continuing basis. Moreover, in previous conferences and at this one, League representatives worked as part of the government team, accepting any assignments offered by the chairman, even some not directly related to amateur radio. Similarly, delegation members representing other radio services pitched in wherever they were needed, including ironing out amateur problems.

At this point, one can only guess when the next full-scale examination of the radio regulations and frequency allocations table will take place (our guess — in about five years). One cannot be sure what problems will face

us, either. Rest assured, though, that long before the gavel is rapped, your ARRL staff will again be meeting with other industry and government radiomen developing the best possible strategy in light of the conditions existing at the time.

THE BEST YEARS?

If you could have chosen a time in history in which to live, what would be your choice? During the time of Ben Franklin, when the United States was struggling to stay alive and electricity was a most mysterious substance? Perhaps during medieval days, when theoretical science was occupied with the attempt to change base metal to gold, and practical science with the first secretive (because they were illegal) explorations of how the human body functioned? Or still further back, when irrigation first brought prosperity to the Near East and the ancients uncovered some of the secrets of mathematics and astronomy?

Perhaps the majority of each generation thinks that its years are the most exciting in all history. True, there are always a few adventuresome souls whose imaginations can see something of the future, and a few who would retreat to simpler or more glamorous days of the past.

We offer evidence suggesting that we are right in the middle of a period in history as exciting as any man may ever see. First, look what has happened in the present century. Since 1900 man has learned to make great use of radio, and send his voice, or picture, or moving image, instantly to any spot on the globe. In 1939 a single atom was split, leaving its trail etched on a photographic plate; six years later, millions were split simultaneously and in chain, releasing the mightiest forces ever handled by man; in five more years, the force was increased a thousand fold. Twenty-five years ago Grote Reber, W9GFZ, set up a radio-telescope in his back yard and focussed on strange sounds coming from the depths of space. His neighbors (and some of his ham friends) thought that Grote had slipped a cog, but the truth is that he had imagination and his neighbors didn't. Radioastronomy is now a very active and fast-moving science — and Reber is still playing an important part in it.

In this issue we have a story by W1HKK

(Please turn the page)

on the progress in Project Ozma, the search for radio signals bearing messages from some other planet. As you read it, let your imagination stir a bit. Reach out beyond the 75-meter phone band or that AC4 on 20 meters and consider the romance of hearing a signal from somewhere out beyond the earth. Step out into your yard tonight and look upward. Millions of stars, some with planets — do they have life of some sort? Project Ozma is betting that somewhere out there someone or something is also searching for radio signals from another planet — perhaps ours.

If man has mastered so many fabulous techniques in the past fifty years, is it not possible that in the next ten years he may learn how to communicate with some other planet?

QST

COMING A.R.R.L. CONVENTIONS

March 18-19 — Michigan State, Saginaw.
 April 9 — Michigan State, Grand Rapids.
 May 1 — New England Division, Swampscott, Massachusetts.
 June 18-19 — West Gulf Division, Dallas, Texas.
 July 30-31 — North Dakota State, Minot.
 September 10-11 — Central Division, Indianapolis, Indiana.
 September 16-17 — Quebec Province, Montreal.



New York — The Ninth Annual SSB Dinner and Hamfest will be held on Tuesday, March 22, at the Hotel Statler-Hilton, 33rd St. and 7th Ave., New York City. This dinner and hamfest, held during the week of the annual IRE convention, is sponsored by the SSB Amateur Radio Association. Equipment displays open at 1000, with the dinner beginning at 1930. Bill Leonard, W2SKE, will be master of ceremonies. Tickets purchased in advance are \$8.50 each, or \$9.50 at the door. Send checks for reservations to SSBARA, in care of Mike Le Vine, WA2BLH, 33 Allen Road, Rockville Centre, Long Island, N. Y.

MICHIGAN STATE CONVENTION

Saginaw, Michigan — March 18-19

Hosting an ARRL Michigan State Convention, March 18-19 at the Bancroft Hotel in Saginaw, will be the Saginaw Valley Amateur Radio Association. Programs include meetings for various nets, Civil Defense, MARS, YLRL, s.s.b. and for the first time, the Michigan chapter of the Quarter Century Wireless Association.

Special programs for NYLs and for interested non-amateur groups are also planned. The v.h.f.-u.h.f., RTTY, Novice corners, a Swap Shop and contests will round out the two-day affair.

As part of the "early bird" program, there will be an initiation for the Royal Order of the Wouff Hong at midnight, Friday, March 18.

Hotel reservations can be obtained through Ed Trombly, W8CAM, 3132 Court Street, Saginaw. Convention tickets at \$1.50 (\$1.75 at door) are available from Charles Leedke, W8LNE, 1970 Brockway, Saginaw, Michigan.

Strays

Delaware Valley amateurs put on a "Hams Around the World" show for Philadelphians last fall in celebration of the United Nations' 14th anniversary.

To demonstrate how person-to-person radio contacts cross boundaries of race, religion, politics and distance, hams went on the air from a downtown location every afternoon and evening and all day Saturday of the week Oct. 19-24. The city set up its emergency communication trailer in front of City Hall for the project.

Passers-by could send and receive messages. One operator hunted DX QSOs while another handled traffic with U. S. hams. The FCC gave the station the special call, K3UN.

K3UN opened proceedings by putting the Mayor's office in contact with UN Headquarters.

City workmen strung a 75 meter dipole and erected a Hy Gain tri-bander lent by A. G. Radio 260 feet above ground on top of City Hall. The rig for 20-meter s.s.b. was a complete Barker and Williamson package loaned by Barry Barker, W3BZ. It included a 5100B, LPA-1, LPS-1, Matchmaster and t.r. switch.

Harold Carr, president of the Council of Radio Amateurs Clubs of Delaware Valley, lent his 75A-4. George Ryan, K2DEI, lent his Viking II. National Radio contributed an NC303 and NC400 while Philmont Radio Club produced a Mobile Emergency Van and the Delaware Twp CD came through with a Gonset for 2 meters.

QST

Philadelphia's Deputy City Representative, Abe Rosin, seated, listening with W3JFI to Dr. Frank Graham's remarks from UN Headquarters in New York City, via W2KH.

QST for

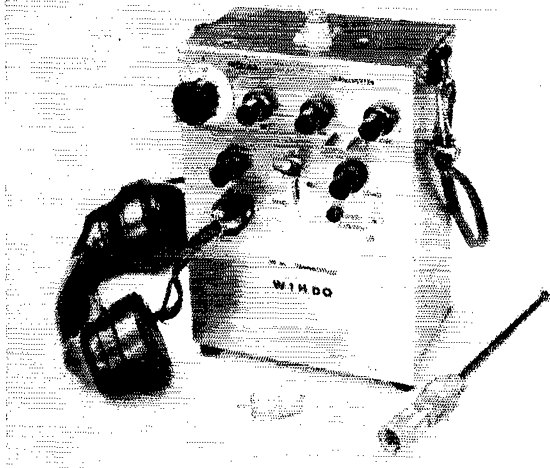


The 50-Mc. portable station, complete with telephone handset, antenna and dummy load, ready for a hiking trip or a civilian defense drill.

Five Pounds of Fun, for Hamming on the Hoof

BY EDWARD P. TILTON,* WH1DQ

A Self-Contained Portable Station for 50 Mc.



NEEED on-the-spot communication for a sports-car race, a golf tournament, a model-airplane meet, a boating event, or your local emergency AREC or RACES plan? Like to take a 6-meter rig along on a mountain hike? Want a challenging switch from the kilowatt rat-race on the lower bands? Looking for a project for the gang at the radio club?

This portable rig may be for you.

“Working portable” is a basic part of the v.h.f. picture, and now, thanks to transistors, miniature components and new low-drain tubes, it is more fun than ever and less of a strain on the back and batteries. The 1960 model 50-Mc. portable described herewith is the latest in a string of v.h.f. rigs that runs back to 50-pound behemoths of the early ‘thirties. It puts out more power and is better at snagging weak signals than any of its predecessors, yet is markedly more economical to operate.

What Band To Use?

No one answer to the above question will satisfy everyone who is interested in portable work, but we assure you that the problem was given plenty of thought before embarking on this project. Choice of frequency involves consideration of equipment efficiency, practical operating problems, and antenna size, in addition to personal preferences. You can build a very efficient portable rig for 75-meter phone, for instance, but how far will one-tenth of a watt get you through the Sunday QRM, especially with any antenna small enough for convenient portable work?

Choosing between 28 and 50 Mc. is something of a toss-up, but greater freedom from QRM and the smaller size of an effective antenna favor the

* V. H. F. Editor, *QST*.

There is something about v.h.f. hamming on a remote hilltop, far from power-line buzz and ignition noise, that makes for perennial interest in lightweight portable gear. Here is a package for just this kind of use. Weighing only 5 pounds, complete with handset and antenna, it should fill the bill for many other communications needs as well.

higher frequency. Battery consumption would limit the appeal of a 2-meter version of the equipment shown here. It would require many times the battery power to develop the output on 144 Mc. that our 50-Mc. job delivers. Equally important, 50 Mc. is near the upper frequency limit for effective use of low-drain tubes or transistors in receiver circuits.

Tubes or Transistors — or Both?

There is a strong temptation to use transistors in the portable station. This is entirely practical for 28 or 50 Mc., and there are uses for such gear. Experience has shown, however, that you need all the power you can get economically, when you try to do routine hamming with a portable rig. Transistors in the transmitter would drop the power output another 10 db. below what we have here — and one-tenth of a watt is little enough for most practical amateur purposes.

Transistors look better for receiving, but some improved low-drain tubes have appeared on the scene in recent years, too. With them we get receiver performance well ahead of that obtain-

able from transistors, at least in r.f. circuits at 50 Mc. Audio is another story. Before transistors, about half the drain of a portable rig went to audio stages. The Class B transistor modulator and single-ended receiver audio amplifier used

here effect real savings in size and battery drain.

Circuits

The transmitter uses a 3A5 dual triode, with one section a 50-Mc. crystal oscillator and the

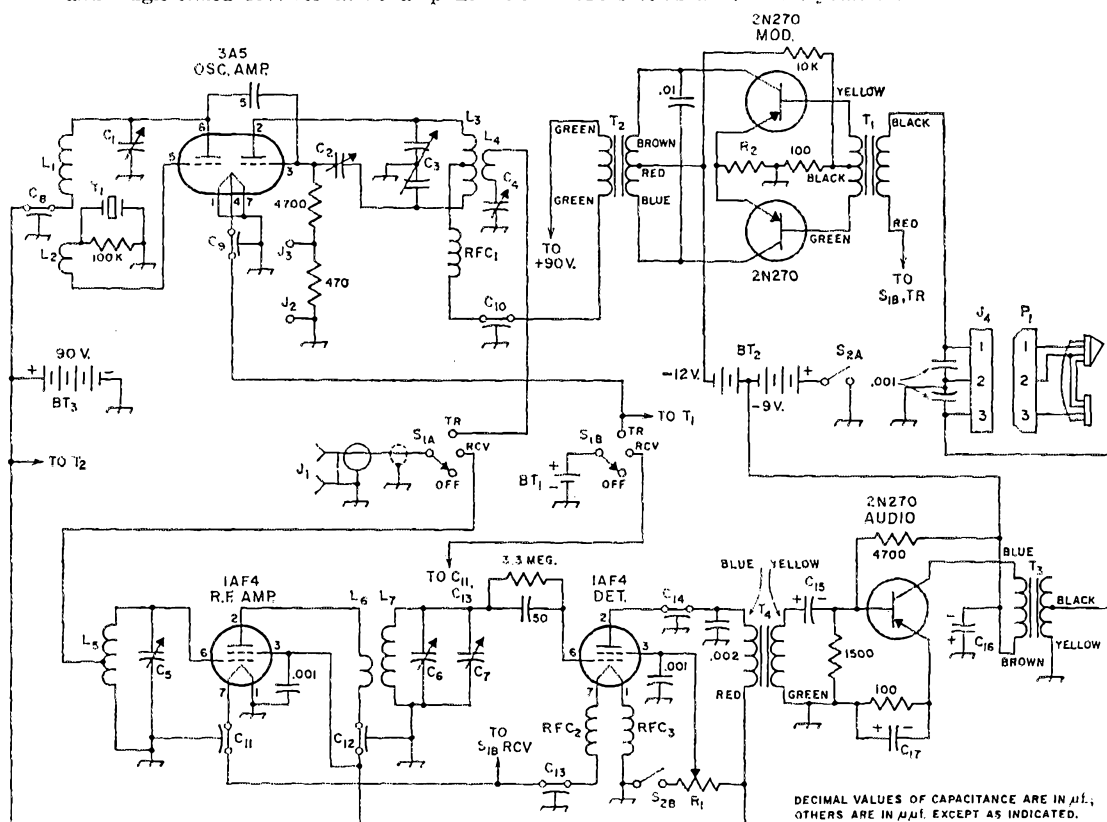


Fig. 1—Schematic diagram and parts list for the 50-Mc. portable station.

- BT₁—1.4-volt cell, mercury type preferred (Mallory RM-42 or RM-42R).
- BT₂—12-volt battery, tapped at minus 9 volts; see text.
- BT₃—90-volt B battery (Eveready 490, Burgess N60, RCA VS090).
- C₁—20- μ mf. miniature variable (Hammarlund MAC-20 NP).
- C₂—5- μ mf. subminiature variable (Johnson 189-2).
- C₃—11- μ mf. miniature butterfly variable (Johnson 160-211).
- C₄—50- μ mf. miniature variable (Hammarlund MAPC-50B).
- C₅—10- μ mf. miniature variable (Hammarlund MAC-10NP).
- C₆—5- μ mf. miniature variable (Hammarlund MAC-5 NP).
- C₇—13- μ mf. subminiature variable (Johnson 189-6).
- C₈ to C₁₄, incl.—500- μ mf. feedthrough bypass (Centralab FT-500).
- C₁₅—20- μ f. 15-volt electrolytic.
- C₁₆—50- μ f. 12-volt electrolytic.
- C₁₇—50- μ f. 3-volt electrolytic.
- J₁—Coaxial output fitting, SO-239.
- J₂, J₃—Insulated tip jack.
- J₄—3- or 4-pin chassis fitting, female.
- L₁—8 turns No. 20 tinned, 1/2-inch diam., 16 t.p.i.
- L₂—3 turns. Make L₁ and L₂ from single piece of B & W Miniductor No. 3003. See text.
- L₃—17 turns Like L₁, center tapped.
- L₄—3 turns No. 20 plastic-insulated wire wound over

- middle of L₃. Twist leads together, leaving 2 1/2-inch ends to reach C₄ and S₁.
- L₅—12 turns like L₁; tap at 3 turns from ground end.
- L₆, L₇—Make like L₂ and L₁, respectively, except 6 turns for L₇.
- P₁—Plug to match J₄.
- R₁—0.1-megohm miniature volume control, with d.p.s.t. switch (Philmore PC 66).
- R₂—5 ohms. Can be two 10-ohm resistors in parallel.
- S₁—2-pole 3-position lever-action switch (Centralab 1454).
- S₂—Switch on R₁.
- T₁—Modulator input transformer, 200-ohm primary, 2000-ohm secondary, center-tapped (Argonne AR-123).
- T₂—Modulator output transformer, 600-ohm primary, center-tapped, 5000-ohm secondary (Triad TY-49X).
- T₃—Audio output transformer, 150-ohm primary, center-tapped, 600-ohm secondary (Argonne AR-163). Use primary center tap.
- T₄—Audio input transformer, 100,000-ohm primary, 1500-ohm secondary (Argonne AR-102).
- RFC₁, 2, 3—4.7- μ h. solenoid choke No. 30 enamel close-wound 1/2 inch on 1-meg. 1-watt resistor (Waters C1004).
- Y₁—Overtone crystal, 50 to 54 Mc. (International Crystal FA-9).

Rear view of the 50-Mc. portable. Transmitter r.f. unit is in the upper left, the receiver at the right. The subassembly at the lower left is the transistor modulator. The send-receive switch is mounted vertically near the center.

other a neutralized amplifier. An earlier model¹ used a 3A5 with 8- or 25-Mc. crystals, with the final running as a doubler to 50 Mc. Changing to a straight-through amplifier gives more power output with less drain on the battery, and loading and modulation are far less tricky.

The oscillator circuit has a feedback winding in series with the crystal. This is not needed in overtone circuits using heater-type tubes with higher transconductance, but with the 3A5 it makes the oscillator start easily and tune uncritically. The oscillator coils, L_1 and L_2 , are made from a single piece of coil stock. Cut the wire about 4 turns in from the end and unwind the cut ends so that there is a 2-turn space between the windings. The finished assembly has 8 turns in L_1 and 3 in L_2 . The crystal end of L_2 is adjacent to the B-plus end of L_1 .

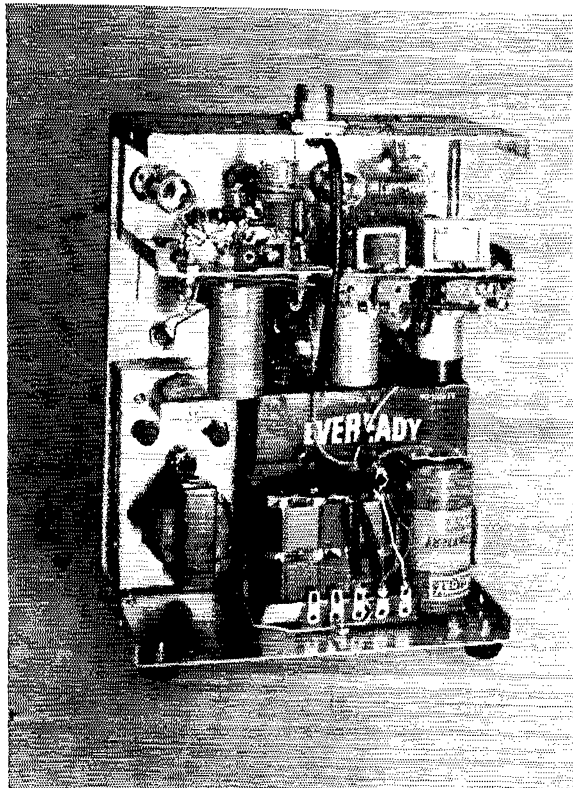
Tip jacks J_2 and J_3 on the front panel provide for measuring the amplifier grid current, as a check on the operation of both portions of the tube.

The receiver uses 1AF4 tubes in a tuned r.f. amplifier and a superregenerative detector. The audio amplifier is a 2N270 transistor, more or less Class A. Audio output was a pleasant surprise. It is more than adequate for the telephone handset. A small speaker could probably be used if desired.

The r.f. amplifier provides some gain and selectivity, but more important, it isolates the detector from the antenna. This holds down receiver radiation and makes tuning less critical than would be the case if the detector were coupled to the antenna directly. Interstage coupling is by means of a coil assembly similar to the one in the crystal oscillator circuit.

The padder capacitor, C_7 , across the detector

¹ Tilton — "A Civil Defense Portable," *QST*, May, 1951, p. 35.

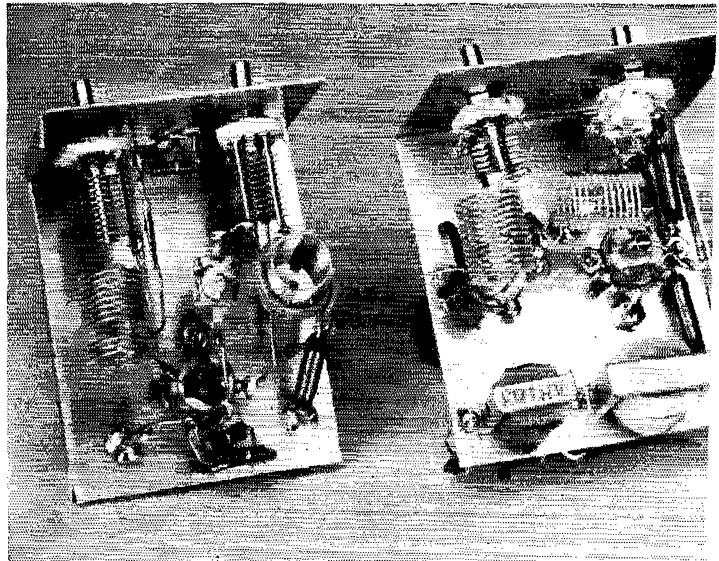


tuned circuit spreads the band over most of the 180-degree range on C_6 . With the padder near maximum setting the detector tunes 49 to 54 Mc. For more range add inductance to L_7 and reduce the capacitance of C_7 . Regeneration is controlled by varying the detector screen voltage. The 1AF4 is designed to operate with the same voltage on both plate and screen, so the potentiometer, R_1 , is run near the all-out position.

The receiver audio and the modulator circuits are conventional for the transistors used. Modulator gain is about right for close talking with the telephone microphone, and the earphone can be held away from the ear if signals are uncomfortably loud, so no gain control is included in either unit.

The regeneration control has a double-pole

Top view of the transmitter and receiver and subassemblies. The crystal oscillator circuit is on the left side, the amplifier plate circuit next. In the receiver the r.f. amplifier grid coil and its capacitor, and the detector tuned circuit are in the same order. The neutralizing capacitor, near the middle of the transmitter, and the band-setting padder, atop the detector tuning capacitor, are reached through holes in the top of the case. Units are held in place by the nuts on the capacitor shafts.



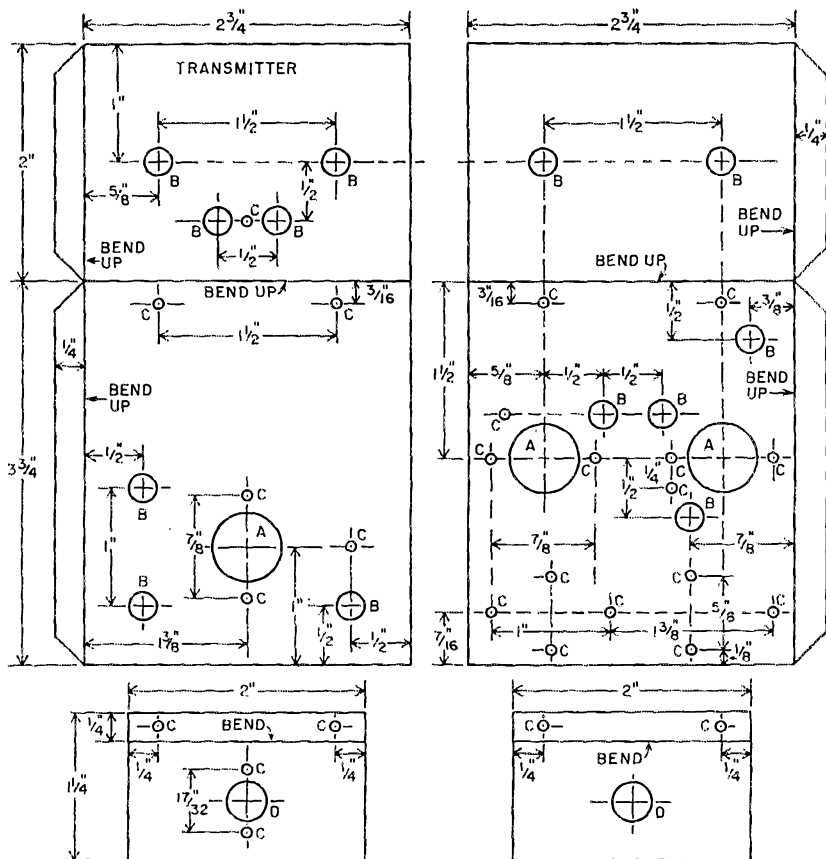


Fig. 2—Detailed layout drawings for the transmitter and receiver chassis. Hole sizes are as follows: A— $\frac{5}{8}$ inch, B— $\frac{1}{4}$ inch, C— $\frac{1}{8}$ inch, D— $\frac{3}{16}$ inch. Bent-up edges may be omitted if stiff sheet metal is used.

single-throw switch (S_2) built in. This breaks the ground leads to the regeneration control and the positive side of the transistor battery, so that no current will be drawn from the batteries with the switch off and the send-receive switch, S_1 , in the off position.

The send-receive switch applies voltage to the 3A5 filament and the microphone in the transmit position, and to the 1AF4 filaments on receive. The other section of S_1 switches the antenna between the transmitter output coil, L_4 , and the r.f. amplifier coil, L_5 . A three-position switch is used, with the top position off. It is mounted between the transmitter and receiver units, with its lever action in a vertical plane.

With r.f. circuits assembled so compactly, grounding and bypassing are important. Feed-through bypass capacitors are used liberally in the filament and B-plus leads. Coil orientation is also worthy of attention. The oscillator coil, L_1 , and the detector coil, L_7 , should be positioned for minimum coupling. Otherwise radiation from the detector may cause the crystal to oscillate as the detector is tuned through the transmitter operating frequency. This can be bad enough to wipe out quite a section of the band. For easy

transmitter neutralization there should also be minimum coupling between L_1 and L_3 . Oscillation in the receiver might result from too-close coupling between L_5 and L_7 , though no trouble was experienced with this in the original unit.

Construction

The portable station is built in three sub-assemblies, the transmitter r.f. unit, the receiver, and the modulator. This permits modifications without disturbing the parts of the equipment not being changed. Both construction and servicing are made simpler when the gear is broken up in this way.

The case is a standard Minibox, $3\frac{1}{2}$ by 6 by 8 inches in size. Everything is built into the outer portion, so that removal of the back opens up the entire equipment to view. The rig can be operated with the back off, facilitating servicing. Only the carrying strap is connected to the back part of the box. This utilizes the same combination of Twin-Lead, steel rings and dog-leash catches that was used on the 1951 model.¹ The rings and catches can be bought in most hardware stores. The Twin-Lead strap is practically indestructible, and convenient for the purpose.

Weight distribution being a factor in carrying case, the receiver and transmitter units are mounted at the top of the case, with batteries and modulator in the bottom. The receiver and transmitter chassis are identical in size, and similar in control arrangement, making for symmetrical front-panel appearance. All controls that are adjusted in the course of normal operation project through the front and are equipped with knobs. Transmitter neutralization and receiver hand-setting are done with an insulated screw driver, through access holes in the top of the case.

Layout drawings of the three small chassis are given in Figs. 2 and 3. The receiver and transmitter chassis are made in two parts each. The main portion is a piece of thin aluminum 3 by 5 1/4 inches overall, cut for bending 1/4 inch along one side for stiffening. This bent-up lip is not absolutely necessary, so don't be alarmed if you don't have facilities for fancy metal work. Below each main chassis is a small bracket of the same material, bolted to the horizontal portion of the chassis. This carries the antenna loading capacitor, C_4 , in the transmitter, and the regeneration control, R_1 , in the receiver. Hole sizes and minor dimensions may vary somewhat with other components than the ones used here, so it is well to check your parts before following the layout drawings implicitly.

The modulator chassis requires some cutting and bending work if a duplicate of the original is to be made. It is so small in size, however, that thin aluminum which can be bent readily between blocks of wood in a vise can be used. Even flashing copper should be suitable.

The bottom-view drawing of the modulator in Fig. 3 shows how the tie-point strips are arranged. The transistors are supported on their

wire leads, each being covered with insulating sleeving. As a further precaution against shorts the edges of the slots in the modulator chassis where the transistor leads are brought through are lined with small pieces of black plastic tape.

Looking at the rear view of the assembled unit, the transmitter is at the upper left, the receiver at the right, the modulator at the lower left, and the batteries at the lower right. The r.f. units are held in place by their control mounting nuts. The modulator is mounted with two self-tapping screws.

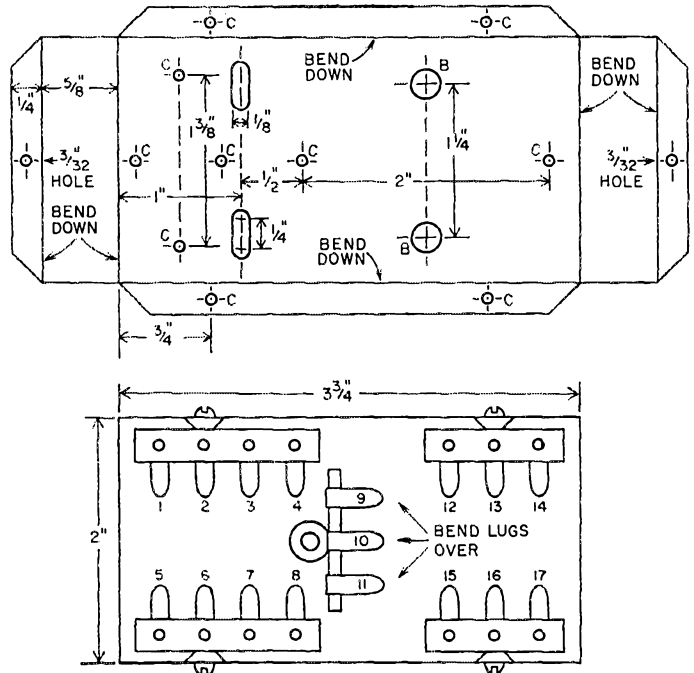
Batteries

Selection of batteries to power the station required some thought. Mercury batteries look good on paper. They offer more power in a given space than carbon-zinc types, and their uniform voltage throughout useful life is advantageous, but upon investigation of the cost per milliamperere-hour we decided on conventional batteries for all but the filament circuits. Mercury batteries last four times as long, for the same cell size, but they cost eight times as much.

Uniform voltage is important for the filaments of the tubes, so a mercury cell (Mallory RM-42 or RM-42R) is used here. It is mounted in a holder designed for the cell, in preference to something of a handmade nature. The cell, BT_1 , is substantially the same size as a regular flashlight cell, so the latter can be pressed into service, if need be. Note, however, that the polarity of the mercury cell is opposite to that of a flashlight cell of the drugstore type.

The voltage of the B battery is not critical, so the extra outlay for mercury cells is not justified for this service, if cost is important to the builder. The small 90-volt battery, BT_3 , is

Fig. 3—Layout drawing of the modulator chassis and underside view showing tie-point strips. Connections to lugs are as follows: 1 and 5—emitters; 2, 6, 10, 13 and 16—ground; 3 and 7—bases and T_1 secondary; 4 and 8—collectors and T_2 secondary; 9— T_1 secondary tap and 100-ohm resistor; 11— T_1 primary; 12 and 14— T_2 secondary; 15— T_1 primary; 17— T_2 primary tap.



widely available and inexpensive. It will give many hours of service, particularly if the operator uses the transmitter sparingly. Drain on receiving is only 3 ma.

We found no suitable inexpensive battery for the transistor supply, so 8 penlite cells were wired up in series for this job. The battery, *BT*₂, is tapped at minus 9 volts for the receiver audio stage. The cells were taped together in a block 4 cells long and 2 wide, with each one inverted with respect to its neighbor. Stiff wires were used to make the series connections.

Word of caution here: You can save yourself a lot of trouble by buying the old-fashioned type of penlite cell. The flashy leakproof cell now available has a small metal disk for making contact at the base of the cell. It does not work unless the cell or series of cells is under spring pressure, as in a flashlight. It took the writer some time to run down intermittent operation in the transistor portion of this rig before this bit of information was turned up. If the leak-proof cells must be used, slice off the base of the paper holder, and solder directly to the zinc cell. Leave the paper on the sides, or the works will short out when the cells are taped together.

The base of the 8-cell battery rests on a piece of corrugated paper. A tie-point strip (visible in the rear-view photograph) is mounted directly in back of the battery. Stiff leads from the battery terminals down to the lugs hold the battery in place.

Note that the top of the detector tube shield is wrapped with black plastic tape. This was done to prevent possible shorting of the B battery, as the positive terminal is directly in back of the shield. It is good practice to lift the cable connector from the battery whenever work is done on any part of the equipment. This is a sure way to prevent possible burnouts of tubes and transistors due to accidental shorting.

Total battery drain, at average voltages, is as follows: Filaments—200 ma. on transmit, 50 ma. on receive; Plates—15 Ma. on transmit, 3 ma. on receive; Modulator—2 ma. resting, 30 to 40 ma. on voice peaks; Receiver audio—18 ma. (The audio transistor is overdriven at times, and its current varies at high audio levels. The resulting distortion is not bothersome on voice.) Be sure that the switch on the regeneration control is turned off when the equipment is not in use. Otherwise the transistors will continue to draw current, and there will be about 1 ma. drawn continuously from the B battery by the

bleeder effect of the regeneration control.

Wiring

The subassemblies are completely wired before they are mounted in place. Most of this is done with the leads on the various components. Wiring hint: Tapping the close-spaced Miniductor stock used for the r.f. coil, *L*₅, is easy if the two turns adjacent to the one to be tapped are pushed down a bit. Transformer leads are identified by a color code that is fairly standard, though information supplied with the transformers should be checked before wiring them up according to the colors indicated in the schematic diagram, if parts other than those specified are used.

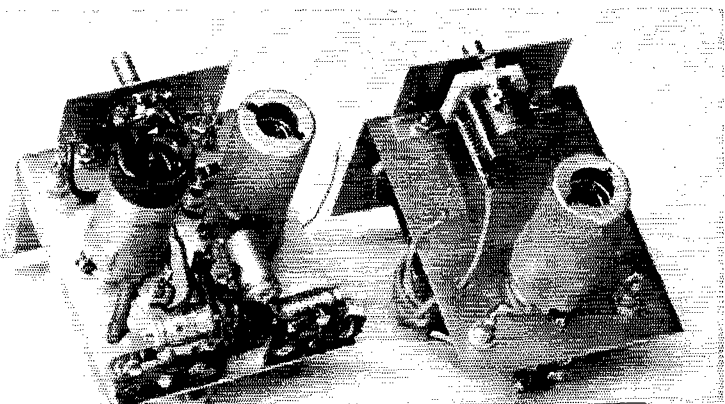
The various impedances are not particularly critical. If the exact components specified here are not obtainable, transformers having somewhat similar characteristics may be substituted. There are many makes of small transistor transformers available, and detailed listings are given in many catalogs.

Identification of the various leads between chassis and batteries is made easy if the wires are color coded. It is a good idea to make notes during the construction of the rig, listing the colors used throughout. Keep the notes handy, for reference when it may become necessary to remove any unit from the case. One way to be sure you always have such information at hand is to paste it inside the back cover.

Testing and Use

The receiver and transmitter can be tested individually, using temporary battery connections, before the units are mounted in the case. You may want to use larger-sized batteries or power sources other than the small batteries, if suitable voltages are available. A plate supply using a VR-90 voltage regulator tube will be a suitable substitute for the B battery. A No. 6 dry cell, if one is handy, will handle the filament job for long periods with no strain.

There is nothing tricky about the transmitter adjustment. If the polarity of *L*₁ and *L*₂ is correct the oscillator portion should work when the tuned circuit is resonated at the crystal frequency. Plate current will be 10 ma. or more with no oscillation, dropping to about 5 to 7 ma. when the crystal starts. Starting is not fussy, and the circuit may be left tuned where the oscillator delivers maximum output. This can be checked by plugging a low-range milliammeter into the tip jacks, *J*₂ and *J*₃.



Looking underside we see the antenna loading capacitor in the transmitter and the regeneration control in the receiver mounted on small aluminum brackets bolted to the chassis. The transistor audio amplifier is assembled at the back of the receiver, left.

With no plate voltage on the amplifier section, grid current should be about 1 ma. Tune the amplifier plate circuit, L_3C_3 , slowly, while watching the grid current. Unless the neutralizing capacitor, C_2 , happens to be set exactly at the right spot, the grid current will dip at resonance in the plate circuit. Start with C_2 near the middle of its range. Change it slightly and tune C_3 through resonance again. If the move was in the right direction there will be less grid-current dip this time. Move C_2 a little at a time, rechecking for dip, until there is no downward movement of the grid meter at all. (There may be a slight rise.)

Grid current now will probably be in excess of 1 ma., with no amplifier plate voltage applied. Make up a dummy load using a 2-volt 60-ma. pilot lamp (No. 48 or 49) with a loop of insulated wire about $\frac{3}{4}$ inch in diameter connected across it. Drop this over the amplifier plate coil. (L_4 need not be wound over L_3 until later.) Apply plate voltage through C_{10} , and tune C_3 for maximum lamp brilliance. This should be a good bright light. Amplifier plate current will be about 7 ma. under load. With no load it will drop to about 2 ma. at resonance. Pull the crystal from its socket. If the amplifier is perfectly neutralized the grid current will disappear and the plate current will rise to 10 ma. or more. Run both C_1 and C_3 through their tuning ranges. No change in plate current should result, nor should there be any grid current. Another check on neutralization: with the amplifier driven and loaded, maximum output, minimum plate current and maximum grid current should all occur at the same setting of the plate capacitor. Grid current under load will be about 0.6 ma.

When the transmitter is mounted in the case, and L_4 is connected to C_4 and the send-receive switch, the dummy load can be connected to the output fitting, J_1 , by means of a matching coaxial connector. Solder a piece of stiff wire to the center contact of the lamp, and press the lamp into the end of the connector sleeve. The metal base of the lamp can be soldered to the sleeve, but this may not be necessary. Run the wire through the pin contact of the connector, and solder it. Such a load is not too bad a mismatch for the transmitter, and with it the rig can be tuned for maximum output readily. The settings of C_3 and C_4 so arrived at will be a fair approximation of those required for best operation with either the base-loaded whip or an antenna system fed with coaxial cable.

Best results in tuning on an antenna can be obtained with a sensitive field-strength meter.

The S meter on a communications receiver (with a 50-Mc. converter attached) can also be used, provided the converter is well shielded and operated with little or no antenna. This method applies only when the portable transmitter is operated with the case on, so that the power radiated by the antenna is what is being indicated, not radiation from the transmitter circuits themselves.

Little if any adjustment is required in the receiver, other than to find the band. A quick check on the tuning range can be made if you have a calibrated 50-Mc. receiving setup at hand. The detector radiation will make a rushing noise in the receiver so used, and its frequency can be checked roughly.

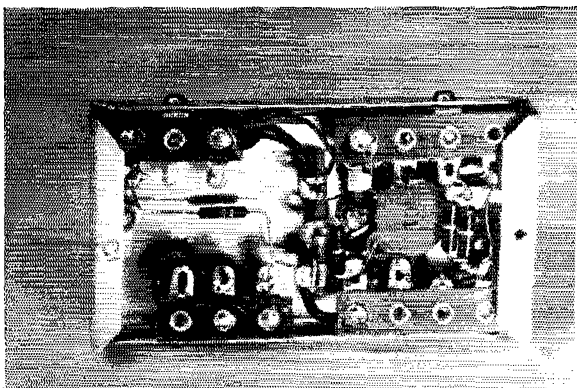
If 50-Mc. signals are available, tune one in and peak the r.f. amplifier tuning, C_5 , for maximum suppression of the characteristic superregenerative hiss. This may be a more reliable indication of proper tuning than audio level, as the superregen has a natural a.v.c. action that makes variations in signal hard to detect.

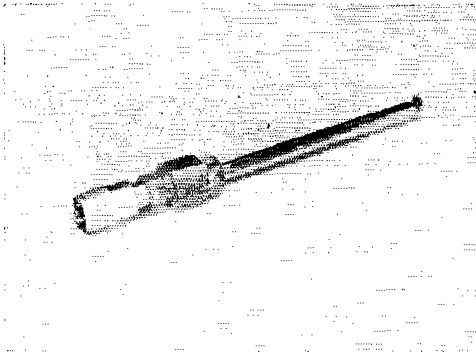
The detector is quite stable, and interesting side effects are possible with variation of the regeneration control. Full on there is the usual loud hiss, which is fully or partially suppressed when a signal is tuned in. Backing off the control brings a condition in between full superregeneration and autodyne reception. A beat is heard as a signal is tuned in, but the quenching is still going on, as shown by the signal reappearing at multiples of the quench frequency either side of the main signal. The receiver is easy to handle on c.w. in this condition, and it even gives intelligible results on single sideband! Further reduction of screen voltage brings true autodyne reception, at reduced sensitivity, but this mode is still usable on strong signals. Local phones can be copied with no background noise, by backing off the regeneration to just below the point of oscillation. In the latter modes the receiver acts just like the old bloopers of a bygone era.

Sensitivity of the receiver will not be up to your low-noise converter-receiver combination, but it will be far more than needed to hear anyone you can work with half a watt input. The first signal heard when the little receiver was hooked up to the beam at WHDQ was a K5 in Mississippi, booming in like a local. Under normal "groundwave" conditions many stations 100 miles or more away come through with readable signals on the home beam.

With the base-loaded whip the receiving radius varies greatly with terrain. We have heard sta-

Bottom view of the transistor modulator. Connections to the various tie-point strips are given in the detail drawing, Fig. 3.





Antenna for the 50-Mc. portable is a base-loaded whip, shown here telescoped to minimum length. Lucite rod is drilled to take the coaxial fitting at the bottom and the antenna at the top, and the loading coil is slipped over it. To make connection to the whip the rod and whip are drilled and tapped for a 6-32 screw, which is the upper terminal of the loading coil.

tions up to 30 miles away with the little job sitting on a desk on the second floor of the Headquarters office. How far you can work with the transmitter depends mostly on the alertness of the receiving operators. Once you make a contact and the word spreads about what you're using, the rest of the gang get interested and start digging for you. The first one often comes hard, but others may follow easily. This applies particularly if you are set up on some remote hilltop, far off the line of most of the home-station beams.

The antenna used for "pedestrian mobile" is a base-loaded whip. When one realizes how well 75-meter mobiles work out with whips that are very short in terms of wavelength, it should come as no surprise that even a whip 20 inches long works well on 50 Mc., provided it is resonant at the desired frequency. We've used two

such whips. The one in the photograph came with a Model III 2-Meter Communicator. It is 21 inches fully extended and 6 inches long collapsed. The other was obtained from Lafayette Radio, Jamaica, N. Y. It is 9 inches long collapsed, and extends to 39 inches.

A piece of lucite rod supports the whip. Drill one end to fit the whip base and the other to slip over the end of PL-259 coaxial fitting. The loading coil is B & W Miniductor. With the short whip 11 turns of No. 3011 (No. 20 tinned wire, 3/4-inch diameter, 16 t.p.i.) will do. Because a scrap of No. 3015 (same wire and pitch, but 1-inch diameter) was handy, it was used with the longer whip. A 5-turn coil was needed with the whip at full length. Coil sizes can be worked out by using the transmitter with a field-strength indicator nearby. Start with a larger coil than is needed, and adjust the antenna length for maximum meter reading. Trim the coil a turn at a time until maximum reading is obtained with the whip at its maximum length. An adjustable whip is handy if you want to work the high end of the band now and then, and still maintain maximum radiation efficiency. Tune both C_3 and C_4 carefully for maximum radiation when the coil size, antenna length or frequency is changed.

Wherever possible use something in the way of a real antenna; a beam if you can manage it. We've had fine results in hilltop work with the portable beam described in *QST*² for August, 1956. It will bring in strong signals that are inaudible on the whips, and its gain is almost a necessity if the little portable rig is to be heard at distances beyond pure line of sight. We're working on ideas for using adjustable whips for a portable beam. More on this later if it works out well.

QST

² Tilton — "A Portable Beam for 50 and 144 Mc." *QST*, August, 1956, p. 35.

Strays

Here are the March schedules for the various MARS technical nets.

First Army MARS

(Wednesday evenings, 2100 EST, 4030 kc. upper sideband)

March 2 — Transistorized Test Equipment for the Amateur Radio Station.

March 9 — Fundamental Requirements for Military S.S.B. Receiver Design.

March 16 — Low Noise Preamplifiers.

March 23 — IRE Convention Recess.

March 30 — Fundamentals of Single Sideband and Some Commercial Practice.

AF-MARS Eastern

(Sunday 1400 EST: 3295, 7540 and 15,715 kc.)

March 6 — The IRE Convention.

March 13 — Sonar Transducers.

March 20 — Energy Systems for Space Operations.

March 27 — Tool Design.

AF-MARS Western

(Sundays 1400 local time; 7832.5, 3295 kc. and 143.46 Mc.)

Mar. 6 — Frequency Control for the Amateur.

Mar. 13 — Infra Red Technology.

Mar. 20 — Propagation with Problems Confronting Radio Transmission in the Arctic.

Mar. 27 — Technical Net Session, Conversion Discussion and Project Reports.

— . . . —

W0CFH points out, in connection with the article on power line noise in November *QST*, that a frequent cause of such noise is ground wires with loose staples. The cure is to drive the staples in real tight.

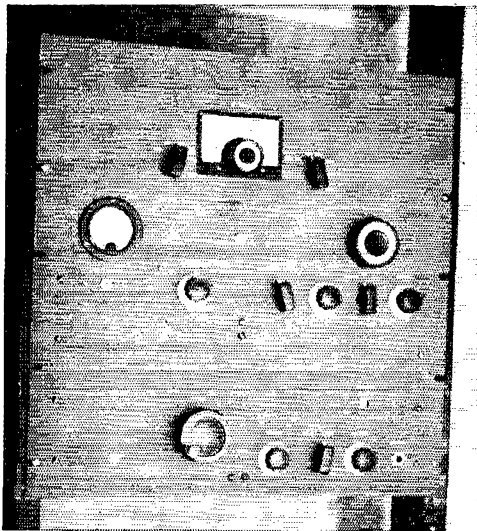
— . . . —

K4TZP called CQ on the 40 meter c.w. band recently and was answered by K4TPZ. After a short QSO, a third fellow joined in — K4TZA. "An enjoyable, but confusing contact," was their judgment.

This isn't a transmitter. It's W3AXF's receiver, designed especially for the ham bands. The small window for the digital frequency dial is at the right center of the main panel. Above it are the Q-multiplier controls and function switch. The gain controls and sideband selector are below the counter window, next to the headphone jack. The main tuning control is at the lower left. The dial on the upper panel tunes the r.f. and first-mixer stages.

A Ham-Band Receiver of Unusual Design

BY HALFORD R. GREENLEE,* W3AXF



Build Your Own Receiver?

IT is unfortunately true that very few amateurs build their own receivers these days. They will spend quite a lot of money on a commercial job instead, and then find out to their dismay how much it is lacking. At this point, many amateurs will resort to hanging all kinds of outrigger gadgets on the receiver to give it the desired features and performance. I have even seen receivers which have most of the circuitry external to the original unit. It should be obvious this is not the best way of doing things. For example, why add a super-sideband selector to a cheap receiver which is not especially stable? Or why add a fifty-cycle band-width crystal filter to a receiver having a string dial with several hundred kilocycles per knob revolution?

There are two alternatives. One is to buy the fanciest and most expensive receiver and hope that it is what is wanted. However, this is hard on the pocketbook, and often results in having a complex piece of equipment around the shack that almost scares the owner. Not having built it, he probably knows little about its insides, and dares not do any servicing or modification. And even the best available receiver falls short of what many amateurs could build for themselves. The reason is twofold. Any commercial receiver is a compromise which must suit people with different needs well enough to assure a market for it. And commercial design lags behind new ideas and developments by years. Why not build your own receiver and put in it exactly what you want? This is what I decided to do, and my first real effort resulted in a receiver I would gladly compare with anything that has ever crossed the counter.

*6911 Walker Hill Road, District Heights, Maryland.

The receiver described here departs considerably from a common conception bred from long association with the article found on dealer counters. This is not a nut-screw-and-solder article, but it supports the author's contention that a satisfactory answer to the question in the title is not difficult to find if you want performance to meet ham-band requirements which become more specialized every day.

My interest is in both DX and local operation, mostly on s.s.b., but also on a.m. and c.w. So my receiver had to have, in this order of importance, excellent stability, selectivity, and sensitivity; easy tuning and accurate calibration; good image rejection, and freedom from overloading. My final design met these demands, and it is outlined below in the hope that it may give you some ideas of your own for a future receiver. A block diagram of the receiver is shown in Fig. 1.

Let's start with the front end. A high-gain variable- μ tube, the 6BZ6, was chosen for the r.f. amplifier. The mixer is a pentode, one section of a 6U8. When a resistor is substituted for the antenna, there is a considerable drop from atmospheric noise to front-end noise, even on 10 meters.

Stability

The double-conversion principle is used, but the arrangement is a little unconventional. The first conversion oscillator is crystal-controlled and the mixer feeds a tunable first i.f. amplifier.

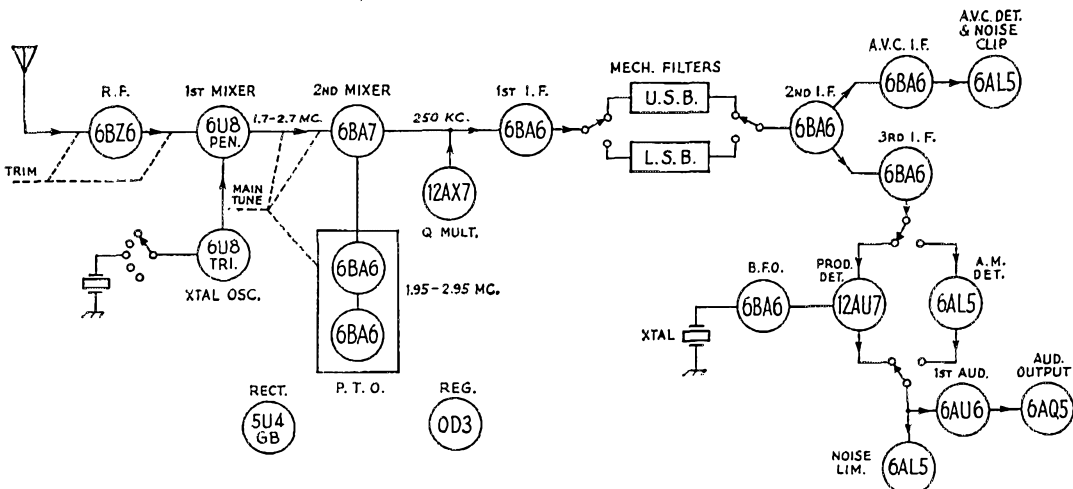


Fig. 1—Block diagram of W3AXF's communications receiver.

The first i.f. tracks with a variable second conversion oscillator to produce the second i.f. of 250 kc. A little thought will reveal that this system is inherently more stable than one using a variable oscillator up near the signal frequency. The h.f. crystal oscillator drifts very little, and the variable second oscillator drift is also relatively small because it is at a much lower frequency than the signal. The short- or long-term drift of my receiver after a five-minute warm-up is less than a half kilocycle on 10 meters, decreasing slightly on lower bands.

Another advantage is that the dial calibration and tuning rate are exactly the same on each band. The average first i.f. frequency is above 2 Mc. and image response is consequently small, on the order of -60 to -80 db.

Selectivity

Two mechanical filters at 250 kc. supply the selectivity. They are both 3 kc. wide and are "side by side" so that the upper or lower sideband of a phone signal can be selected by switching filters. The beat-oscillator frequency is right between the filter passbands (see Fig. 2). Since there is no need to change its frequency it is crystal-controlled to increase stability. The filters are about 4.2 kc. wide at -60 db., giving a

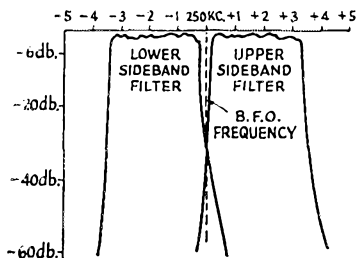


Fig. 2—Approximate response curves of the two mechanical filters. The crystal-controlled b.f.o. frequency is centered between the two filter passbands.

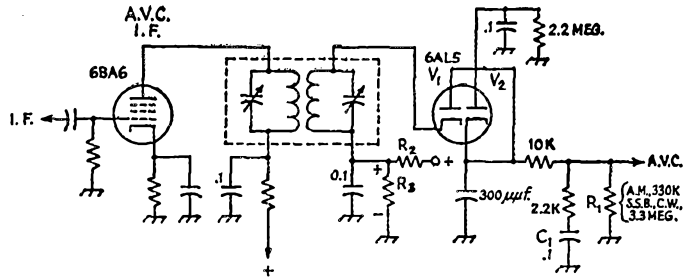
nearly rectangular, "ideal" passband. A Q -multiplier circuit provides a notch for nulling heterodynes or a peak for greater selectivity on c.w. It has the advantage over a crystal filter that it can be tuned to different c.w. signals without changing the main tuning and shifting the beat-note pitches.

Note that there are two detectors, a 6AL5 diode detector for a.m. and a 12AU7 double-triode product detector for s.s.b. and c.w. The advantage of eliminating intermodulation distortion on s.s.b. and c.w. makes the use of the product detector very worthwhile.

A.V.C. Circuit

The block diagram, Fig. 1, shows a split in the i.f. line after the mechanical filters. The upper branch is an isolated a.v.c. amplifier, detector, and noise limiter. The b.f.o. and a.v.c. circuits are carefully shielded and no b.f.o. output leaks into the a.v.c. detector. As a result, a.v.c. can be used equally well on a.m., c.w., or s.s.b. Refer to Fig. 3 for the circuit. When a signal reaches the detector, a negative voltage builds up quickly across C_1 . If the signal is cut off, this negative voltage does not disappear immediately because it must discharge through R_1 . Thus the receiver does not return to full gain too quickly and the a.v.c. follows the average level of a c.w. or s.s.b. signal rather than "pumping" up and down. A shorter time constant is satisfactory for a.m. because of the comparatively steady carrier. The release time constant is set by R_1 and C_1 plus other capacitance shunting the a.v.c. line; my receiver uses about 0.1 second for a.m. and 1.0 second for c.w. and s.s.b. The a.v.c. is also delayed and does not act on the weakest signals. The delay voltage (about 25 volts positive) is taken from the junction of R_2 and R_3 . The noise limiter in this circuit reduces the tendency of noise pulses to operate the a.v.c., since with a long release time constant, noise pulses would produce a very bothersome effect.

Fig. 3—A.v.c. circuit used in W3AXF's receiver. V_1 is the a.v.c. rectifier. V_2 is a noise limiter used to keep the a.v.c. system from operating on noise pulses. The release time constant is set by R_1 and C_1 . Values of 330K for a.m., and 3.3 megohms for c.w. and s.s.b. are suggested. The voltage divider, consisting of R_2 and R_3 , provides a delay voltage of about 25 at the junction of the two resistors.



Following the signal detectors is an adjustable full-wave noise limiter, and a two-stage audio amplifier. The effectiveness of the noise limiter is reduced because the mechanical filters tend to lengthen short noise pulses into damped-train oscillations. A unique method of silencing the receiver during transmissions involves simply lifting the 6AU6 cathode 30 volts above ground (see Fig. 4), cutting off that stage. Thus no high-voltage switching is used, and the receiver runs continuously. This is always desirable to minimize drift.

Tunable I.F.

Several of the critical parts were purchased from Collins. The second-conversion oscillator is the p.t.o. unit found in Collins receivers. It wouldn't have been impossible to build an oscillator with equal or better stability, but there was another consideration. If the oscillator tuning is linear (i.e., so many degrees of shaft rotation produce so many kilocycles change in tuning), an ordinary type of dial is not needed. I used a Veeder-Root counter coupled to the oscillator-tuning shaft so that the hundreds of kilocycles are read through a small window. If the band-switch indicates 21 Mc. and the number in the window is 231, then the frequency is 21,231 kc. ± 1 kc. The Collins p.t.o. is linear within 1 kc. and makes this nice arrangement possible. The mechanical filters are the 250Z1 and 250Z2 and their equivalents are available from Collins. Cost would have been reduced by nearly half if I had built my own oscillator and had built crystal lattice filters instead of using mechanical filters.

The dial mechanism driving the p.t.o. is a worm-gear box which slows the tuning rate to less than 2 kc. per knob revolution. This is excellent for s.s.b. (my first concern, remember), but getting across the band takes some time. A two-speed drive would be better, but I could not locate a good one.

Performance

(Operating the receiver is an experience. The

One side panel has been removed in this view. The smaller chassis at the top houses the crystal-controlled signal converter. The center chassis contains all stages after the mechanical filters which are visible at the lower left. The lower chassis also contains the tunable second converter. The Q multiplier is in a separate box between the panel and the center chassis. Sectionalizing simplifies construction and maintenance.

extreme skirt selectivity of the filters makes heterodynes suddenly appear and disappear, and they can be tuned out completely if they are not present on both sidebands, close to the carrier of the desired signal. The only thing that would help

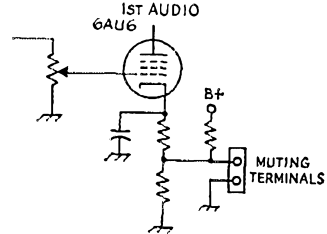
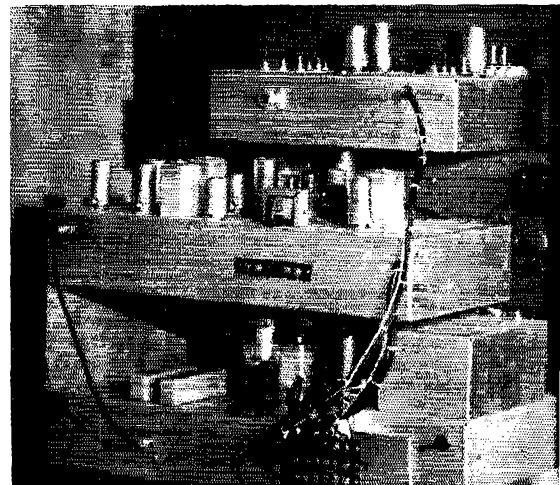


Fig. 4—The output of the receiver is muted by opening the terminals. This applies cut-off bias to the audio output stage. The resistor at the cathode is the normal cathode biasing resistor. The other two resistors make up a high-resistance voltage divider delivering approximately 30 volts at the tap.

in such a case, anyway, is a telephone. On c.w., one side of zero beat is heard to 3 kc., but nothing can be heard on the other side unless the sideband selector is switched. Even a b.c.l. can tune in s.s.b., thanks to the slow tuning rate. The receiver is rock-stable, mechanically and electrically, and is literally a frequency meter. The a.v.c. allows listening to s.s.b. round tables with S3 and S9+ 40 db. stations without having to adjust the r.f. gain. This works equally well on c.w. nets.

You, too, could have in your shack the kind of receiver that still proves we can build 'em better than they can make 'em. I spent less than half a kilobuck on mine and you can get away quite well with much less. I'll be looking forward to hearing, "The receiver here is a homebrew. . . ." **QST**



• *Beginner and Novice* —

Preventive Maintenance

Tips for Novices on Keeping Equipment Operating

BY JOE SMITH, * W9ZDN

THE author's experience here with some twenty-one beginners, mostly Novices, in this amateur radio game is that few of them really understand how to maintain their equipment. When a set breaks down the average Novice immediately runs to his nearest ham friend, either with the rig itself or with a very sad story of trouble. Now the chances are that said ham friend is more than willing to help in debugging the gear, but the fact remains that he may not always be around when things break down, as they inevitably will in time. Therefore the wise beginner will acquaint himself with certain preventive-maintenance measures and corrective methods, to assure his ability to maintain his own gear.

Much of this lack of confidence has its origin in the fact that a Novice licensee is not required to know much about radio theory nor to have the know-how necessary for keeping things going. Still, it need not be too difficult if one will stop to think things out a bit. After all every "bug" has its cause, although the cause may at times be a bit hard to find. Generally speaking, it is not difficult to keep most simple low-power rigs in good running condition.

With the sermon out of the way let's get down to the business of preventive maintenance.

First off, have you cleaned out the dust, cobwebs, and surplus material from the gear lately? Ever clean the plates of the variable capacitors with a soft-hair long-bristled brush? (A pipe cleaner is good for this, too. — *Editor*.) If excessive dirt and dust collect between closely spaced plates of variables they can be over.

If you've had the rig for two or three years have you ever tested those faithful tubes in a good tube tester? They can't last forever, and one or more might be on their last legs and therefore may not be doing their full job; it's better to find out *before* they break down on you during some fine QSO.

Did you ever take time out to tighten those miscellaneous screws, nuts, and bolts that were used in assembling the rig? If one is holding a ground lug, especially, it can give you trouble if it works loose. Other connections can and sometimes do work loose — even supposedly soldered ones — so it would be wise, while looking over the old reliable rig, to check them, too.

If the rig is rather advanced in age, as many of them are, have you ever taken time out to check the tube-socket prongs? Are they becoming rather loose in the sockets? If so, why not invest in new sockets (cost, 10 cents) and replace them? Some of the meanest intermittent troubles in

transmitters can be traced back to bad socket connections.

How about those connecting cables if the rig uses them; are the soldered connections between the wires and plug pins good and tight, or has pulling the plug out and replacing it in the socket loosened them? A loss of power from an external power supply can oftentimes be traced to a defective power cable.

Getting back to the rig, how about those rotary switch contacts; have they been cleaned with carbon tet lately? Dirt can collect on them and make them erratic in operation. If plug-in type tank coils are used, have you checked that coil socket and its pins recently? Are they tight, or has changing plug-in coils over a period of time loosened them? If so, replace the socket and save yourself some headaches. Likewise, if an octal tube socket has been used in a homebrew rig as the crystal socket, frequent changing of crystals can loosen its prongs and cause erratic crystal operation.

While you have the rig out of the case, why not take a look at the component parts? Borrow an ohmmeter and check the resistors; are they up to par? Do any appear scorched or burned from operating too close to their maximum ratings? If so, replace with a larger wattage-rating resistor of the same value. Check those bypass capacitors, especially the electrolytics. Over a period of time electrolytics can and usually do become leaky. Any questionable ones should be replaced. The high-ohms scale of most v.o.m.'s will test electrolytics for leakage¹; if any turn out to have greater leakage than normal, why not replace them rather than leave them there to break down on you later — usually at a most inopportune time!

If you are using screw-down type output terminals, check them carefully and tighten them down; loose ones can be real trouble makers. Watch out for possible near shorts in wiring as you look over the rig; vibration might bring about an actual short circuit some time later and blow something out.

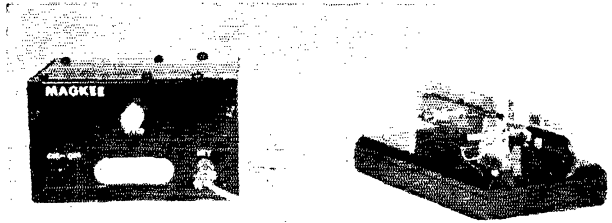
Finally, have you checked that antenna tuner, feed line, and antenna lately? If not, it's high

(Continued on page 168)

¹ High leakage shows up as a lower-than-normal resistance reading on the ohmmeter. The normal leakage current is proportional to capacitance, so high-capacitance units can be expected to show lower resistance values than low-capacitance units. Measure the resistance of a few new capacitors as a guide; if an old one is well below average it is probably in rather poor condition. Resistances of good electrolytics usually will be in the megohms range. Be sure that the positive battery lead from the ohmmeter goes to the positive terminal of the capacitor in making this test. — *Editor*.

* 719 Jordan St., Jacksonville, Ill.

The "Magkee" has everything except the key-lever mechanism in its $3 \times 4 \times 5$ -inch box. This includes a line-powered rectified-a.c. supply for the transistors and relay.



The "Magkee"

The technique of using magnetic-core "memories" for storage and switching was bound to work its way into amateur practice sooner or later. Here's an application in the electronic-keyer field. The description includes some background information on magnetic core operation which even those not in the market for a keyer should find interesting.

An Electronic Key

Using Magnetic Cores and Transistors

BY JOSEPH C. THORNWALL,* W4FGM

HERE is an electronic key design in which magnetic cores are used to perform as many of the functions as possible. These small switching cores offer many advantages in circuit design—among them small size, low impedance, low power requirements, and reliability. The low impedance and low power requirement of these cores make them ideally suited for transistor circuits.

The heart of this key is a three-stage "shift register." This is just a special name for a circuit that transfers a pulse from one core to another in response to pulses from an oscillator. This shift register provides the proper delay in forming a dot or dash from pulses provided by a time-base generator. As indicated in the block diagram, Fig. 1, pulses from the time-base generator set

another character until after the one that has been started has been completed. This interval includes the space following the dot or dash. In other words, once a dot or dash has been started the key may be opened at any time during the dot or dash or the immediately-following space interval and another dot or dash will not be started. It is only necessary to have the key closed during the start of the dot or dash. Of course, a continuous string of dots or dashes may be formed by holding the key closed.

Core Operation

Before discussing the actual circuit it might be well to find out a little about how magnetic cores function. Fig. 2 shows an idealized magnet-

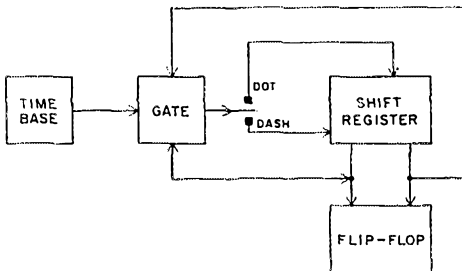


Fig. 1 — Block diagram of basic circuit layout.

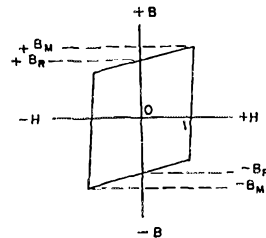


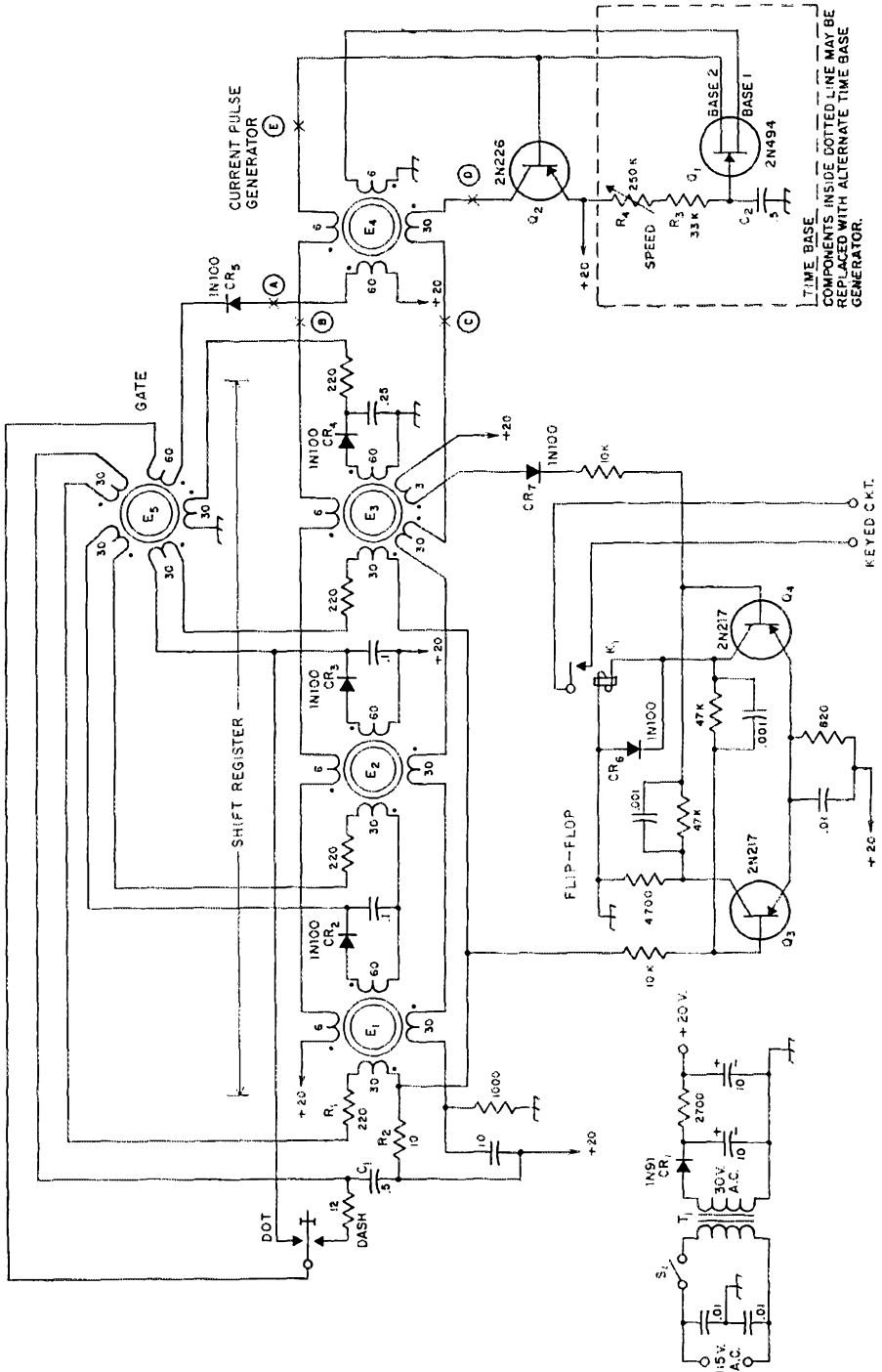
Fig. 2 — States of core magnetization.

the flip-flop to start a dash or dot and, after a suitable delay provided by the shift register, the flip-flop is reset, thus completing the character.

A gate has been provided in a feedback loop around the shift register so that once a dot or dash has been started, no more pulses from the time-base generator can be available to start

ization curve of a magnetic switching core. Suppose we take a core of this magnetization curve and place a couple of windings on it. Let us apply a current through one of these windings to provide the ampere turns necessary for the magnetizing force represented by point 1 on the H axis. If we have an oscilloscope across the second winding a voltage pulse will be observed during the time the current is increasing in winding No. 1. The magnitude of this voltage will depend upon several things: the number of

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turns on winding No. 2, the rate of change of current in winding No. 1, the initial state of the core, the magnitude of the current, and the type of material in the core. The flux in the core will reach a magnitude of $+B_m$ (maximum flux

density) and remain there as long as the current flows in winding No. 1. When the current is cut off in winding No. 1 the flux will drop to $+B_r$ (residual flux density) and remain there. A slight voltage of opposite polarity will develop in

Fig. 3.—Circuit of the "Magkee." Resistances are in ohms; fixed resistors are 1/2-watt composition, 10 per cent tolerance. Capacitances are in μf ; capacitors with polarities marked are electrolytic; others are paper; 50-volt rating adequate. Circled letters refer to connections for alternative time-base generator shown in Fig. 4.

- C_1, C_2 —0.5- μf . paper, good quality desirable.
- CR_1 —1N91 (G.E.).
- CR_2, CR_3, CR_4 , Inc.—1N100 (Hughes).
- E_1, E_2, E_3 , Inc.—Toroidal cores, tape-wound Delta-max (Arnold Engineering Co. type 16-D1000-18) with windings of No. 36 enameled wire having the numbers of turns shown alongside each winding. Dots identify corresponding ends of windings when all are wound in the same direction.
- K_1 —Keying relay, 5000-ohm coil, 3-ma. operating current (Sigma 4F-5000S/511; see note below).
- Q_1 —2N494 (G.E.).
- Q_2 —2N226 (Philco).
- Q_3, Q_4 —2N217 (RCA).
- R_1 —220 ohms, 1/2 watt.
- R_2 —10 ohms, 1/2 watt.
- R_3 —33,000 ohms, 1/2 watt (see text).
- R_4 —0.25-megohm composition control, linear taper (see text).
- S_1 —Sp.s.t. toggle.
- T_1 —Power transformer; filament transformer (Triad F-14X) rewound to give 30 volts a.c. (see text).

Note: with relay specified, adjust spring tension and contact spacing to decrease operating time. See Stein, "Some Hints on Relay Operation," QST, June, 1956, for information helpful in determining the factors involved in the choice of a relay.

winding No. 2 when this happens, but if the core material has a high B_r/B_m ratio this voltage will be negligible.

Now suppose we apply a pulse of current to winding No. 1 again in the same direction and with the same magnitude as before. The core will magnetize from $+B_r$ to $+B_m$ again and a small voltage will be developed in winding No. 2. The impedance of winding No. 1 to a current pulse of this magnitude and direction will be very low. In fact, it will be about the same as that of an air-wound coil of the same configuration. Now suppose the polarity of the current pulse is reversed. The core will switch from $+B_r$ to $-B_m$, and a relatively large voltage will appear on winding No. 2. Of course, as soon as the current pulse stops, the flux will drop to $-B_r$ and remain there. In other words, each time the current in winding No. 1 is reversed a relatively large voltage will appear on winding No. 2. Also, a current pulse applied to winding No. 1 encounters either a relatively high or relatively low impedance, depending on whether or not the flux in the core is reversing.

The Shift Register

The complete "Magkee" schematic is shown in Fig. 3. Let us take a look at the circuits in detail before we follow the sequence of events in forming a dash or dot.

Q_1 is a unijunction transistor connected as

an oscillator to provide trigger pulses to the base of Q_2 , and at the same time to provide current pulses to core E_4 . Core E_4 is used here as a means of obtaining short-duration pulses suitable for setting the shift register. This is accomplished by setting the core in one direction by Q_1 and then immediately resetting the core with the regenerative action of Q_2 , thus inducing a pulse in the 60-turn winding of core E_4 .

The collector of Q_2 is connected to four series-connected 30-turn windings on four cores. The base of this transistor is connected to four series-connected 6-turn windings on the same cores. Now suppose that one of these four cores is magnetized in such a way that when current flows through the 30-turn winding, as a result of a negative trigger pulse applied to the base of Q_2 by Q_1 , a voltage is induced in the 6-turn winding on the same core. This voltage is of the proper polarity to produce additional negative potential on the base of Q_2 . This is a regenerative process and current will flow until the core has switched. A circuit of this type reverses the magnetization of any core that has been set during the time interval between trigger pulses. The 30-turn windings connected in series are generally known as the "shift line."

The pulses from the 60-turn winding on core E_4 must pass through a 60-turn winding on core E_5 . If this 60-turn winding offers a low impedance to the pulses from core E_4 then core E_1 or E_3 may be set when the key is closed, E_1 for initiating a dash and E_3 for initiating a dot. On the other hand, if this 60-turn winding offers a high impedance to these pulses then there will not be enough current available to set core E_1 or E_3 . In this way core E_5 acts as a gate.

Cores $E_1, E_2,$ and E_3 make up a three-stage shift register. If a pulse from core E_4 is applied to the dash contact of the key, C_1 will be charged. C_1 and R_1 make up a delay network. This delay network is necessary because the first core cannot set while current is flowing in the shift line, and the shift-line current flows for the same length of time as the duration of the pulse being applied to C_1 . By introducing the delay network the application of the current pulse from the key circuit is delayed enough so that the core will be set by the pulse after the shift-line current has stopped. This same type delay network is required between each stage of the shift register. The diodes (CR_2, CR_3, CR_4) are required to keep the associated capacitors from discharging back into the preceding windings when the pulse has been completed. The diodes are also necessary to prevent reverse current from flowing as a result of the potential induced in the 30-turn winding of the following core when it resets. Now it is evident that if core E_1 is set there will be a potential induced in the 60-turn winding when the next shift-line pulse comes along. In this way the pulse or "bit" is passed from core to core with each shift-line pulse.

Forming Dots and Dashes

With this as an introduction let's see what



The flip-flop regenerative circuit and the unijunction oscillator section. Some components were eliminated after this board was constructed, which explains the gaps on the board.

happens when the dash contact of the key is closed. Assume that the 60-turn winding on core E_5 offers a low impedance to the pulses from core E_4 . Under these conditions the next pulse from core E_4 will set core E_1 through the dash contact of the key lever, and since there is a winding on core E_5 in series with the input winding of core E_1 , core E_5 also will set. In addition, the voltage drop across the 10-ohm resistor, R_2 , in series with the input winding of core E_1 will turn off flip-flop transistor Q_3 and turn on Q_4 , thus starting the dash.

If we continue to hold the dash contacts closed, core E_5 will tend to reset. To prevent this from happening, a winding for each stage of the shift register is placed on core E_5 . Each of these windings receives a current pulse from each core of the shift register in sequence. In this way core E_5 is set each time the pulse is transferred from one core to the next in the shift register, thereby keeping the 60-turn winding on core E_5 in a high-impedance state. Of course, the key contacts may also be opened any time after the start of the dash.

The shift register now shifts along the "bit" that we placed in core E_1 until, after three pulses from the timing generator, a pulse appears on the 3-turn winding of core E_3 . This pulse turns Q_4 off, completing the dash. At the same time that Q_4 is being turned off core E_3 resets core E_5 . This provides a low-impedance path through the 60-turn winding on core E_5 for the next pulse from core E_4 , thus completing the sequence.

A dot is formed by using only one stage of the shift register; otherwise, the operation is the same as in forming a dash.

CR_7 and the 12-ohm resistor in series with the dash contact were added to improve the stability of the keyer under extreme temperature variations, after some initial experience with it in

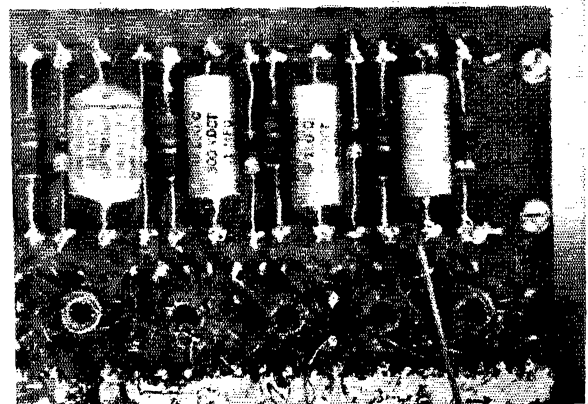
practical operation. The same consideration determined the choice of a capacitance of $0.5 \mu\text{f}$. for C_1 , which originally had been $0.1 \mu\text{f}$. CR_6 is used to absorb the inductive kick from the relay winding, which without such protection might put excessively large negative pulses on the collector of Q_4 .

Construction Notes

All of the coils on the magnetic cores are wound with No. 36 enameled wire. With the exception of the 3-turn winding on core E_3 , no more than three types of windings are used on any one core. An easy way to keep track of the phase of each winding is to make certain that each coil is wound in the same direction. Then when the core is mounted assume that all of the leads coming to the top through the core are of the phase indicated by the dot beside each winding in Fig. 3, and wire the circuit accordingly.

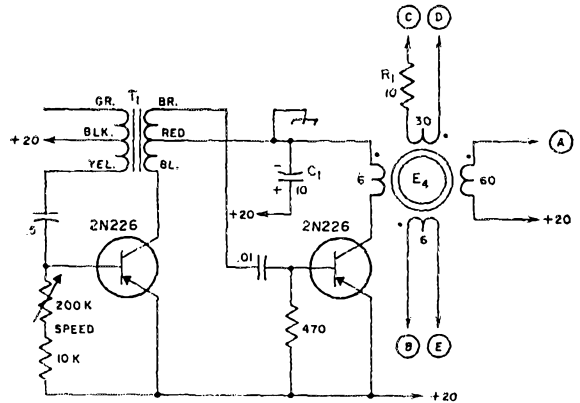
If the windings are kept separate from each other on the core when they are wound it is an easy matter to distinguish between a 60-, 30-, or 6-turn winding by the relative sizes of the windings. Keep the leads from the core to the solder tie points short so it will be easy to go back and recheck the wiring for errors after the wiring has been completed.

Transformer T_1 is a Triad F-14X filament transformer with the secondary removed and replaced with 380 turns of No. 32 enameled wire. This modification will provide 30 volts a.c. The only reason for doing this was to obtain a smaller transformer than any of the 24- or 28-volt transformers available commercially. Triad F-13X is even smaller but it appears that the secondary on this transformer is next to the core and it would be more difficult to take the transformer apart and rewind it. As an alternative to the rectified-a.c. supply the key could be powered



The magnetic cores and components associated with the shift register and gate circuit.

Fig. 4—Alternative time-base generator. Capacitances are in μf ; resistances are in ohms, fixed resistors are $\frac{1}{2}$ watt. Circled letters indicate connections to similarly-marked points in Fig. 3. E_4 in this diagram is identical with E_4 in Fig. 3. T_1 is an interstage audio transformer, 8000 to 2000 ohms, both windings center-tapped (Argonne type AR115).



from a 22.5-volt battery if desired. The total current drain is approximately 6.5 ma.

The values of R_3 and R_4 determine the maximum and minimum keying speeds. The values shown in the schematic provide a variation from a low speed of about 5 w.p.m. to a somewhat higher speed than the relay can follow — perhaps 40 or 50 w.p.m.

The diodes in the shift register (CR_2 , CR_3 , CR_4) should have low forward resistance at low forward current, but there is no particular requirement that the back resistance be high. Diodes such as the 1N34 are not suitable in this application.

Capacitor C_2 in the timing oscillator should be a good quality paper unit, since it controls the frequency of the oscillator.

The components may be arranged in any way that is convenient. There are no critical layout problems. Most of the components in the model shown in the photographs were mounted on two $3\frac{1}{2} \times 2\frac{1}{4} \times \frac{1}{16}$ -inch phenolic boards. The cores and associated components were mounted on one board and the flip-flop, timing generator, and regenerative stages were mounted on the second. Holes were drilled in the boards and small pins placed in these holes. These pins serve to hold the components and also to provide solder tie points. Most of the component wiring connections were made on the undersides of the boards with insulated enameled wire. The relay,

power transformer, rectifier and filter components make up another subassembly. Both of these subassemblies were mounted in a $5 \times 4 \times 3$ -inch Minibox.

The paddle shown in the photograph was constructed by K4QLH from an article by D. F. L. May (G2BB) appearing in the January 1959 issue of the *RSGB Bulletin*. This seems to be an excellent paddle control lever design. The central moving arm is contained between two metal pads under pressure. The idea of this is to prevent the inadvertent closure of the opposite contact when the lever is released. This is a very effective arrangement, making possible close contact spacing for high-speed operation.

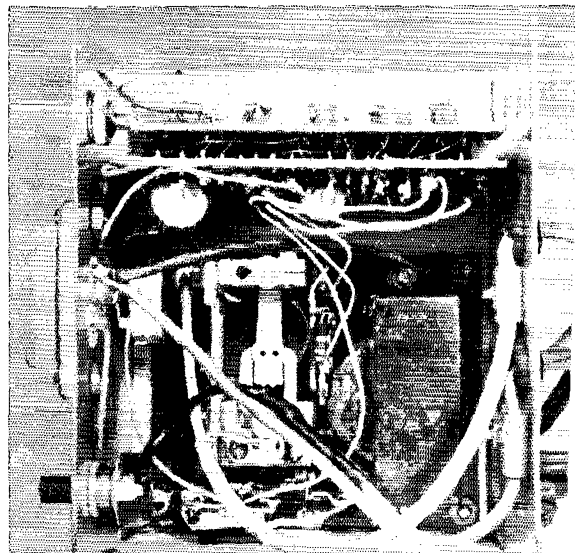
The three-conductor cable that connects the key lever to the keyer should be shielded if there are strong r.f. fields in the shack.

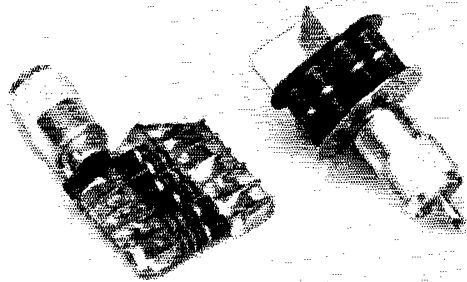
Alternative Timing Generator

The 2N494 unijunction transistor performs very satisfactorily in this application, but as transistors go is quite expensive. If the experimenter prefers, the blocking-oscillator circuit shown in Fig. 4, using an ordinary-type transistor, may be substituted with a considerable saving in cost. In trying this circuit it was found that the 10-ohm resistor, R_1 , had to be added in the shift line (in series with the 30-turn winding of E_4)

(Continued on page 166)

Interior of the keyer showing the boards mounted upright along the upper part of the photograph and the relay and power supply taking up the remaining area in the box.





Two dummy loads made with carbon resistors. Six resistors are soldered to copper strips in the one at the left. The other uses a circle of resistors with copper disks to hold down lead inductance, and cooling fins to aid in heat dissipation.

V.H.F. Dummy Loads

WITH everything made to work into coax these days, the need for nonreactive dummy loads is greater than it once was. You can't adjust a coupling system or check the efficiency of a transmitter correctly and legally without one. The old standby, the light bulb, is out for v.h.f. use. Poor enough on any frequency, the lamp load is hopeless in the v.h.f. range and higher. Its impedance changes with temperature at any frequency, and in the v.h.f. range the filament is likely to have resonances that make its brilliance unreliable as an indication of power output.

Particularly in the low-power range, lamps are extremely poor loads for v.h.f. transmitter testing. Whatever their impedance may be, it is so far removed from 50 ohms that a coupling method that transfers power to a lamp load is almost certain to be far from right for use with low-impedance line.

Carbon resistors are usable, if they are connected in such a way as to keep leads to an absolute minimum. A single resistor inside a coaxial fitting will do for measurements that do not involve more power than the resistor is intended to handle. Noise generator terminations and resistive loads to simulate antenna conditions in receiver work are in this category. For transmitter use we need more power-handling capability than a single resistor will provide. There are noninductive resistors of high wattage on the market, but they are expensive and hard to find, so something like the loads shown here may be useful as inexpensive substitutes.

The wattage of a load made like these is limited by the number of resistors you can hook up in parallel without running the lead inductance up to a point where the noninductive character of the resistors is destroyed. Obviously the number of resistors could be extended considerably beyond what we have used here.

Low inductance is achieved by soldering the resistor leads to copper plates. The copper is also a good conductor of heat, and it keeps the resistors from overheating seriously when subjected to somewhat more than their normal dissipation for short periods.

The smaller of the two loads was made by paralleling 6 330-ohm 1-watt resistors. These are soldered to strips of flashing copper, which are in turn soldered to a coaxial fitting. The strip that goes to the inner conductor of the fitting was

trimmed with tin shears to fit into the center contact of the fitting, rather than using a wire lead for this purpose. It is wrapped with plastic tape to prevent shorting to the sleeve of the fitting.

Using disks of flashing copper makes it possible to connect more resistors in parallel and still keep the inductance down. In fact, the disk construction of the larger unit makes it a more uniform load in the v.h.f. range than the one using the flat strips. A circle of 9 470-ohm resistors is shown, but 13 680-ohm or 19 1000-ohm 1-watt resistors could be arranged similarly, probably with equally good results.

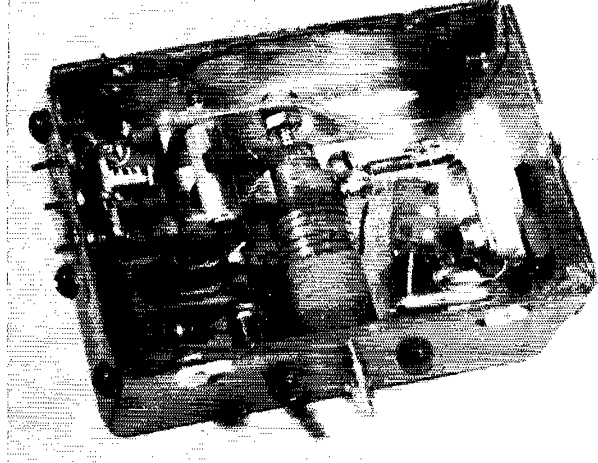
While these are by no means perfect loads, they are good enough for most amateur purposes. Tested at 50, 144 and 220 Mc. they showed no greater than 1.2:1 s.w.r. At 50 Mc. they were extremely close to pure resistive terminations, and at 144 Mc. they showed only barely measurable reflected power when used within their power capabilities. As might be expected, performance was poorest at 220 Mc., but there they were far better than other inexpensive loads. In fact, in the past we have customarily used matched dipoles as loads at 144 and 220 Mc., because nothing around the ARRL lab was suitable for the purpose.

The wattage rating of the resistors should not be taken too literally. In a given batch of resistors there may be quite a range of ohmic value, and consequently the lower resistors will be dissipating more than the higher ones. You can solve this problem by selecting the resistors, but this was purposely not done with the loads shown. Suffice to say, the dissipating qualities of the copper plates and fins seem to be able to at least make up for the lowered cooling efficiency that results from putting a number of resistors in a confined space. The load with the disk plates and fins gets uncomfortably hot to the touch when it is run at 10 watts dissipation, but operating at this level for several minutes seems to have no bad effects. A stream of cooling air would raise the allowable dissipation considerably.

Normally a load will be used for only a minute or two at a time, just long enough to take a reading or two. For this work it is probably safe to subject the resistors to at least a 50 per cent overload. Check with an ohmmeter periodically to see that total resistance has not changed.

— E. P. T.

The complete v.f.o. is contained in a box measuring only 2 $\frac{3}{8}$ by 3 $\frac{3}{8}$ by 1 $\frac{5}{8}$ inches. The transistor subassembly is at the left, slug-tuned coil at the center, and the tuned-circuit capacitors at the right.



Compact Unit for Mobile Use

BY THOMAS H. ARNOLD,* K7KCI

The p.t.o. v.f.o. described in this article represents a significant departure from the conventional type constructed by most amateurs. Designed in this instance primarily for mobile use, it is, of course, suitable for other applications. Its linear tuning, extreme compactness, and low cost make it an attractive project.

Transistor V.F.O. with Linear Tuning

FOR quite a few years now, the author has been building transmitters of one kind or another. Starting with the first small rig, all have been v.f.o.-controlled. With conventional a.m., v.f.o. requirements in regard to frequency drift are not too severe. However, the last couple of transmitters, designed for s.s.b., showed that the old v.f.o. had to go.

In designing a better v.f.o., there were considerations in addition to the one of frequency stability. A standard 180-degree dial of practical diameter provides less than 6 inches of scale for calibration. With a desired tuning range of 300 kc., a kilocycle occupies very little space on such a short scale. Also, the physical size of the v.f.o. units previously built was prohibitive for use with modern compact equipment.

The newest in the long line of transmitters was designed for mobile use and therefore compactness was doubly important. The panel space that could be devoted to the v.f.o. dial measured only 3 $\frac{1}{2}$ by 2 inches. The problem of compactness was solved primarily by making use of a transistor instead of a tube. The second problem of spreading the tuning range out over more than 180

degrees of dial rotation was overcome by turning to permeability tuning—Collins' bread and butter.

Circuit

The circuit of the v.f.o. is shown in Fig. 1. It is essentially the same as used by Landefeld in his transistorized receiver¹ (Pierce version of the Colpitts oscillator). A few small changes were made to assure more independence in respect to collector voltage and easier starting of oscillation. The tuning range is 2075 to 2375 kc. (This signal is mixed with a sideband signal from a homemade 2900-kc. crystal filter to produce a 4975-to-5275-kc. signal. The latter is then mixed with a crystal-controlled frequency in the vicinity of 9 Mc. to produce a sum which falls in the 20-meter band, or a difference falling in the 75-meter band.) By making suitable changes in tank-circuit values other frequency ranges within the frequency limitations of the transistor may be obtained. The transistor is the common and inexpensive 2N170.

The Variable Inductor

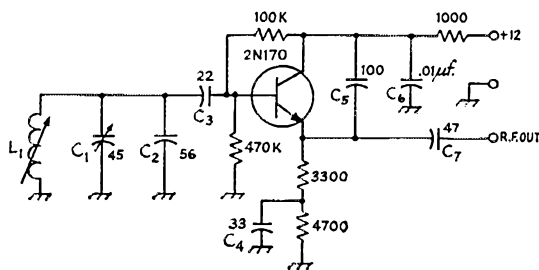
The heart of the v.f.o. is the variable inductor,

¹ Landefeld, "A Transistorized Communications Receiver." *CQ*, May, 1959.

*Capt., U. S. Army, 6150 Fordham Drive, Tucson, Arizona.

Fig. 1—Circuit of the permeability-tuned v.f.o. Unless otherwise indicated, capacitances are in $\mu\text{mf.}$ and resistances are in ohms. Resistors are $\frac{1}{2}$ watt.

- C₁—Ceramic trimmer, 7-45 $\mu\text{mf.}$, negative temperature coefficient (Centralab 822-BN).
- C₂—56 $\mu\text{mf.}$, silver mica.
- C₃, C₄, C₅, C₇—Mica or stable ceramic.
- C₆—Disk ceramic.
- L₁—See text.



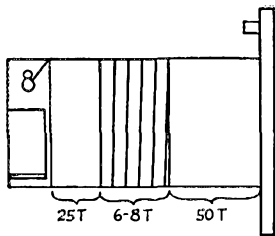


Fig. 2—Sketch showing approximate distribution of turns on L₁. The notch at the left end of the form is to accommodate the stop arm as described in the text.

and the project was started with the fear that its construction might be beyond accomplishment with simple tools. However, this did not turn out to be the case.

The simplest mechanical arrangement for a variable inductor is the slug-tuned coil. So many factors have influence on the value of inductance (unavoidable variable capacitance is involved, too) that a prediction of the tuning curve in advance is a practical impossibility. However, with a little perseverance, the tuning curve can be adjusted experimentally to follow closely the desired linear shape when the required tuning range is small, as it is in this case.

The starting point of the construction is the selection of the slug to be used. The author removed the slugs from the core of a 455-kc. i.f. transformer (capacitor-tuned type). These slugs are $\frac{3}{8}$ inch in diameter and have a $\frac{1}{8}$ -inch hole through the center. The holes were threaded with a 6-32 tap. Adjacent ends of the two slug sections were coated with cement and threaded tight against each other onto a 6-32 screw while the cement dried.

The coil form is a piece of phenolic tubing having an inside diameter of $\frac{3}{8}$ inch. To allow free movement of the slug inside the form, the slug, mounted on a screw, was chucked in an electric drill and trimmed down with a file.

The slug rides back and forth on a threaded lead screw. Turning of the slug with rotation of the lead screw is prevented by a threaded stop arm attached to the slug. The lead screw is made from a 2-inch 6-32 machine screw of brass. The head is filed off, and the opposite end is turned to a point in the electric drill. This point should have an included angle of slightly more than 45 degrees which can be easily estimated by eye. A 6-32 nut is then run onto the screw to a distance of $1\frac{5}{8}$ inches from the point, and soldered fast. The remainder of the screw beyond the nut is trimmed smooth to a diameter of $\frac{1}{8}$ inch. This may be facilitated by filling the threads with solder before trimming.

Bearings and Stop Arm

The rear bearing for the lead screw is a short 6-32 screw fastened in a small bracket mounted toward the rear of the v.f.o. box (see interior photograph). The end of the screw is countersunk with a small drill and the tip of an ordinary countersink. Care must be taken to insure that this

bearing is exactly centered on the lead screw and that the lead screw itself is perfectly straight. A bent screw or a bearing point off center will cause the slug to wobble and hamper resetability.

The author had some difficulty with the front bearing, which is simply a hole drilled in the front wall of the box. Looseness at this point will cause incremental shifts in frequency when the unit is shaken or banged. The problem was solved by increasing the size of the screw shaft at the bearing hole. This was done by forcing a piece of $\frac{3}{16}$ -inch o.d. metal tubing over the lead screw. The bearing hole in the box should, of course, be made as snug as possible, at the same time permitting smooth rotation.

The stop arm is a piece of $\frac{1}{8}$ -inch bakelite, shaped as shown in the detail photograph. The hole in this piece is tapped 6-32, and the arm is threaded as tightly as possible against one end of the slug before cementing it to the slug. This measure assures a secure grip on the threads of the lead screw to prevent backlash. The arm of the stop slides along a post mounted on the bracket supporting the rear bearing. The arm is held against the post by a spring anchored to the bottom of the bracket. Wearing of the threads of the slugs and consequent looseness on the lead screw can be minimized by a light application of oil on the screw.

The Coil

The coil form, mentioned earlier, is $1\frac{1}{8}$ inches in length. The rear end of the form is notched out $\frac{1}{8}$ inch for the stop arm, as shown in Fig. 2, leaving a winding length of 1 inch. This notch permits the slug to be moved completely within the coil winding.

The coil form is cemented into a hole cut in a mounting base made of $\frac{1}{8}$ -inch phenolic which, in turn, is fastened to the front wall of the box with two machine screws. Sawed-off machine screws are used as terminals for the winding. One of these is tapped into the coil form at the rear end, while the other is tapped into the mounting base. Care should be exercised in placing the one in the coil form to make sure that it does not project inside the form and interfere with the slug. The inductance required for 2075 kc. is approximately 80 μ h. No. 36 enameled wire was used, and the turns are proportioned approximately as shown in Fig. 2. In mounting the finished coil, every care should be used to align the coil form with the slug so that binding will not occur.

The remainder of the assembly of the unit is not critical. Mounting of the components in the small available space was facilitated by making a separate subassembly of the transistor and its associated resistors on a small strip of $\frac{1}{8}$ -inch bakelite.

Adjustment

Since the coil is a little difficult to work on after final assembly, a preliminary bread-board setup is advisable. Referring to Fig. 2, the adjustment consists essentially of changing the proportion of turns in one section of the coil, as com-

pared to the number of turns in the other section, to get the right frequency spread with a chosen movement of the slug, and then adjusting the turns between the two sections to give the desired linear tuning curve. The two adjustments are not completely independent, of course, but the tuning range needed is so small, and the movement of the slug so limited ($\frac{3}{16}$ inch) that a linear tuning curve is not difficult to obtain.

With the slug mostly out of the coil, trimmer capacitor C_1 should be adjusted so that the frequency is at the high-frequency end of the desired tuning range. Then the slug should be moved into the coil by making 6 revolutions of the lead screw. If the resultant frequency is lower than desired, move a few turns from the larger section to the smaller section. If the frequency is too high, move a turn or two from the smaller section to the larger one. Since the slug may be moved 8 to 10 turns, a little experimenting will indicate which 6 turns most nearly approximate the desired turning range. Keep at least a half dozen turns in the space between the two sections of the coil. When the low end is on frequency, return the slug to its original position, readjust the trimmer, and repeat the process.

When the proper tuning range has been obtained, the frequency should be checked at intermediate points. Any nonlinearity can be corrected by movement of the spread-out turns between the two sections.

Six-Turn Stop

Fig. 4 shows the essentials of a stop for limiting rotation of the lead-screw shaft of the inductor to 6 revolutions. An extension shaft, coupled to the shaft of the v.f.o. inductor, carries 7 disks or large washers. The front disk is fastened permanently to the shaft, while the others are free to turn on the shaft. Each of the disks has a tab that will bear against the tab of the following disk. In Fig. 4, the shaft is shown in its full counterclockwise position, further turning in that direction being prevented by the tabs which have piled up against stop A.

Just before the first disk completes its first revolution in the clockwise direction, its tab will engage the tab of the second disk and carry the latter along with it. As the second revolution nears completion, the third disk will be picked up and so on until the last disk is picked up. At this point, the shaft will have almost, but not quite, completed 6 revolutions. The last revolution is short of completion by the combined

Essential components of the variable inductor. The slug with its stop arm is at the left, the coil attached to its mounting base at the center. The lead screw on which the slug rides is in the foreground. The washer is a thin one of the spring type. It is placed on the lead screw between the nut and the bearing hole in the front wall of the box.

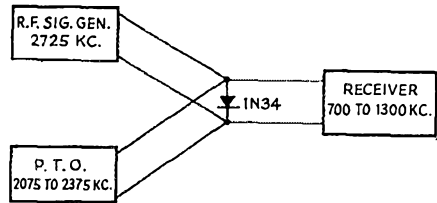


Fig. 3—Setup used in calibrating the v.f.o. as described in the text.

thicknesses of the tabs. The second stop, B, limits rotation of the seventh disk to that necessary to complete the last full revolution. The front portion of the shaft should be supported in some sort of bearing. Stops A and B may be mounted on the front wall of the v.f.o. box or on a subpanel.

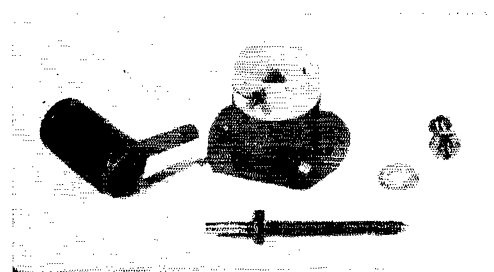
After the lead screw of the inductor has been turned counterclockwise to its proper minimum-inductance end of the range (high-frequency end of the tuning range), the extension shaft should be turned counterclockwise until the tabs pile up against stop A, as shown in Fig. 4. The extension shaft may then be coupled to the lead screw.

Dial

The dial to be used with the v.f.o. is similar in principle to the dials used on Collins receivers and transmitters. Since it takes 6 revolutions of the tuning shaft to cover 300 kc., the coverage is 50 kc. per revolution. A knob with a $1\frac{1}{2}$ -inch dial marked off in 50 divisions (1 kc. per division) is attached to the shaft. A string-drive system couples the shaft to a small slide-rule scale which indicates the section of the band being covered with each revolution.

Calibration

The frequency range of this v.f.o. is outside the tuning range of many communications receivers, and the accuracy of calibration of receivers that do cover the proper frequencies is often questionable. For this reason, the calibrating arrangement of Fig. 3 was used. The signal from a stable oscillator or signal generator at 2725 kc. and the signal from the v.f.o. are heterodyned in a 1N34 diode mixer. The second harmonic of the 350-to-650-ke. beat, i.e., 700 to 1300, is fed into a calibrated receiver covering the broadcast band. Broadcast signals furnish marker frequencies, and the use of the second harmonic helps to improve the accuracy of calibration because the



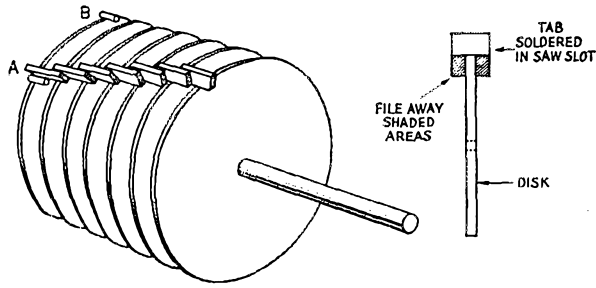


Fig. 4—Sketch showing the principle of the 6-turn stop. The shaft is shown in the full counterclockwise position. The disks may be large washers, the front washer soldered to the shaft, while the others just clear the shaft and are free to turn. The tabs are small squares of metal soldered into slots in the edges of the disks. The edge view of a disk, at the right, shows how the lower corners of the tabs should be filed away so that they will not interfere with adjacent disks.

error in frequency measurement is divided by two.

When the 2N170 is oscillating, the circuit draws approximately 0.8 ma. from a 12-volt source. Mechanical stability is about 100 cycles per three-foot drop to the floor, and thermal stability is less than 300 cycles over a normal temperature range. Changes of load on the output of the oscillator will cause small changes of frequency. However, a single buffer stage could be

built right in the box with the oscillator and should eliminate this problem.

Although the project is a lot of fun just as an experiment, the oscillator is a useful stable unit and it should solve those tuning-mechanism problems that we run across in home construction. The parts are all easily available and cheap, which makes it desirable to those who must work on a budget.

QST

Strays

SOS — A BOY IS DYING

Here are a couple of stories that make you feel glad you're a ham.

The first comes from *Newsweek*:

Rami Katz, an 8-year-old Israeli boy, was carried into a hospital in isolated Ghana, his head injured in an auto accident. The hospital had neither surgeons nor equipment for the delicate operation doctors thought necessary.

Then the father's ham friend sent an urgent SOS to Israel. It was Jewish Sabbath and the Foreign Office was closed. But a Tel Aviv ham picked up the cry and alerted Israel's leading brain surgeon, who packed his bags.

Meanwhile, a Georgia ham heard the SOS and tried to contact UN officials. But a North Carolina amateur overheard and reached the Israeli Minister in Washington, who was then put in contact with Israel's ambassador in Ghana, 6,000 miles away. The Israeli officials then alerted U. S. officials and a naval brain surgeon in Morocco was ordered to Ghana.

But still another ham in France had heard a radio message from the prime minister of Ghana to his embassy in London. As a British surgeon emplaned for Ghana, the French ham informed French authorities of the emergency and a French neurologist set off for Ghana.

First man on the scene was the U. S. Navy surgeon, who decided the boy seemed better and might recover without an operation. The other

surgeons arrived and agreed. But for three days the specialists waited on 24-hour alert until young Rami was out of danger. Then they flew home, waiving any fee.

The French newspaper *France-Soir* called the hams' performance "A grand chain of human solidarity (in a time of crisis)."

— . . . —

Another such ham story comes from Lima, Peru. These are the details from the *News Tribune* in Florida:

Chester E. Watkins, K4KKZ, was chatting with his pal, Frank Sage, OA4CS of Lima, a retired airline pilot. Then a physician caring for a 12-year-old boy with spinal meningitis and pneumonia came into OA4CS's station. He needed a certain drug quickly — but it wasn't available in Lima or anywhere nearby.

Watkins called druggist T. J. Butterfield, discovered he had the drug, hurried it special delivery to Pan American Airlines.

Meanwhile, Dave Packard of the U. S. Embassy staff in Nicaragua heard the exchange and tipped Watkins on how to hurry the drug's delivery. K4KKZ called the Pan American cargo manager, who slapped top priority on the drug and had it delivered in Lima in 24 hours.

The boy was then unconscious and blind. Ten hours later he had regained consciousness and 12 hours later he could see again. A few more days and he was declared out of danger.

QST

S.S.B. Exciter Circuits Using a New Beam-Deflection Tube

Practical Circuit Data for Modulation, Frequency Conversion and Detection

BY H. C. VANCE,* K2FF

The new beam deflection tube described here appears to be a bulbful of versatility, with more applications than were visualized when the tube was under development as an improved type of balanced modulator. This article tells how the 7360 can be put to work in a number of ways in the amateur field, particularly in s.s.b. transmission and reception.

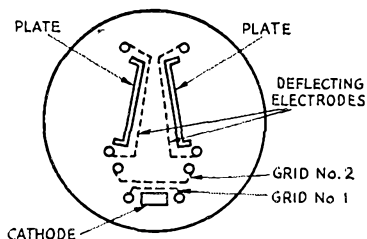


Fig. 1—Arrangement of electrodes in the beam-deflection modulator tube, type 7360.

A NEW beam-deflection tube, the RCA-7360, incorporates novel design features which, with suitable circuits, allow it to be used in many kinds of applications with improved performance at frequencies at least as high as 100 megacycles.

The tube was originally developed to provide a high degree of stable carrier suppression when used as a balanced modulator in single-sideband service. More than 60 db. of carrier suppression has been obtained with it as a balanced modulator in s.s.b. exciters of both the filter and phasing types. It is of course equally valuable in double-sideband suppressed carrier service.

Frequency conversion, product detection, synchronous detection, single-ended to push-pull phase inversion, switching circuits, fader circuits and compressor-expander-limiter circuits are among the many other interesting applications in which the unique properties of this new tube have been found to be valuable.

In this article circuits will be described which make use of the 7360 as a balanced modulator, a frequency mixer and a product detector. Balanced modulator circuits will be shown for both the filter and phasing methods of s.s.b. generation. The circuits are presented for the purpose of illustrating various methods of employing this new tube as a balanced modulator and as a frequency mixer rather than as a complete s.s.b. transmitter design. The writer wishes to express his appreciation to M. B. Knight and Ken Uhler of RCA for much of the information in this article.

First, let's examine Fig. 1, which is a cross-section sketch of the main elements of the tube. The single flat cathode, control grid and screen grid form an electron gun which generates, controls and accelerates a ribbon or sheet beam of electrons. The screen grid and the two deflecting electrodes act as a converging electron lens to focus this beam.

Varying the bias or signal voltage on the control grid varies the plate current as in a conventional tube. The total plate current to the two plates, at a given plate voltage, is determined by the voltages applied to the control grid and the screen grid. The division of the total plate current between the two plates is determined by the difference in voltage between the two deflecting electrodes.

Mechanical-Filter Type S.S.B. Generator

Now, bearing these brief fundamentals in mind, let's see how they can be applied in a balanced modulator, using a mechanical filter to obtain a single-sideband signal. A 455-ke. circuit for this purpose is shown in Fig. 2.

The 7360 beam-deflection tube as used in this circuit combines two basic functions — it generates its own 456.85-ke. carrier as a crystal-controlled oscillator, and it also functions as a balanced modulator which delivers both sidebands without the carrier to the mechanical filter. The filter suppresses one sideband and delivers the other to its output circuit.

The control and screen grids of the 7360, together with its cathode, are used in a self-oscillating circuit. It is also entirely practical, of course, to supply the carrier to the control grid from a separate oscillator, if desired, as will be described later.

In the self-oscillatory circuit shown in Fig. 2 the 1N34A diode connected between the control grid and the ground side of the cathode-bias resistor acts as a clamp to prevent the voltage on the control grid from going positive or even to zero volts. As operated here the most positive excursion of the control grid is to -2.5 volts. This prevents excessive values of screen current from flowing and gives better modulation linearity and carrier frequency stability.

* Radio Corporation of America, Electron Tube Division, Harrison, N. J.

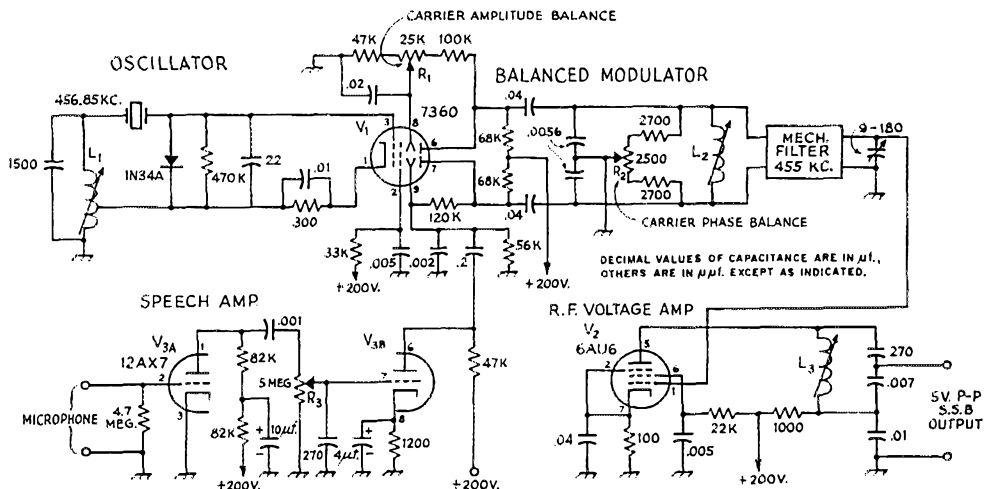


Fig. 2—Filter-type s.s.b. generator using the 7360 as a combined self-excited oscillator and balanced modulator. Fixed resistors are $\frac{1}{2}$ watt except as indicated.

- L₁—App. 88 μ h., adjustable (see text).
- L₂—App. 50 μ h., adjustable (see text).
- L₃—App. 450 μ h., adjustable.

- R₁, R₂—Composition control, linear taper.
- R₃—Composition control, audio taper.

We now have a single-ended carrier input to our push-pull plate output. In order to suppress this carrier in the push-pull output circuit both ends of the output circuit must go equally positive and then equally negative at exactly the same times. That is, the amplitudes of the two voltages, one from each plate, must be exactly equal and the two voltages must be in exactly the same phase in order to balance out or cancel the carrier completely. Amplitude balance is obtained very simply by varying the d.c. voltage difference between the two deflecting electrodes by means of the amplitude-balance potentiometer, R₁.

Since a phase unbalance of only 1 degree makes it impossible to obtain more than about 40 db. of carrier suppression, special pains were taken to provide good methods of obtaining stable phase balance. In the method used in Fig. 2 the phase angle of the load circuit is controlled by varying the resistance to ground from the two ends of the capacitance-center-tapped plate tank circuit by means of the phase-balance potentiometer, R₂. This method is best suited for relatively low-frequency operation. A small differential capacitor across the plate tank circuit is best suited for phase balancing in higher-frequency circuits.

These two balance controls allowed better than 60 db. of carrier suppression to be obtained from the balanced modulator. An additional 20 db. of suppression was obtained in this filter circuit because the carrier was located at a point 20 db. down on the filter frequency-response curve. This gave a total of approximately 80 db. suppression!

Negative Feedback

You will notice that each deflecting electrode receives its d.c. voltage (approximately 25 volts) from a tap on a resistance voltage divider from

each plate to ground. A desirable by-product of this resistance coupling from plate to deflecting electrode is negative feedback. Additional negative feedback, which tends to correct any unbalance between the two plate currents, is obtained from the two 68,000-ohm plate resistors. If desired, still more negative feedback can be obtained by reducing the capacitance of the two 0.04- μ f. plate blocking capacitors so that they offer a relatively high reactance to audio frequencies but relatively low reactance to the carrier frequency being used. This negative feedback improves modulation linearity and reduces hum and microphonics originating in the balanced modulator.

The audio signal is fed to this balanced modulator at a relatively high impedance—special transformers to obtain a low-impedance driving source are not required. Furthermore, a push-pull audio source is not required—a single-ended feed is used. With 10 volts r.f. on the control grid, 2.8 volts a.f. deflecting voltage is required. Both values are peak-to-peak.

This arrangement is possible because of the fundamental characteristic of the tube mentioned initially—the voltage difference between the two deflecting electrodes controls the division of the total plate current between the two plates. This gives an intrinsically balanced push-pull output from a single-ended input. Also, a 180-degree phase reversal can be obtained by simply switching the audio input from one deflecting electrode to the other.

In order not to overload the mechanical filter the gain of this circuit was reduced by shunting the mechanical filter input winding with a separate slug-tuned inductance, L₂, as shown in Fig. 2. This allowed about 1.5 volts input to the filter. Approximately 0.5 volt peak-to-peak output was obtained from the filter.

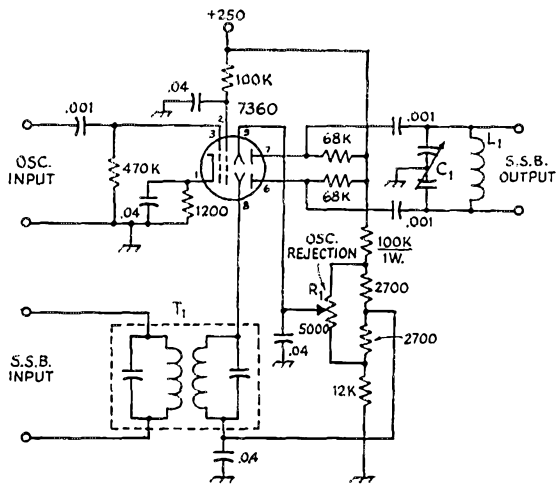


Fig. 4— Balanced mixer circuit with separate excitation. Capacitances are in μf .; fixed resistors are $\frac{1}{2}$ watt except as indicated. Tuned-circuit constants depend on frequency; ordinary L/C ratios may be used for L_1C_1 and in the s.s.b. input transformer, T_1 . R_1 is a linear-taper composition potentiometer.

coil form. No slug was used. The grid tap should be located $7\frac{1}{2}$ turns above the ground end of the coil. The cathode tap is $19\frac{1}{10}$ turns above the ground end of the coil. Actually, in building L_4 , it was first determined that the coil specified above required a total length of wire measuring 121 cm. The taps were then soldered to this length of wire before winding it on the coil form, in order to avoid melting the polystyrene form with the hot soldering iron. The cathode tap was located 15.1 cm ($12\frac{1}{2}$ per cent of the total wire length) from the ground end of the wire and the grid tap was located 60.5 cm (50 per cent of the total wire length) from the ground end. At 3.5 Mc. this coil had a Q of 150 and required 400 μf . to resonate it. The Q was measured with the coil shield in place.

7360 Mixer With Separate Oscillator

A generalized mixer circuit for use with an external r.f. oscillator is shown in Fig. 4. Here the s.s.b. input is shown fed from a two-winding transformer instead of from a capacitive tap on the preceding tank circuit, as was used in Fig. 2.

Since the 7360 is not used as a self-oscillator the 1N34A diode clamp is not used and the cathode bias resistor is changed from 300 ohms to 1200 ohms. The r.f. oscillator input to the control grid must be adjusted to be between 5 and 10 volts peak-to-peak, measured between control grid and cathode, for best results. A 0.04- μf . r.f. bypass capacitor effectively grounds one deflecting electrode (pin 9) so the s.s.b. input is single-ended between the other deflecting electrode and ground.

In this mixer circuit the 68,000-ohm d.c. feedback or plate-current equalizing resistors are connected as shunt feed resistors to the two plates, the same as was shown in the balanced modulator circuit in Fig. 2, instead of being in series with the center-tapped connections to the d.c. plate voltage supply as was shown in the mixer circuit of Fig. 3. This difference allows L_1 , the mixer plate tank coil, to be a simple untapped coil instead of requiring a bifilar-wound coil as is the

case when the d.c. feedback resistors are connected in series with the split, center-tapped coil connections to the plate voltage supply. The capacitance and inductance values of T_1 and C_1 and L_1 in Fig. 4 will depend upon the input and output frequencies involved.

The combination of the two circuits shown in Figs. 2 and 3 will provide single-sideband output in the range between 3.8 and 4 Mc. Since these circuits were for the purpose of obtaining characteristics and specifications, as was previously stated, they do not include all of the facilities that might be required for actual amateur operation on the air, particularly as regards switching between upper and lower sideband.

Sideband switching can be obtained by any of the normal methods. For example, a simple method would be to employ two crystals in the carrier oscillator circuit of the balanced modulator, one for upper sideband and the other for lower sideband, with a switch for instant choice. Band switching would require an additional mixer stage to heterodyne the v.f.o.-mixer output to the various other bands.

R.F. Phasing-Type S.S.B. Generator

Fig. 5 shows the schematic of an r.f. phasing exciter circuit for 455 kc. which gives a peak-to-peak output of about 4 volts single sideband. Here you see the usual r.f. and a.f. 90-degree phase-shift networks, an audio amplifier, and two 7360 tubes as balanced modulators.

The audio circuits include two sideband-balance potentiometers — one for adjusting the input voltage ratio to the audio phase shift network, R_3 , and one for audio amplifier balance, R_4 . Each balanced modulator has its own carrier amplitude-balance potentiometer which controls the d.c. bias voltage on one of its deflecting electrodes, as was done in the filter rig.

The outputs of the two balanced modulators are combined in a common push-pull tank circuit. Over-all r.f. phase balance is obtained in this tank circuit by the use of a differential capacitor connected across the tank circuit. This type of phase-

BALANCED MODULATORS

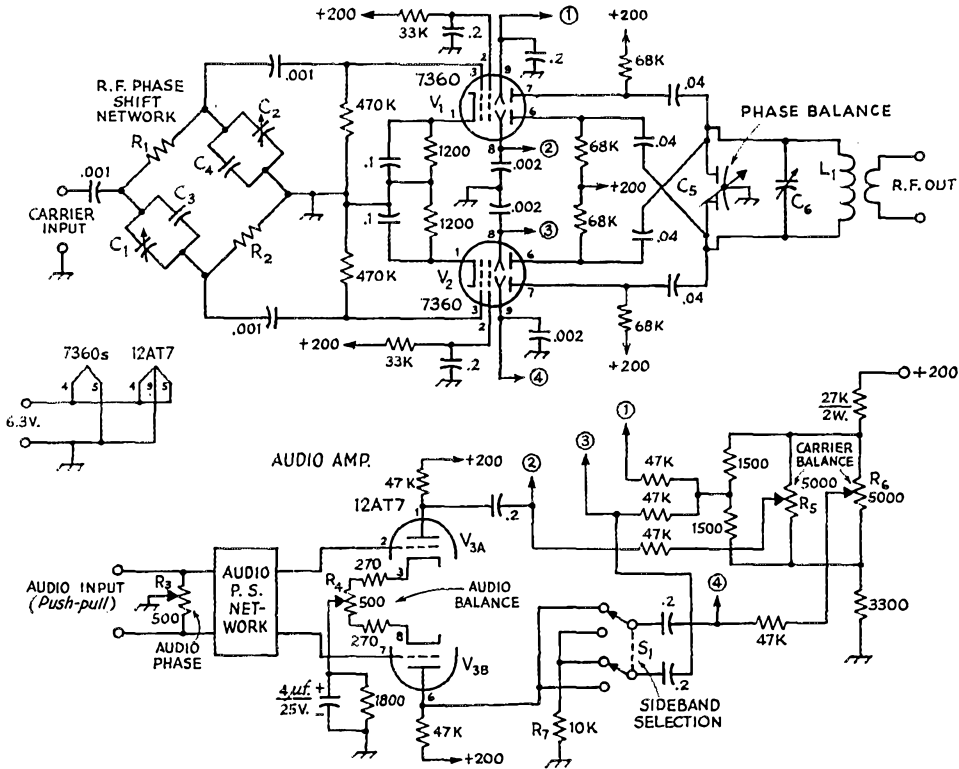


Fig. 5—Phasing-type s.s.b. generator using two 7360s as balanced modulators. Capacitances are in $\mu\mu\text{f.}$; fixed resistors are $\frac{1}{2}$ watt except as indicated.

C_1, C_2 —Trimmers, ceramic or air, approximately $25 \mu\mu\text{f.}$
 C_3, C_4 —Value dependent on frequency and $R_1 R_2$. Reactance at operating frequency should be approximately equal to the resistance of R_1 and R_2 .
 C_5 —Differential capacitor, approximately $25 \mu\mu\text{f.}$ per section.
 C_6 —Variable, to resonate with L_1 at output frequency.
 L_1 —To resonate with C_6 at output frequency. Conventional L/C ratio may be used.

S_1 —D.p.d.t. toggle or rotary.

R_1, R_2 —Non-inductive, $\frac{1}{2}$ or 1 watt, values to be equal within close tolerances. Actual resistance not critical, but should be low to minimize effect of stray capacitances. Resistances of the order of 100 ohms are satisfactory.

R_3, R_4 —500-ohm composition control, linear taper.

R_5, R_6 —5000-ohm composition control, linear taper.

R_7 —App. 10,000 ohms, $\frac{1}{2}$ watt (see text).

balancing circuit is better suited to the higher carrier frequencies generally used in phasing-type exciters.

The r.f. phase-shift network used here is of the simple R-C bridge variety. Any of the other usual types of networks could be employed instead if desired.

As in the filter exciter, better than 60 db. suppression of the carrier was obtained by proper adjustment of the r.f. phase and amplitude balancing controls.

Suppression of the unwanted sideband is limited by the degree of accuracy with which the audio phase-shift network maintains an exact difference of 90 degrees in phase between the two branches of the audio system, over the entire range of audio frequencies fed to the audio phase-shift network. With the audio phase-shift network used in our experimental setup carrier plus unwanted sideband measured about 40 db. below the wanted sideband.

Switching the single-ended audio input to one

of the balanced modulators from one deflecting electrode to the other allows a ready choice of upper or lower sideband output. This is done by switching the audio input to one balanced modulator, V_2 , from one deflecting electrode to the other, through one arm of S_1 . The other arm of S_1 connects a 10,000-ohm resistor, R_7 , between the other deflecting electrode and ground through a d.c. blocking capacitor, in order to preserve better balance. The exact value of R_7 should be adjusted for best balance stability since various wiring layouts, and particularly various audio tube types, will require different values.

As in the case of the filter circuit, additional stages and functions would be required for a complete s.s.b. exciter, including a v.f.o.-mixer stage and a crystal oscillator-mixer stage to heterodyne the signal to various bands.

7360 as a Product Detector

A rather unique circuit for obtaining a single-ended audio output from the 7360 as a product

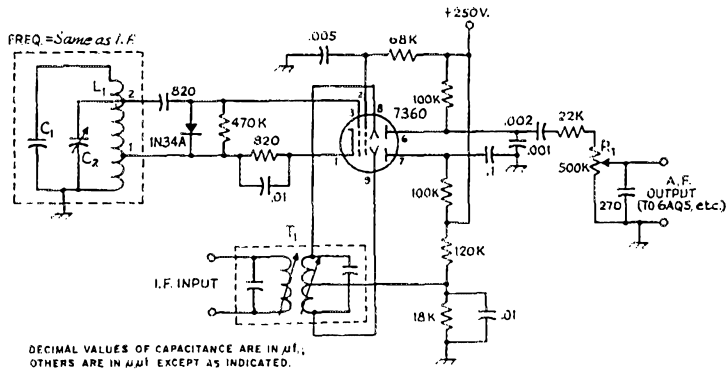


Fig. 6—Product detector circuit with self-excitation. The beat-frequency oscillator tuned circuit, $C_1C_2L_1$, should be high- Q at the intermediate frequency used; C_2 is for fine frequency adjustment. On L_1 , tap 1 is at approximately

5 per cent of the turns counted from ground, and tap 2 at approximately 25 per cent. T_1 is an i.f. transformer with balanced secondary, such as is used for a push-pull diode detector. R_1 is the audio volume control.

detector in a receiver is illustrated in Fig. 6. As in the v.f.o. circuit of Fig. 3, the "front end" of the 7360 is used as a self-oscillating b.f.o. and includes the diode clamp to prevent its control grid from going positive. A fairly high- Q , high- C b.f.o. tank circuit is used, and with the coil tapped as in Fig. 6 about 8 volts peak-to-peak was obtained between control grid and cathode.

the flattening characteristic will limit impulse-noise peaks.

The deflecting electrodes were driven in push-pull primarily because it was felt that limiting of high-amplitude impulse noise would be better. Actually, tests with the same circuit connected for single-ended input to one deflecting electrode showed no substantial difference. Balanced operation has some second-order advantages, however, such as minimizing the contribution of stray capacitance to oscillator locking or pulling.

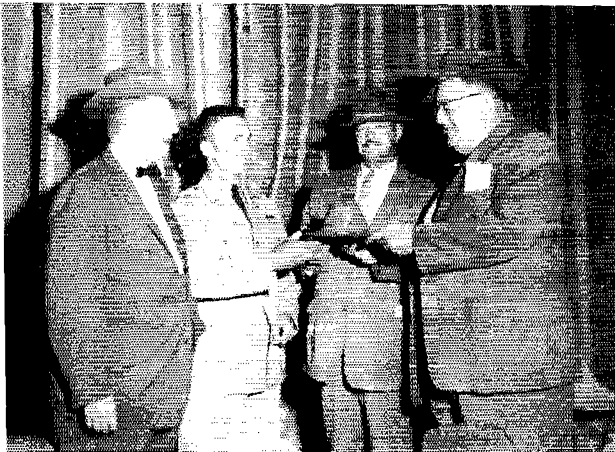
As indicated in Fig. 6, the b.f.o. and audio output of one plate is bypassed to ground through a 0.1- μ f. capacitor. A 0.001- μ f. capacitor to ground from the other plate bypasses the b.f.o. output to ground while the audio output (more than 20 volts at maximum input signal) is used to drive the grid of a 6AQ5 output tube. This circuit was tested at an intermediate frequency of 910 kc. (the output from a BC-348M receiver). It is probable that more of an r.f. filter may be required at lower intermediate frequencies. For example, the 22,000-ohm r.f. filter resistor may need to be replaced with an i.f. choke.

The i.f. input to the deflecting electrodes should be held close to 10 volts peak-to-peak. At higher inputs the output "flattens" noticeably. If the input signal is held close to this maximum

Maximum suppression of the i.f. in the audio output of the 7360 plate circuit could be obtained by using a push-pull or balanced output circuit together with an amplitude-balance potentiometer on one of the deflecting electrodes, as is shown in Fig. 4.

QST

Strays



Late last summer Capt. John Stewart, WØVOP, accepted a commission in the Confederate Signal Corps on behalf of Gen. "Butch Griswold," KØDWC. That's Confederate Signaler W4ZD presenting the commission, while W9GPI (far left) and WØTSN (second from the right) look on. Probably very few of you knew that all of these hatted gentlemen are high-ranking officers in the Confederate Signal Corps, but you all knew that W9GPI is ARRL Central Division director, WØTSN is ARRL president, and W4ZD is ARRL Southeastern Division director.

Recent Equipment —

Hallicrafters HT-37 Transmitter

THE HT-37 is a transmitter-exciter capable of 70 to 100 watts output on s.s.b. (p.e.p.) and c.w. and 17 to 25 watts output on a.m. It will cover all amateur bands between 80 and 10 meters and contains its own v.f.o. for frequency selection. Ten-meter operation with the HT-37 is restricted to 500-ke. segments, however, and the transmitter comes from the factory equipped for operation between 28.5 and 29.0 Mc. Other 500-ke. portions are made available by use of crystals not furnished with the transmitter.

The 18-tube transmitter uses the phasing method for s.s.b. generation. The s.s.b. generator, which includes the audio speech-amplifier stages, is housed in separate subassembly mounted on the main chassis. Except for this generator assembly and a few mechanical details, the HT-37 is practically identical with the HT-32 transmitter¹ (the HT-32 uses the filter method for sideband generation).

The block diagram of the HT-37 in Fig. 1 shows the line-up and functions of the tubes. A fundamental carrier frequency of 9 Mc. is generated in the crystal-controlled oscillator, V_{2B} .

During s.s.b. operation the 9-Mc. signal is fed into an r.f. phase-shift network where it is separated into two equal parts 90 degrees out of phase. These two signals are then applied to the balanced modulators, V_{4A} and V_{5A} . Audio from the microphone is amplified in V_{1A} and V_{2A} , split into two signals having a 90-degree phase difference by the a.f. phase-shift network, and then fed into the balanced modulators. The resulting output from the modulators is a 9-Mc. s.s.b. signal. Either upper or lower sideband emission is available and is selected by means of the front panel FUNCTION switch. Carrier suppression is rated to be 50 db. or more, with unwanted sideband rejection 40 db. or more (at 1 kc.).

For a.m., one of the modulators is unbalanced to let an appropriate amount of carrier voltage through, and audio is cut off in the other modulator. This results in a 9-Mc. a.m. signal. For c.w., the same system is used except that the audio is disconnected from both modulators, leaving only the 9-Mc. unmodulated carrier. The signal is keyed by removing cut-off bias from the

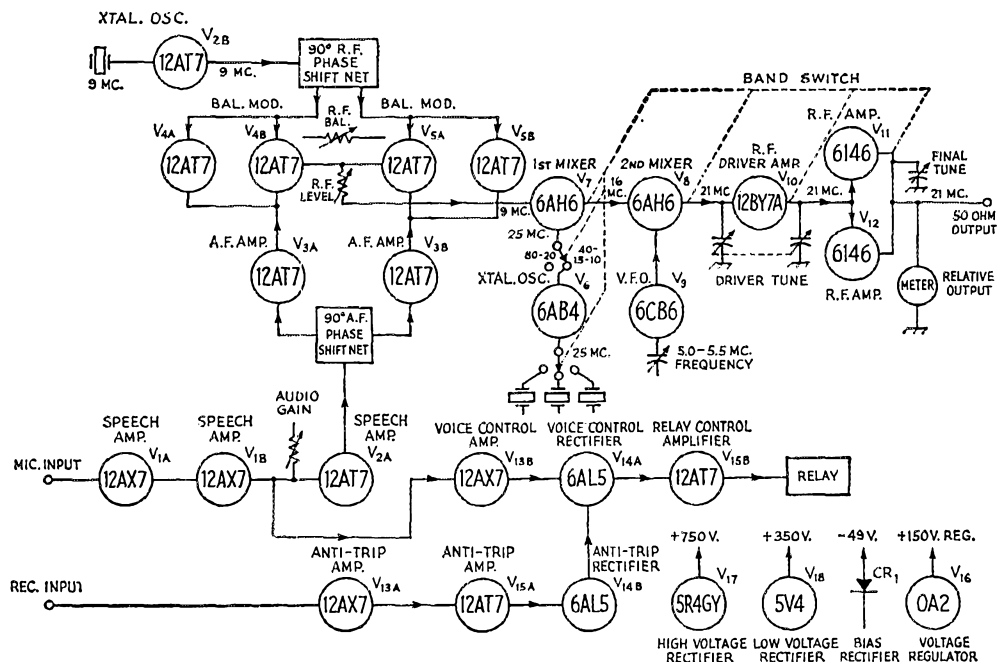
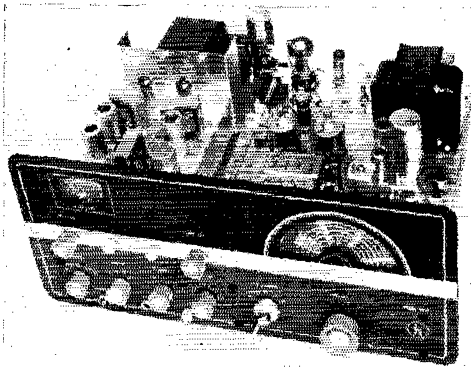


Fig. 1—Block diagram of the HT-37 transmitter.



The HT-37 controls are located in the same panel positions as those of the HT-32 transmitter with the exception of the carrier balance (top left) and calibration level control (bottom center). The two-piece cabinet has been removed in this photograph.

first- and second-mixer control grids.

After leaving the sideband generator, the 9-Mc. signal is fed through a series of mixers and amplifiers to bring it into the desired amateur band. As an example, the block diagram shows the frequency combinations required to beat the 9-Mc. signal to 21 Mc. In the first mixer, V_7 , the 9-Mc. signal is combined with energy from a crystal oscillator, V_6 . This oscillator is operative only on 40, 15, and 10 meters since 80 and 20 meters can be obtained in one step by beating 9 Mc. with the 5-Mc. v.f.o. signal at the second mixer, V_8 . In the second mixer, 5.0- to 5.5-Mc. energy from the series-tuned Colpitts v.f.o., V_9 ,

The sideband generator chassis is at the bottom left in this underside view of the HT-37 transmitter. Final amplifier and driver components are grouped at the chassis center while the drive assembly for the v.f.o. is at the top left. Directly beside the v.f.o. drive is a portion of the v.f.o. circuitry which is enclosed in a cardboard compartment.

is combined with the output of the first mixer.

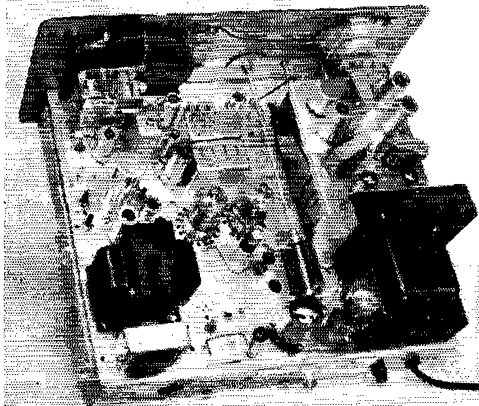
Since both frequency addition and subtraction are used to heterodyne to the different amateur bands, a switch wafer on the BAND switch automatically controls the sideband generator so that the desired sideband is always in its correct relationship with the final carrier frequency.

Output from the second mixer, which is at the desired frequency, is applied to the driver, V_{10} , and then to the two parallel-connected 6146 final amplifiers, V_{11} and V_{12} . The final amplifier uses a pi-section output tank and is designed for use with a fixed nonreactive load of 50 ohms. This does away with the usual loading control, but unless the transmitter load is actually 50 ohms and purely resistive, a coupler or matching device should be used between the transmitter and load. An output meter using a diode rectifier across the output tank circuit indicates the relative output of the transmitter.

Conventional VOX and anti-trip circuits are used in the HT-37. A three-pole double-throw relay controlled by the VOX circuits has one set of contacts connected to an outlet at the rear of the chassis; these contacts may be used for controlling the station receiver, amplifier, antenna, or other functions as may be desired.

D.c. power for the transmitter is supplied from four voltage sources. A 750-volt supply furnishes high voltage for the final-amplifier tubes and a 350-volt supply gives final-amplifier screen voltage and plate and screen voltages for other tubes in the transmitter. A regulated 150-volt supply is used to power the v.f.o. plate and screen as well as the mixers and crystal oscillators. A negative 49-volt supply using a selenium rectifier furnishes grid bias, both operating and blocking.

Top view of the HT-37 shows the sideband generator chassis just forward of the power transformer at the bottom right. The temperature-compensated v.f.o. assembly is near the panel at the upper left of the photograph. Two convection-cooled 6146 final-amplifier tubes are located in the center of the chassis. The final-amplifier tuning capacitor, which is controlled by the long insulated shaft running from the front panel, is adjacent to the final-amplifier tubes. An accessory socket, antenna output terminal, fuse and line cord are visible along the chassis rear.



Power requirements for the transmitter are about 375 watts at 105 to 125 volts, 50 to 60 cycles.

The HT-37 closely resembles the HT-32 so far as panel control layout is concerned. In fact, as mentioned earlier, the two units are practically identical except for the sideband generator, its controls, and a few mechanical differences such as the cabinet and knobs. Although the HT-37 has the same final amplifier as the HT-32, it does not use a fan for cooling. The fan was probably found to be unnecessary since the HT-37 does not have shields or partitions surrounding its final-amplifier tubes as does the HT-32.

The front panel controls include, from top left to right: AUDIO GAIN, CARRIER BALANCE, and FINAL TUNE. Along the bottom: OPERATION (OFF, STANDBY, MOX, CAL, VOX), microphone (high impedance) jack, FUNCTION (CW, DSB, USB, LSB), key jack, R.F. LEVEL, CAL LEVEL, DRIVER TUNE, BAND SELECTOR, and FREQUENCY (v.f.o. control). The meter at the upper left on the panel is the output level indicator. The sensitivity of this meter is controlled by the CAL LEVEL control which, in addition to adjusting the desired signal level in the station receiver for monitoring purposes, contains a push-pull switch. When the switch is in,

the meter reads about 100 volts r.m.s. full scale. During carrier-balance adjustments the switch is pulled to the out position, giving about 20 volts r.m.s. full-scale deflection.

Rear chassis connections include an 11-pin male connector which mates with an Amphenol 86-PM11 and which contains connections to the key jack (if the panel jack is not used), the relay contacts, and the anti-trip input from the station receiver. Also, the 50-ohm r.f. output connector (mates with an Amphenol 83-1SP), fuse and line cord are along the rear chassis apron.

The dark gray cabinet of the HT-37 measures $8\frac{15}{16}$ inches high, $19\frac{1}{2}$ inches wide and $15\frac{7}{16}$ inches deep. The cabinet is in two pieces and is held to the chassis by several machine screws. To adjust the VOX or anti-trip controls located on top of the main chassis it is necessary to remove the top half of the cabinet or use a long-shank tool that will pass through the cabinet perforations. Shipping weight of the HT-37 is about 80 pounds.

A 20-page instruction manual containing alignment, service and tune-up data is included with the transmitter. The HT-37 is manufactured by the Hallcrafters Co., Chicago, Ill.

— E. L. C.

Mars Thunderbird Mobile Transmitter

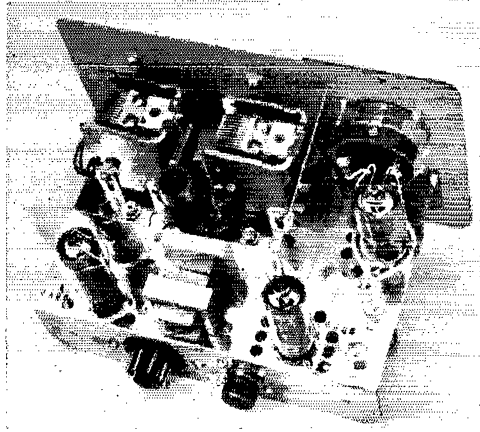
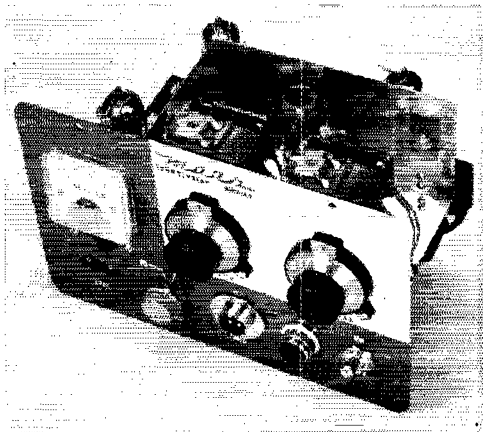
THE transmitter shown in the photographs is a Japanese import designed for mobile phone operation in the 40- and 75-meter amateur bands. Although its circuit is a conventional one, all components and workmanship are Japanese.

Three tubes are used in the circuit. One section

of a 12AU7 double triode functions as a crystal oscillator while the other section operates as an amplifier-multiplier. The final r.f. amplifier is a 6AQ5, as is the single-stage choke-coupled modulator. The modulator is designed for use with a carbon microphone, which is transformer-coupled

Front view of the Mars mobile transmitter with its gray perforated case removed. The two vernier dials operate the final amplifier tuning and loading capacitors. The indicating meter is calibrated for both grid and plate current, and is switched to read either by means of a slide switch located directly below the meter. Sockets and controls along the bottom of the panel are the crystal socket, band switch, carbon-microphone connector, pilot-lamp indicator, and the on-off toggle switch.

An aluminum partition separates the final amplifier components from the rest of the transmitter circuit. The 6AQ5 modulator tube is at the lower left. The 6AQ5 final r.f. amplifier is at the lower right and the 12AU7 crystal oscillator-multiplier is adjacent to the meter. Rear apron connectors are the power jack (left) and antenna coax fitting. The small transformer above the power plug is the carbon-microphone transformer.



The bottom view of the Mars mobile transmitter gives an eye-full of the Japanese components which, except for the unfamiliar brand names, closely resemble their American counterparts. The two slug-tuned coils at the left are part of the 12AU7 multiplier-amplifier's tuned plate circuit.

which is not in itself so unusual, but in this transmitter the practice is extended even to the output coaxial connector, which is soldered directly to the rear chassis lip. Braided-conductor leads connect the variable-capacitor frames to chassis, and most of the screws and nuts in the transmitter are dabbed with paint to prevent them from loosening under vibration.

Heater voltage (6.3 or 12.6 volts) and a plate supply (about 250 volts) must be obtained from an external source to power the transmitter, which is rated at 12 watts input to the final amplifier.

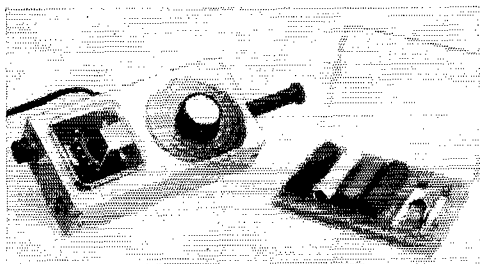
The transmitter case measures $7\frac{1}{2}$ inches wide, 5 inches high and $4\frac{1}{4}$ inches deep. The Thunderbird is imported by the Pausan Co., San Rafael, California.

— E. L. C.

to the grid of the 6AQ5. A pi-section output circuit couples the transmitter to the antenna load.

As shown in the photographs, several mechanical features not usually seen in domestic rigs of this class are included in the transmitter. Hold-down clamps for the tubes and vernier dials for the plate and antenna loading controls are a few of the obvious ones. Ground connections are soldered directly to the copper-plated chassis,

Knight-Kit Grid-Dip Meter



The grid-dip meter shown in the accompanying photograph was constructed from a kit, Model G-30, made by Allied Radio of Chicago, Illinois. The oscillator tunes from 1.5 to 300 Mc. in six overlapping segments. Six prewound coils are supplied in a cushioned, clear plastic box which serves as a handy storage case. Each dial range and corresponding coil are color coded for easy identification and an adjustable hairline is provided so that each range may be calibrated against a known standard. The 0-1-ma. indicating meter is calibrated in 50- μ a. steps and has a special mark at about 80 per cent of full scale which aids in setting the GAIN control properly for top grid-dip performance and accuracy.

The grid-dip meter circuit uses a single 6AF4A triode in a conventional Colpitts oscillator circuit. A built-in transformer power supply provides all the necessary operating voltages. Power

requirements for the unit are about 3 watts at 117 volts a.c.

In addition to operating as a grid-dip oscillator, the G-30 can be used as an absorption wave-meter, crystal oscillator or oscillator-detector. A circuit-closing jack is wired in series with the indicating meter so that when headphones are inserted in the PHONES jack the meter is disconnected and the instrument may be used to observe modulation quality or for zero-beating and thus identifying unknown radio frequencies.

The two terminals of the coil socket on the G-30 are spaced 0.486 inch apart so that any crystal with this spacing (and with pin diameter of 0.093 inch) can be substituted for a coil in the unit to convert it into a crystal-controlled oscillator.

The case of the G-30 measures only $6\frac{1}{4} \times 3\frac{1}{2} \times 1\frac{1}{2}$ inches and the unit weighs only 26 ounces, so it can easily be held in one hand. A serrated dial extends beyond the edge of the case so that the unit can be tuned with the thumb of the same hand.

Construction should not take even the beginner over two hours. Included with the step-by-step instructions are suggested applications of the instrument to measurements involving receivers, transmitters, and antennas. Data are also given on using the instrument to find unknown capacitances and inductances.

— E. L. C.

Some Observations

Based on Experiment

BY KATASHI NOSE,* KH6II

Notes on Parasitic Beams

DURING the course of developing a lecture demonstration on parasitic beams, the following points were briefly investigated:

- 1) Azimuthal distortion of the radiation pattern with gamma versus balun-matched feed.
- 2) Insulated versus uninsulated elements.
- 3) Effect of varying second and third director element spacings.
- 4) Gamma-rod length versus gamma capacitance with driven-element length in the vicinity of a half wavelength.

The Test Apparatus

A frequency of 144.008 Mc. was chosen in preference to a higher one, to take advantage of readily available standard components. Physical dimensions of antennas at this frequency are such that measurements of length are not too critical, yet the frequency is high enough so that isotropic conditions can be simulated when the antenna is held high aloft in a test rig in an open field. Fig. 1 shows the general layout of the test apparatus.

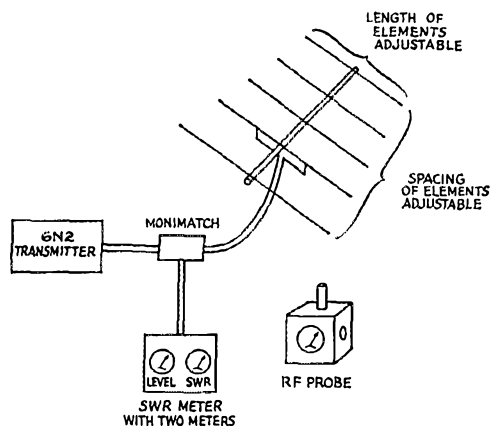


Fig. 1—Equipment used in the test setup.

Validity of Measurements

Fig. 2 shows details of the pickup system and radiator. The diode pickup and amplification system was calibrated against a thermogalvanometer pickup dipole and its linearity established. Gain

* 9 Concord Ave., Belmont, Mass.

Some of the things discussed in this article—such as voltage unbalance and “squint” with a one-side feed system such as the gamma—haven’t had much attention in amateur circles. If some questions about beams have been worrying you, the answers may be here.

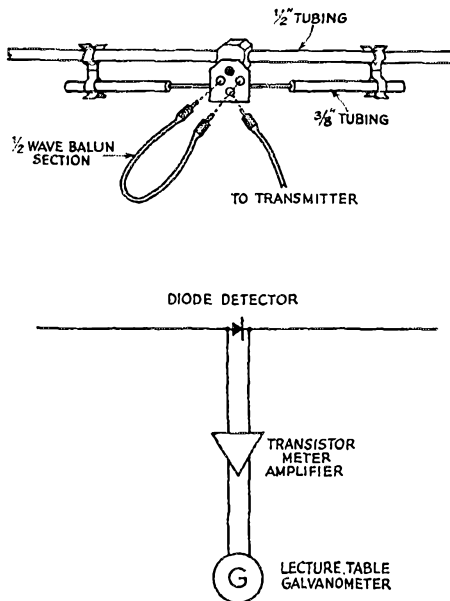


Fig. 2—Detail of radiator feed arrangement and pickup antenna system.

figures obtained for three- and two-element beams over a reference dipole were repeatedly checked and gave consistent results in close agreement with published figures.

It might be pointed out to those who may want to duplicate these tests that it is much easier to make gain measurements by using a dipole radiator, without parasitic elements, and make the adjustments in length, spacing, number of elements, and so on, to a test array arranged as a pickup system instead of as a radiating system.¹

Gamma Match versus Balun Match

Fig. 3 shows relative voltages measured at the ends of a three-element beam with a balun and

¹ The method should be used with some caution, however, since each adjustment has an effect on the antenna feed-point impedance and thus on the match between the antenna and line. This in turn affects the efficiency of power transfer to the receiver or other indicating device. For accurate results, rematching is required after each adjustment that changes the antenna impedance significantly. — Editor.

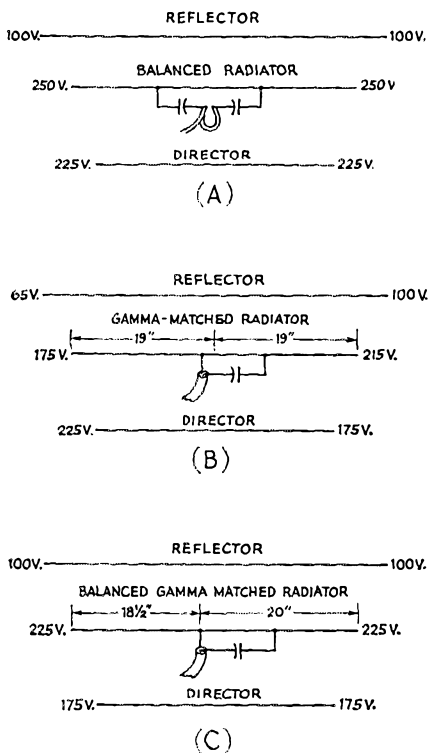


Fig. 3—Relative voltages at ends of elements with (A) Balanced feed—T matching section with balun; (B) Gamma match; (C) Gamma-matched radiator with undriven side shortened to balance voltages at ends of element.

with a gamma match. The voltages at the opposite ends of an element in a gamma-matched system are indeed unequal, whereas the corresponding voltages with the balun-matched system are equal.

Unequal distribution (unbalance) can be corrected in a gamma-matched system by shortening the side with the lower voltage, as shown in Fig. 3C. Thus one ends up with a lopsided beam, physically, if an attempt is made to balance the voltage distribution.

Lacking an r.f. probe, an approximation of the voltages in a practical beam can be made either by using a neon bulb or by drawing an arc off the ends of the elements. With high power, half-inch arcs can be drawn off the ends of elements, but this is a dangerous practice and not to be recommended. However, if you insist on doing it, tape a pencil to the end of a wooden (not metal) broomstick. For maximum effect, sharpen a soft lead pencil in an automatic pencil sharpener.

The gamma match shows a slightly greater tendency toward radiation from the down lead—that is, the coax feed line—as shown by probing for several wavelengths, but this can be minimized by coiling the feed line in the form of a loose r.f. choke.

However, the most interesting fact observed was that the azimuthal radiation patterns were

identical with both the gamma and balun match when both halves of the elements were the same length. One would surmise from the above data—and intuition—that azimuthal distortion (squinting) would occur with the gamma. Yet repeated measurements at different heights showed no distortion of the pattern, at least not within the resolution of this system, either inside or outside the Fresnel zone. For these and other tests, a whole football field was available.

The conclusion is that it is not worth the effort to use a balancing system. Experience has shown that the less hardware one has up in the air the less trouble there is with galvanic action. And from a mechanical standpoint the simplicity of unbalanced feed is hard to beat.

Insulated versus Uninsulated Elements

Element insulation was accomplished in the test setup by substituting a plastic rod for the metal boom. There seemed to be little advantage in insulating elements from the boom. Insulated elements did tend slightly to minimize the voltage unbalance in a gamma-matched system, but in practical systems insulation does not seem worthwhile.

Effect of Varying Fourth and Fifth Element Spacing

Theoretical gain figures for four- and five-element beams bother many of us, especially when it comes time to cut up a long piece of boom material to conform to precalculated element spacings.

The popular 0.1- and 0.2-wavelength spacings have no magical properties, needless to say, and any intermediate spacings will work. Authors of articles on beam antennas get a large number of inquiries about element spacings, some correspondents wanting to know right to the inch.

The second director (fourth element) was found to be most effective in the vicinity of 0.2-wavelength spacing. Placing this element too close (0.1 wavelength) to the first director produced little gain and sometimes even caused a reduction in gain depending on the tuning. Assuming that this also holds for additional directors, the conclusion is that unless one has an extra long boom which will permit at least 0.2 wavelength spacing between directors, one is liable to suffer deterioration in gain by adding extra elements.

The 20-meter four-element beam at KH6IJ uses a 42-foot boom with 0.2-wavelength spacing between elements. After five years of evaluation against a close-spaced four-element reference beam, the conclusion is that the gain and bandwidth are as predicted, and that the front-to-back ratio is not as pronounced as with the close-spaced beam. But the mechanical difficulties of putting up and maintaining a long-boom beam are formidable. This beam was smashed to smithereens by a 105-m.p.h. hurricane which snapped the 16-inch butt of an 80-foot telephone pole supporting it. The pole fell on the beam, which had been lowered before the storm.

Gamma Rod Length versus Gamma Capacitance in the Vicinity of a Half Wave

Practical adjustment of a gamma-matched beam has been covered in a previous article,² step procedures for which were derived in part from this experiment.

The following relationships hold:

1) The longer the radiator (departure from true half wave) the shorter the gamma rod length required, and vice versa.

2) The longer the gamma rod the less gamma capacitance required, and vice versa.

Axiomatically, an infinite number of combinations of gamma capacitance, rod length, and radiator length is possible. However, experimental measurements show that only one combination will result in the lowest s.w.r. consistent with good bandwidth and gain.

The following conclusions were drawn from some experiments:

1) It is possible to resonate and match, with reasonable s.w.r., almost any length of radiator. In one interesting accident, the end section of the radiator of a 20-meter beam was inadvertently left off, but by judicious use of gamma rod length and capacitance the system was made to show a reasonable s.w.r.

2) Maximum bandwidth is attainable with a radiator length as close to an electrical half wave as possible. However, as pointed out in a previous article,² better and easier matching is possible with the radiator cut slightly shorter than the standard 470 divided by frequency in megacycles.

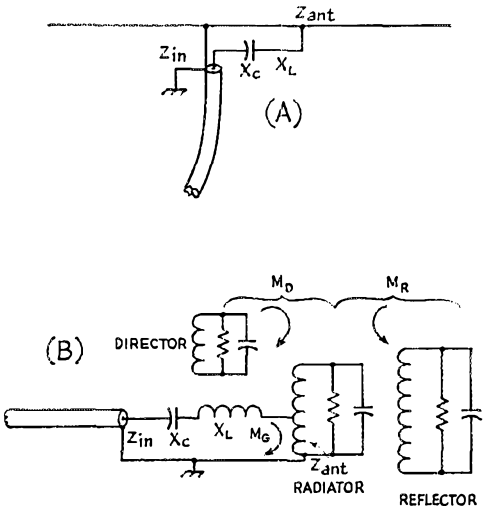


Fig. 4—(A) Gamma-match with impedances indicated; (B) Approximate lumped-circuit equivalent for a three-element antenna.

Fig. 4A shows the electrical equivalent of a gamma-matched three-element beam. The gamma-rod section represents a section of feed line less than a quarter wave long terminated in a

²Nose, "Adjustment of Gamma-Matched Parasitic Beams," *QST*, March, 1958.

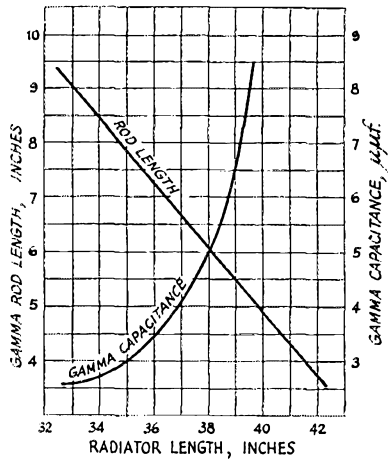


Fig. 5—Gamma rod length and series capacitance required for matching to coax line as a function of antenna length, at a frequency of slightly over 144 Mc.

load less than its characteristic impedance, and therefore always presents an inductive reactance which must be cancelled out by the series gamma capacitor.

Fig. 5 shows data obtained in a series of experiments in which gamma rod lengths were balanced off by gamma capacitance to obtain minimum s.w.r. The plot shows the nature of the curve of gamma capacitance required. Most amateur beams using 72-ohm coax end up using a gamma rod length which is in the region where a small change in length makes a comparatively large change in the impedance seen by the feed line, which explains why the rod lengths and capacitance values are so critical.

Again referring to Fig. 4B, we might consider the matching section (gamma rod and capacitor) as similar to a conventional tuned circuit, the resonant frequency of which is determined by the loop X_C , X_L and Z_{ANT} . The inductive reactance X_L is to be cancelled by X_C . The difficulty with this oversimplification lies in the mutual coupling (M_D , M_R) which exists between radiator and reflector and director, complicated further by the fact that part of the matching section (M_G) is

(Continued on page 170)

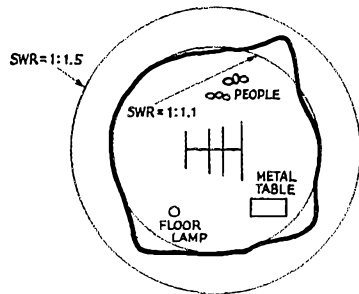


Fig. 6—Variation of s.w.r. on feed line as antenna was rotated, with various objects in near field.

• Beginner and Novice —

In an earlier article on using the BC-454, a hint was dropped that there was a simple way of getting higher i.f. selectivity in these popular receivers. This is it. As old as the single-signal receiving concept, it's close to being a no-cost method of getting high selectivity.

Improving the Selectivity of the BC-454 or 455

BY LEWIS G. MCCOY,* WHICP

A Poor Man's Q Multiplier

THE BC-454 is very popular both as an 80-meter receiver and as a tunable i.f. in a multiband receiving arrangement, as the response to recent articles¹ in *QST* has proved. Those interested in getting a lot of selectivity, with minimum cost and effort, from the 454 will find the "poor man's Q multiplier" described in this article a very simple way to do it.

The circuit, with "before" and "after" details, is shown in Fig. 1. All that is required is the addition of a 5000-ohm variable resistor, R_1 , and a capacitor, C_1 . The circuit change consists of lifting the cathode resistor of the 12SK7 second-i.f. tube from chassis ground and inserting the 5000-ohm resistor as shown. C_1 is made from two short lengths of insulated wire. One piece is connected to the grid terminal on the tube socket and the other to the plate terminal. The other ends of the wires are left open; thus the two wires serve as a coupling capacitor between the grid and plate circuits of the second i.f. stage. When the 5000-ohm resistor is varied the i.f. stage can be made to oscillate. At the point just below oscillation the over-all selectivity of the receiver is considerably improved. In fact, the selectivity approaches that obtained with much more elaborate circuitry.

* Technical Assistant, *QST*.

¹ McCoy, "Getting Started with the BC-454," *QST*, January, 1959.

McCoy, "80 Through 6 with the BC-454," *QST*, May, 1959.

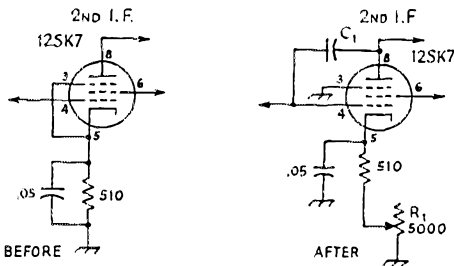


Fig. 1—Circuit diagrams before and after modification of the second i.f. stage.

C_1 —See text.

R_1 —5000-ohm potentiometer.

How To Do It

Fig. 2, a bottom-view layout drawing of the receiver, will help in identifying the proper tube socket. After taking off the bottom plate, remove the two screws that hold the potted capacitor directly over the second i.f. tube socket. It isn't necessary to unsolder the lead to the capacitor; there is enough lead length so the capacitor can be laid to one side, leaving plenty of room to work at the socket.

Remove the jumper wire between Pins 3 and 5 and ground Pin 3 to the nearest chassis ground connection. Locate the cathode resistor, which is on the mounting board immediately to the rear of the tube socket. The resistor, 510 ohms (green-brown-brown), should be the first unit, nearest the tube socket. One side of the resistor is connected to the cathode terminal, Pin 5, and the other side goes to chassis ground. Unsolder the end of the resistor connected to ground. The simplest method of doing this is to hold the lead with long-nose pliers and heat the connection, then when the solder melts pull up gently on the lead and it will come out of the terminal.

If you have your receiver mounted on a separate chassis as described in the January, 1959, *QST* article, the 5000-ohm resistor can be installed on the chassis. If not, a small right-angle bracket can be mounted on the side of the receiver case to hold it. Once you decide on the mounting, all you need do to complete the installation is connect a lead from the ungrounded end of the 510-ohm resistor to the movable arm of R_1 and connect one fixed terminal of R_1 to chassis ground.

The feedback capacitor, C_1 , consists of two pieces of insulated wire (any convenient gauge) approximately $\frac{3}{4}$ inch long. Solder one wire to Pin 4 and the other to Pin 8. Position the two so they are parallel to each other and about $\frac{1}{12}$ inch apart. Make sure the free ends of the wires aren't touching anything.

Adjustments

Use a clip lead to connect the case of the potted capacitor to chassis ground temporarily.

The feedback capacitor, C_1 , may require adjustment and it is easier to do with the capacitor out of the way.

Apply power to the receiver and let it warm up. Set R_1 so all the resistance is in the circuit. Next, adjust the b.f.o. trimmer so that the background noise has a high pitch. The trimmer control is the small screw in the square box mounted on one side of the receiver near the rear, and is accessible from the side of the case. Only a slight adjustment of the screw should be required.

Next, tune in a c.w. signal. Slowly decrease the resistance of R_1 and you should find a setting where the i.f. stage will go into oscillation. This will be indicated by a howl. Set the control just below the point of oscillation and tune the receiver across the signal. You should find a tuning dial setting where the signal peaks quite sharply. In addition, as you tune through the signal from one side of zero beat to the other, you'll notice that the beat note on one side is much weaker than on the other.

If you find that you cannot get the conditions just described or that the i.f. cannot be made to oscillate regardless of the setting of the resistor, try moving the wires forming C_1 closer together. Once you get the correct setting you can remount the potted capacitor, making sure the open ends of C_1 aren't shorting to the capacitor case.

The modifications described here were tried

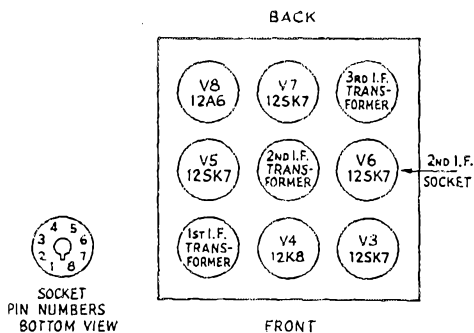


Fig. 2—Layout diagram (bottom view) of the receivers showing locations of tube sockets and i.f. transformers.

on both the BC-454 and 455 with equally good results. For the very small expense and labor — the modification only takes about an hour and a half — it is pretty hard to find a better method of improving the performance of these popular receivers.

One final tip: Keep the receiver gain down so the signals arriving at the second i.f. stage aren't too strong. The regeneration in this stage will build them up to normal strength. The more you depend on the regeneration for gain the better the selectivity. QST

Strays

We're told about one ham who has an "interesting" way of switching his high voltage on and off. Because all the current flows through a volt-ohmmeter, he turns his carrier on and off merely by plugging and unplugging a test lead from the v.o.m. FB, OM! This is the sort of thing that sets a fine example for beginners.

.....

Anyone want to listen to the amplifier described on page 37 of the December issue of QST? Watch for W3EFZ, who has been using it to keep 14/21/28 Mc. c.w. hot.

A Reminder

On the average, man is a 0.25-megohm, 1-watt resistor.
 At 1 milliampere, shock is perceptible.
 At 10 ma., you can't let go.
 100 ma. is generally fatal,
 and technicians are already in short supply.

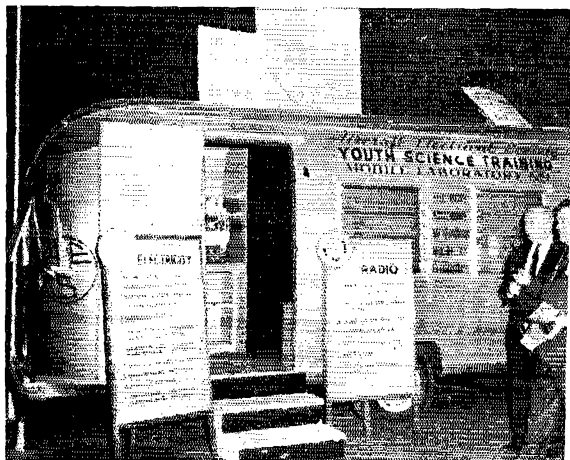
Don't make an ash of yourself!

.....

Ham shack cold? W6WFR suggests replacing your desk light with a 150- or 250-watt heat lamp — keeps you warm as toast and gives you light too.

Turning Boy Scouts into hams is one of the latest projects of California amateurs. The Aircraft Electrical Society, in an effort to spur interest in science, has purchased a Conset III for each of the 13 Explorer (high school age Boy Scouts) posts in Los Angeles. The Society has also equipped a house trailer with a modern weather station, high-powered telescope for astronomy projects, a complete radio station and an electronics laboratory and books.

Ray Meyers, W6MLZ, ARRL Southwestern Division director, left, stands by the trailer with Luther Monell, W6QGV, who is coordinating Scout activities in the amateur radio field. W6QGV is organizing a 2-meter Explorer Net. W6MLZ has sent out a call to Los Angeles area hams to act as Explorer Post advisors, teaching the boys code and theory. The AES says it will expand the project if results are good in Los Angeles.





Hints and Kinks

For the Experimenter



LAZY SUSAN FOR TOOLS

A HOLDER for hand tools can be made by drilling a series of holes in one flange of a large wire spool as shown in Fig. 1. A good source of these

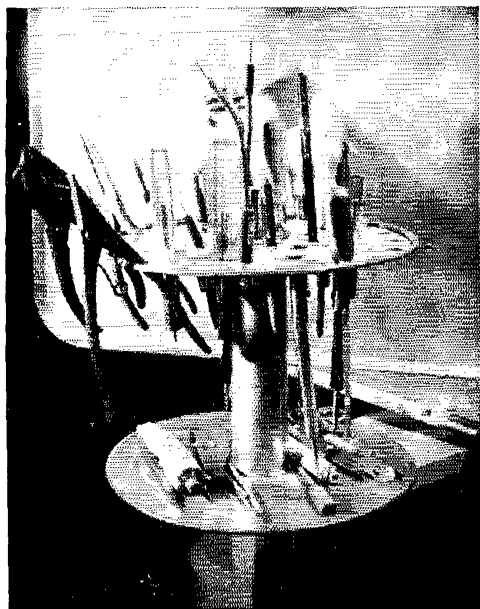


Fig. 1—W8QMI's lazy susan tool holder.

spools is a radio or TV service shop. Since screwdrivers and similar tools are apt to be top-heavy, small tubes made of tin plate can be made to support them vertically. Form the tube to a diameter to fit the hole in the spool and solder it in place. The entire holder can be picked up by the spindle and carried out for work on mobile or antenna projects.

— E. W. Koch, W8QMI

FORMULA AID

At left in Fig. 2 is a chart that can be used as an aid in determining formulas for power.

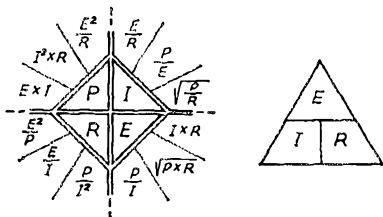


Fig. 2—Formula chart for finding power, voltage, current and resistance.

voltage, current and resistance. Each quadrant contains formulas for finding the unknown factor which is represented by the large letter in that quadrant.

The triangle at the right is an "Ohm's Law triangle." Place a finger over the unknown factor. The mathematical arrangement of the remaining figures gives the formula for finding the unknown.

— Voc Poston, K9GCE

KWS-1 HINT

AFTER receiving several TS reports while using the KWS-1 transmitter on c.w., I checked my equipment and found that the trouble was caused by the audio section of the station receiver modulating the transmitter. The condition was also responsible for erratic operation of the VOX system. Somehow, due to the interconnections between the receiver and transmitter, audio was "leaking" into the transmitter audio circuits.

To rectify the situation I modified the speech amplifier circuit of the KWS-1 as shown in Fig. 3. I disconnected the ground leads from the

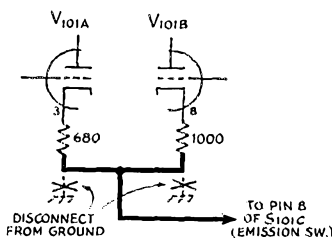


Fig. 3—Change in KWS-1 speech amplifier insures against modulation during c.w. emission.

cathode circuits of V_{101A} and V_{101B} and reconnected them to pin 8 of the EMISSION switch, S_{101C} . When the switch is positioned to c.w. the cathodes of V_{101} are disconnected from ground and thus no audio will find its way into the modulator. During a.m. or s.s.b. operation, the cathodes are automatically grounded and the stage functions normally as a speech amplifier. My thanks to Jack Chapman for his help in solving this problem.

— George Morton

APACHE ADJUSTMENTS MADE EASY

IN order to make adjustments on the clamp control, final-amplifier bias control and modulation bias control in the Apache transmitter it is necessary to remove the chassis from the cabinet—a job that requires the removal of 10 panel screws, 8 rear cabinet screws, coax fittings, etc. This chore can be eliminated simply by drilling

three holes in the Apache cabinet. The holes should be located so that adjustments can be made from outside the cabinet with the chassis fully assembled. Location of the three holes is

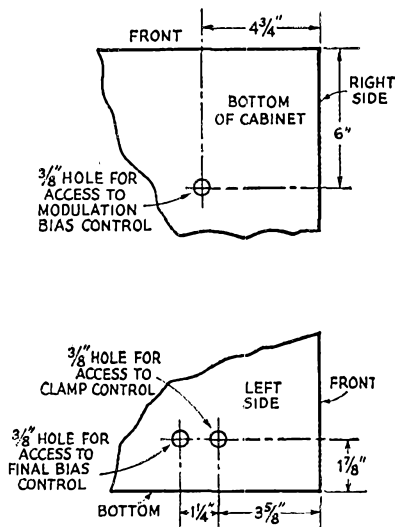


Fig. 4—Dimensions for placement of access holes.

shown in Fig. 4. If the diagram is followed exactly, the slotted shafts of the controls will line

up in the center of these access holes. The holes can be covered with snap hole plugs available from most radio supply houses. Remember, always make adjustments with an insulated tool or screwdriver.

— Peter H. Shavney, sr., W3FFR

TAKE-OFF FOR R.F. SAMPLER

ANYONE who is using a coax switch with a spare unused fitting can easily convert the device into an r.f. sampler for feeding a specimen signal into a scope for monitoring purposes. Simply connect a low-value capacitor, about 5 or 10 μmf . for medium-power transmitters, from the center conductor of the unused connector to the center conductor of the input connector. The monitoring device is then connected to the spare fitting.

— Paul Goldman, K2GKU

HOOP RULER

BEFORE the hula hoop becomes extinct, every ham should acquire one for his shack since it can be used as a measuring device for finding the dimensions of lots for that rhombic or for measuring actual antenna wire. Roll the hoop along the ground and record the number of revolutions. Merely multiply the number of revolutions by the circumference of the hoop to find the distance.

— Frank Andrews, W3ARZ

LONG ANTENNA FOR A SHORT LOT

MANY amateurs don't operate on the lower frequencies because the size of a city lot does not permit the erection of suitable antennas. The antenna described here permits operation on 80 meter even though space may be limited.

Fig. 5A shows the physical arrangement of the antenna. A wire 67 feet long extends from a pole (my pole is 25 feet high) to a connection on the antenna tuner. A second wire, also connected to the tuner, drops from the shack to a pair of stakes where it is supported a foot or so above the ground. This second wire, of some random length, is positioned directly under the top wire.

The circuit for this antenna arrangement is shown in Fig. 5B. Capacitor C_1 resonates the antenna to the desired operating frequency while the inductance L_1 acts as a loading coil to compensate for the shortage in length of the lower wire. It also provides a means of coupling the antenna system to the transmitter. For operation on 40 meters the antenna should be connected as shown in Fig. 5C. Capacitor C_1 should have a plate spacing similar to that of the plate tank capacitor in the transmitter.

— William G. Walker, W3NUG

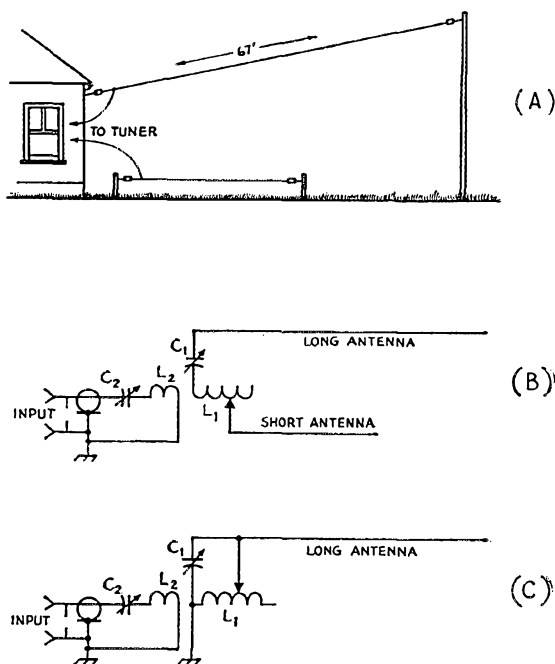


Fig. 5—A—W3NUG's low frequency antenna; B—circuit of the antenna tuner for 80 meters; C—circuit of the antenna tuner for 40 meters.

Amateur V.L.F. Observation

BY W. C. JOHNSON,* W1FGO

WITH most eyes turned these days toward the glamour of jets, rockets and satellites, speculation on space beyond the earth is growing by leaps and bounds. At the same time, to a world accustomed to electromagnetic propagation below the ionosphere, the idea of propagation *through and beyond* it is a fascinating one. Thus a paper by Storey on whistling atmospherics,¹ presented to the URSI Assembly in Australia in 1952, attracted wide attention in the scientific world — particularly that part of it in North America.

Articles appearing in the technical literature about the work done and to do in the field of whistler propagation² have served to excite the curiosity of amateurs with scientific interests. In recent months it has become quite apparent that the challenging ideas presented have inspired many an attempt to receive signals in the v.l.f. region, transmitted by this type of propagation. While much has been published on theoretical considerations, practically nothing has appeared in print that is of use to the amateur.

Equipment Requirements

Since phenomena of this type have a frequency range within the hearing of most humans, all that is absolutely essential in the way of equipment is some means of amplifying the faint signals received and changing them into sound. A wide-band audio amplifier with a gain of 130 db., a pair of phones, and 200 feet or so of No. 12 wire meets the minimum requirements nicely. As might be expected, there is a considerable gap between this minimum and what is satisfactory from a research point of view.

To receive these v.l.f. signals some kind of antenna must be used. Three general types are common: long horizontal or gently-sloping wires, from 100 yards to several miles long; verticals, from 30 to over 100 feet high; loops, from 200 turns a meter square, to the single-turn monster hanging across a Colorado canyon. All have been used in whistler research, and all are capable of detecting signals satisfactorily.

Any one antenna will, in general, be something of a compromise. Long wires have excellent pick-up, but the nasty habit of responding easily to precipitation static, man-made noise and r.f.

* Research Associate, Thayer School of Engineering, Dartmouth College, Hanover, New Hampshire.

¹ Storey, L. R. O.: An Investigation of Whistling Atmospherics, *Phil. Trans. Roy. Soc., A.*, Vol. 246, pp. 113-141, July 9, 1953.

² Morgan, M. G. and Helliwell, R. A., Atmospheric Whistlers, *Proc. IRE*, Vol. 47, No. 2, Feb. '59, pp. 200-208.

fields. Vertical whips, while easier to put up, have smaller pick-up and can be dangerous in electrical storms. Loops are relatively free of these troubles, but are extremely subject to interference from stray fields, which exist in amazing strength near civilized areas!

Since most amplifiers use either vacuum tubes or transistors, the problem of coupling the antenna to the input of the amplifier is next in order. Long wires and whips are easily coupled to the high-impedance grid circuit of a vacuum tube, but they are somewhat awkward to use with transistors. A ten-foot square loop of 100 turns or so can be coupled directly to a transistor, but is unbalanced, and usually has a resonant frequency low enough to be troublesome. A 40-foot square loop of 20 or so turns is fine, but far too heavy to put up, while a similarly-sized one of two or three turns, though easy to erect, has such low impedance that some sort of transformer is needed to match it to anything!

The IGY whistler programs at Stanford University and at Dartmouth College use triangular loop antennas about 40 feet per side. They drive a transformer of approximately 1 to 250,000 ohms step-up. This means that the distance between loop and amplifier must be small, and that the loop and transmission line be of low resistance compared with the 1-ohm primary. The Triad Transformer Corporation and Jobbins Electronic Enterprises have made transformers especially for this purpose, and it is quite possible to use a velocity microphone transformer, taking possibly a small loss in signal by so doing. To match such a loop to a transistor, a different ratio (1 to 1000 ohms, for example) would be used. At the present state of the art, special audio tubes seem to be quieter than transistors, so as far as equipment noise is concerned, it is preferable to use a low-noise audio tube such as 12AY7 for the first stage or stages. However, in many areas local noise is so high that nothing is to be gained through use of these special tubes, and high-gain audio pentodes, triodes, or even transistors are perfectly adequate.

The antenna should be placed as far from occupied houses, power lines, TV sets, etc., as possible; 100 yards at least. Since the amplifier will usually be near the antenna, it will be subject to the vagaries of weather, indicating need of a weatherproof shelter. At this point, one great disadvantage of transistors becomes important. It is difficult to design transistor circuits to have constant gain over a wide range of thermal conditions, but vacuum tubes present no problem at all. When equipment must be designed to operate

ABOUT WHISTLERS

Though the eerie radio noises discussed in this article were first discovered in Austria in 1886, and thus are among the oldest known radio phenomena, probably few amateurs have ever heard of them, much less listened for them. A report of a 6-year investigation of the phenomena was published in 1893, but this work was generally overlooked until very recently. The German scientist Barkhausen rediscovered whistlers while eavesdropping on Allied telephone conversations during World War I. He thought them something new, and gave the descending tones he heard their descriptive name.

Observation of whistlers assumed scientific importance when they were recognized as evidence of propagation of radio waves of very low frequency along the lines of flux of the earth's magnetic field. The principal source of whistlers is the electromagnetic energy radiated from lightning discharges. Though propagated as a radio wave, its frequency overlaps the audio range, and the "signal" can be heard simply by picking it up on an antenna and applying it to a headphone.

With more sensitive equipment, atmospherics (commonly called sferics) can be heard by dispersive propagation from halfway round the world. As the speed of propagation in a dispersive medium is a function of the wave frequency, a note of descending pitch is heard when the low frequencies in the sferic travel slower than the higher frequencies, and consequently arrive progressively later. It can be seen that here is a means of determining path length, and from this it was learned that whistler propagation is by a route far out in space beyond that of normal ionospheric propagation.

All manner of interesting possibilities are suggested by this hypothesis. A full discussion of whistler theory is beyond the scope of a QST presentation, but references are given for those who wish to pursue it further. Meanwhile, here is information on how to listen for whistlers. The author has been working in this field for several years at the Thayer School of Engineering at Dartmouth College, one of the centers of whistler research. The extensive program there is under the direction of Dr. M. G. Morgan, WHDA.

— Editor

at such extremes as the Equator (Huancayo, Peru) or the poles (Antarctica, Greenland), vacuum tubes offer very definite advantages in spite of their inherent inefficiency, and thus are at present standard in whistler equipment.

Getting Ready

A circuit which represents the latest thinking at Dartmouth is shown in Fig. 1. It has quite enough gain, and is fairly simple to build in a 4 × 5 × 6-inch box. Great care should be used in layout and wiring to prevent coupling from

output back to input, or oscillation will inevitably occur. When made carefully, it cannot be made to oscillate without external pickup. By using a 500-ohm balanced output, it is possible to run a long signal line back to the warmth and comfort of one's home, where the signal can be applied through a 500-to-20,000-ohm transformer to a pair of crystal headphones.

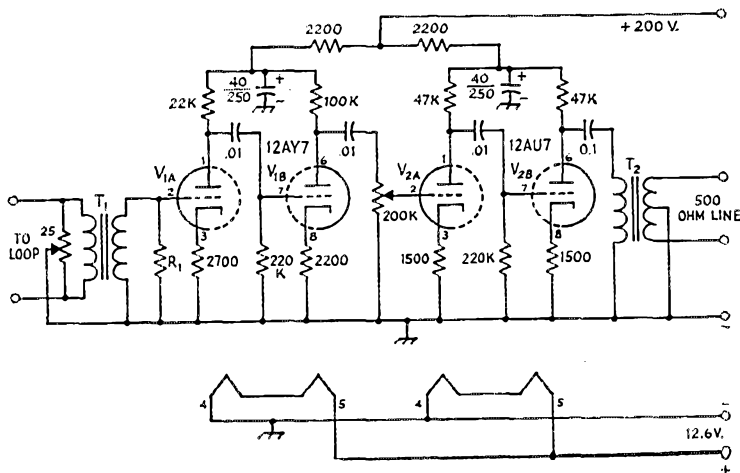
A well-filtered high-voltage source of 150 to 200 volts d.c. for the plates is needed, and 12.6 volts d.c., reasonably well filtered, is also desirable for the filaments. It is possible to use a.c.

Fig. 1—Basic amplifier for whistler reception. Capacitor values in μf .; those with polarity marked are electrolytic. Resistors 1 watt.

R_1 —Depends on T_1 , in this instance it is 270,000 ohms.

T_1 —Special input transformer, 1 to 270,000 ohms (Triad 40133).

T_2 —Output transformer, 20,000 ohms to 500-ohm line (Triad HS-50).



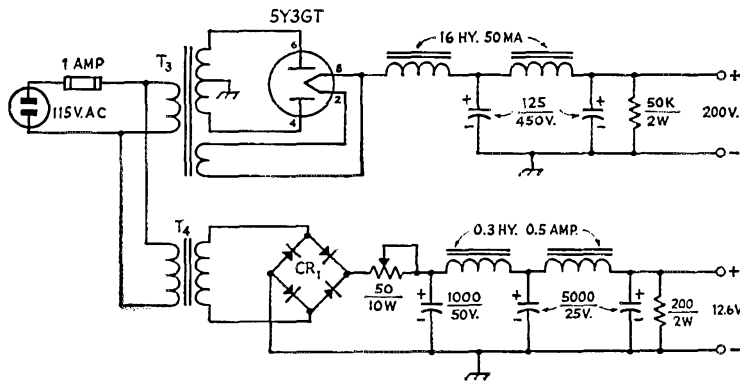


Fig. 2—D.c. supplies used with the whistler amplifier. All capacitors are electrolytic; values in μf .

CR₁—Full-wave rectifier, 36 v. a.c., 0.5 amp.
T₃—Plate transformer with 5-volt filament winding; to give 200 volts d.c. at 50 ma. through filter (Triad R-6A).

T₄—Filament transformer, 115-volt primary, 24-volt 1-amp. secondary (Triad F-40X).

on the filaments, but it is far from desirable. A typical power supply is shown in Fig. 2. When installing the power supply near the antenna, field leakage from the transformer may get into the antenna, and unnecessary hum results. Use of high-quality components and careful orientation of equipment near the antenna will keep this hum to a minimum.

The next step is to set up the antenna system, which, like that of many radio stations, is the most important element of the entire operation. For easy erection of a three-turn triangular loop, we need a 40-foot pole with a pulley on top, 80 feet of rope and 150 feet of three-conductor plastic sheathed No. 12 cable. The pole should be well removed from utility lines (especially those of 2300 volts or more) and associated transformers. Tie the rope to the middle of the 3-conductor cable and haul it to the top of the pole. Bring the two ends of the cable together at the base of the pole, and connect them so that there are three turns in series: solder left-hand white to right-hand red, and left-hand red to right-hand black. The two remaining ends, left-hand black and right-hand white, should be connected to the input transformer of the amplifier. The loop should then be pulled out into an isosceles triangle with base parallel to the ground, and for convenience, about 3 feet above it, as in Fig. 3.

Interference Problems

The great moment has now arrived! Apply power to the amplifier, put on the headphones, and await results. Except in rare cases of extraordinary good fortune, the results will be a tremendous roar of odd harmonics of the 60-cycle power lines, punctuated by the sferics of summertime static perceptible in the background. If such indeed is the case, the aid of two pairs of patient, if not necessarily willing, hands is required. Physical strength is not required, so the wife and number one child, brothers, sisters, or even the attractive girl next door will do—just any two people who can be persuaded or coerced into furthering scientific discovery for the good of society will be quite satisfactory.

Have these two assistants grasp the two lower vertices of the triangle made by the cable, and

while keeping in a plane through the pole, walk slowly about it, first in one direction, then in the other, as directed by the chief engineer, who is diligently listening while this is going on. There should be one direction where the worst of the hum disappears, if not all of it. At this point, small careful adjustment of the input balancing pot may improve things.

If no position of the loop produces a distinct minimum in hum, and if the hum consists only of the lower-order harmonics (780 cycles or less), then the installation of a high-pass or band-pass filter, designed to cut sharply just above the highest interfering harmonic, may save the day. If, as far too frequently happens, the hum has strong 60-cycle harmonics to 2 ke. and beyond, then you've just about had it—for that particular location at least. At this point, there are two courses of action: (1) move to a new location, and try again or (2) give up the whole idea!

What To Listen For, and When

Suppose for a moment that the unusual has happened and all went well: luck is with you, and hum is down enough to hear tube noise. Tie down the loop in the position for which hum is a minimum, and then listen carefully for strange noises in the audio range. You will listen hard, yes, very hard, to hear the strange noises mentioned in those exciting articles. So it might be well at this point to consider just what the expected phenomena are like.

The v.l.f. phenomena for which we are listening are broadly classified into two main groups: (1) whistlers; (2) ionosferics. Whistlers are believed to be the result of some of the electromagnetic energy released by an impulse of atmospheric electricity being propagated through the ionosphere, following a path taking it thousands of miles from the surface of the earth, and being greatly modified in character during its course. Ionosferics are believed to be the result of some electromagnetic energy, originating within or beyond the ionosphere, traveling through the ionosphere and being modified during its travels.

A whistler is most frequently not a clean-cut whistle, but rather a broad band of noise something like hiss, which descends in frequency with

time. An approximation can be made by mouth-
ing the sound "ce-you" while hissing instead of
vocalizing.

The other category, ionosferics, turns out to be
something of a catchall, and is subdivided much
further. The most common of these in occurrence
in New England stations is called *hiss* and *dawn
chorus*. Hiss is just as its name implies — a
sound like compressed air escaping through a
small vent, while the name dawn chorus was given
by the British, to whom the sound is like that of
birds before sunrise. To most Americans, the
sounds made by spring peepers are quite similar,
so the name *frog chorus* might be more descrip-
tive. There are many more sounds in the category
of ionosferics, but a description of them would
read somewhat like lurid science fiction, quite
inadequate for the uninitiated and unnecessary
for the experienced listener.

Setting up the loop was probably done on
some pleasant summer week-end morning so the
probability is very strong that nothing exciting
will be heard; that is nothing more than the
snap — crackle — pop of summertime sferics.
A session of listening to this program material
is frequently enough to cause the budding scien-
tist to go back to the peace and comfort of the
hi-fi in the living room. The more hardy, un-
daunted by the disappointing racket, may even
have courage enough left to try listening after
supper, only to find the barrage of snap — crackle
— pop not only still there, but even more over-
powering than before. Those with skilled and
toughened ears may be able to note a slight
change in the character of certain sferics after
sundown. Some sferics, through reflections from
the ionosphere, have a musical character, similar
to the sound of a bullet flying closely overhead.
Still, most probably there will be no whistlers, no
ionosferics; nothing except racket!

About this time, there may well be some mut-
tering of "fake," "gyp," etc., but let's see why.
At those stations operated by Dartmouth, it has
been observed day in and day out (or, more pre-
cisely, night in and night out), month in and
month out, that whistlers are owlish in habit,
occurring mostly at night, starting up usually
shortly before local midnight, and continuing
until after local sunrise. During the winter
months, whistler activity is quite small compared
with analogous summer months. Ionosferics, on
the other hand, show more activity in winter; less
in summer.

This is typical for east coastal North America
from Washington to the St. Lawrence. North
and south of this region, there seems to be a differ-
ent pattern, the nature of which is not as yet
fully understood.

From the incidence of whistlers at W1FGO,
it is fairly evident that in order to hear this
activity at all consistently one will either lose a
lot of sleep, become something of an owl oneself,
or adopt some means of automatic sampling via
recordings. At this point it must be obvious
that something a great deal more complicated
is required for extensive work.

Automatic Sampling and Recording

To engage in a program of systematic sampling
of these phenomena poses problems which take
the business quickly out of the hands of most
amateurs and dump it squarely into the ample
laps of the professionals. Precise timing of sam-
plings is not of prime importance for general
studies of ionosferics, but for studies of whistlers
it is of utmost importance. The equipments in use
at W1FGO and W1HDA use Western Electric
100-ke. crystal standards, driving laboratory-
built countdowns to cycle as slowly as once in
10,800 seconds.

This clock (and it is a clock, albeit somewhat
difficult to tell time by!) has operated without
need for adjustment, within 0.05 seconds of
WWV and CHU for over 50 days at a time! A
good but less precise approach is to record WWV
or CHU simultaneously with the signals received.
In this way, time is as good as could be desired,
provided only that WWV or CHU can be heard
reliably.

Apparatus as used at the Dartmouth stations
is designed to program automatically every 30,
60 or 180 minutes. At 35 minutes past each hour,
it starts up a tape recorder, applies a 1-ke. cali-
bration tone for 2 seconds (length of tone is shorter
every third hour), superimposes an 8-ke. tone on
the recording every second, and a 7.5-ke. tone
every tenth second. At the end of 110 seconds, the
signals are muted, and the recorder then records
5 seconds of blank tape, after which the program
comes to an end, to be repeated again on the
next schedule.

Should anyone wish to maintain a similar
schedule (there is now a possibility of changing the
time of recording to 50 minutes past each

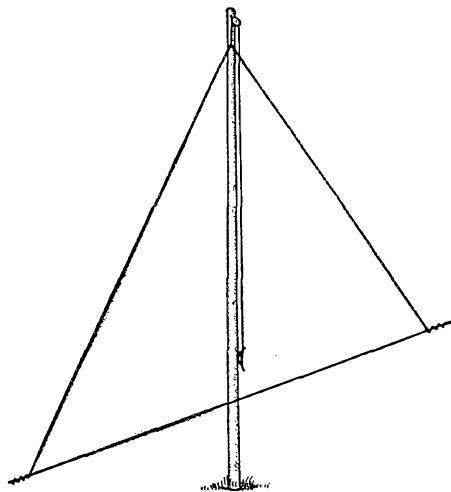


Fig. 3—Loop antenna used for whistler and other v.l.f.
reception. Three-conductor cable is connected in series to
form a 3-turn loop. Apex of the triangle is made by haul-
ing the antenna to the top of a 40-foot support on a
halyard. Loop must be oriented for minimum hum pickup in
locations near to built-up areas.

hour), I would be very glad to compare information, as regularly-recording stations are scarce on this continent, being largely confined to the coastal areas. In North America, Stanford University is operating stations at Kotzebue, Anchorage, College, Unalaska (all in Alaska), Seattle and Stanford. They are also cooperating with the CRPL station in Boulder, Colorado. Dartmouth College is currently operating stations at Frobisher Bay, Northwest Territories; Knob Lake and Mont Joli, Quebec; Dartmouth; Washington, D. C.; and Bermuda. The Canadian government has stations at Saskatoon, Ottawa, and Halifax. Information from areas not close to those mentioned would be most welcome.

A final word of warning is in order. The U. S. Navy operates several v.l.f. transmitting stations: NSS near Washington; NLK, the colossus of Jim Creek, now keyed via HF link from San Francisco under the call NPG; and NPH in Hawaii, not to mention several others operated by other nations, all on frequencies from 15 to 25 kc. It is a sad fact of tape recording that con-

siderable boost per octave is applied to material beginning at 6 kc. or so before applying to the recording head. With strong signals existing on, for example, 15.5 kc., the 20-db. and more boost given this frequency range saturates the tape, causes cross modulation with other signals, and frequently produces enough harmonics to mix efficiently with the bias frequency of the tape recorder.

Thus, in practically every installation where a tape recorder is to be used, it will be necessary to install a filter somewhere in the system to attenuate these v.l.f. signals to a point where they are harmless. At a low level they are actually beneficial, for they form a means of checking the time at which events occur at various stations.

A tape has been prepared at Dartmouth containing some samples of the phenomena heard in this area, for use in helping identify various phenomena. Until it gets to be too much of a nuisance, the author will, for the price of the postage, lend it out to groups or interested individuals. QST

Strays

D-A-N-G-E-R

"Some people have to learn the hard way," says K6AOV. "I did and I hope my experience will prevent trouble for someone else.

"In a lot of 'Safety' articles *Never wear headphones while working on equipment* is at the top of the list. I did worse than that.

"Two years ago last Field Day, I was unable to join the local club in activities. But on Sunday morning I thought I'd fire up and give them a call anyhow. I tuned up on 75 and started to call, but had no audio.

"Being short on time, I quickly went behind the transmitter and put my phones directly across the modulator output terminals which also carried 600 volts final plate voltage for the rig I was using at that time. I just wanted to make a quick check on the audio and didn't take time to get a blocking capacitor and isolate the phones.

"Fortunately the XYL was in the next room. She heard a thumping on the floor and came in to investigate. She found me on the floor, in convulsions, frothing at the mouth and not breathing. The transmitter was still keyed, the phones still on my head, the current still flowing from my skull to my legs which were against the transmitter cabinet.

"She couldn't reach the switch or power cord since the rig was in the corner and my body diagonally across in front of it. So she jumped on the bed close by, pulled the headphone cord and freed the phones. She then gave me artificial respiration, treated for shock, called the ambulance and the doctor — in rapid succession. She got my breathing started, but I remained unconscious.

"I have vague recollections of the doctor. We live 10 miles from town and I finally regained

consciousness as we neared the hospital in the ambulance. Fortunately I was unharmed except for a 2-inch burn down to my skull where the headphone band contacted my head.

"I later found what happened. I was using an old pair of phones that had terminal lugs on the cord. These fastened to insulated bolts and nuts on the outside of each headphone. One got loose, the lug on the end of the wire twisted around and touched the clamp that holds the headphone to the headband. The headband was not covered with material. So a circuit from the modulator output terminals (600 volts) through the cord, to the lugs, through the headphone band, through my skull, body and legs to the grounded transmitter cabinet was complete.

"I'm fortunate not to be a Silent Key. I was very foolish and very careless — but even with caution, voltages are like the 'unloaded gun' — DANGEROUS. Take heed — current kills!"

FEEDBACK

With reference to the 2-meter transistor transmitter-receiver described on page 49 of the February issue of QST, the oscillator transistor should also be a 2N384.

— . . . —

In the circuit shown on page 33 of January QST (McCoy, "Radioteletype Conversion from Receiver I.F.", Fig. 1) W0LQV advises that the ground connection shown going to pin 2 of V_{3B} , the discriminator tube, actually should go to pin 5 of the same tube section. Pin 2 is connected only to the secondary of T_5 .

In Fig. 2 of the same article the 10K resistor shown connected between the plus-225 volt line and Pin 1 of V_3 should be 100K. The trigger circuit is symmetrical.

The Geneva Radio Conference

BY A. L. BUDLONG,* WIBUD, AND JOHN HUNTOON,** WILVQ

ON December 21, 1959, the principal delegates of some eighty nations signed, in the names of their respective countries, a new set of regulations which will, effective May 1, 1961, govern the operation of the world's radio services. These regulations, comprising a volume more bulky than *The Radio Amateur's Handbook*, were hammered out in an intensive series of meetings held in Geneva, Switzerland, under the organization of the International Telecommunications Union, commencing August 17 and running for the full four months until the date of signing. Nearly a thousand people were involved — as official government delegates or as industry advisers to government delegations — not counting the large staff of the secretariat providing extensive translation and document duplicating services. As usual at such conferences, the amount of individual paperwork involved was simply prodigious; it was something like ARRL's log checker task for the DX Test, Field Day, and Sweepstakes Contest combined.

The results of the world conference from the amateur standpoint were briefly reported in an insert (p. 64A) in the January issue of *QST*; the new regulations make provision for continuance of every amateur assignment now available in the United States and Canada. That simple statement does not begin to suggest the problems and difficulties encountered at Geneva in preserving our domestic amateur frequency allocations. It is the purpose of this article to report for the information of all amateurs the participation in the conference, and its preparatory work, of officials of your American Radio Relay League who, as members of the United States and Canadian delegations, were the only non-government people from this hemisphere specifically present to represent the interests of the amateur radio service throughout the conference.

Atlantic City Background

The serious student of conference matters is referred at this point to a two-part article in August and September *QST*, "Geneva — 1959" by ARRL General Manager Budlong, for more complete background on the history of national and international regulation and the general procedure at world conferences. Briefly, however, the International Telecommunications Union is an organization of governments through which agreements are reached concerning radio opera-

tions (and other forms of communication such as wire telegraph). The basic agreements are accomplished at full-fledged world-wide conferences such as the one at Geneva, although in the interim between major conferences there are many smaller conferences treating problems of a particular region or a particular service. The full-scale conference previous to Geneva was held at Atlantic City in 1947, and the ACy regulations are those which have set the basic pattern in recent years.

The Atlantic City conference made rather substantial changes in the world's radio regulations, particularly in the table of frequency allocations (which is of course the amateur's primary concern). These changes were so extensive, in fact, that a considerable amount of readjustment was necessary on the part of individual governments and private radio services, especially the fixed service, to accommodate their operations to the new bands. Thus many of the ACy regulations did not come into effect until around 1952 (strictly speaking, some parts of the Atlantic City table have never been finally put into effect internationally because of the problems encountered in attempting adjustment satisfactory to all nations). Most amateurs will remember, for example, that our new 21-Mc. band and the cut in the 14-Mc. band, agreed upon at Atlantic City in 1947, actually did not become effective until mid-1952.

In the middle 1950s, a number of other nations began making representations to ITU looking toward the holding of another full-scale radio conference. These proposals were strongly opposed by the United States, in the feeling that considerably more experience with operations under the ACy regulations was necessary before another conference could intelligently appraise their utility and whether changes were desirable. However, our country was eventually outvoted, by an overwhelming majority, and in 1956 it became official that a conference would be scheduled soon, perhaps some time in 1959.

Preparatory Meetings

Our Government had no choice but to participate, of course, and, realizing the need for extensive preparations, in the autumn of 1956 called the first of a series of preparatory meetings. From that time until the conference opened last August, extensive studies were made of every aspect of the Atlantic City regulations, particularly the table of frequency allocations, to deter-

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mine whether changes were desirable from the viewpoint of the United States. Each radio service — fixed,¹ aeronautical, maritime, broadcasting, mobile,¹ amateur, etc. — was on the spot and required to justify its continued use of spectrum space. Your League was again the representative for the amateur radio service, and the eventual U. S. viewpoint became — as we have numerous times mentioned in *QST* — to seek at the international conference continuance of provisions for all current amateur assignments.

Missionary work with other countries, by both Government and industry groups, commenced promptly after the U. S. announcement of our position (toward all services, not just amateur). One Government team of experts visited a number of the countries of Europe, and another several countries of Latin America, conferring with their communications authorities to explain the U. S. position and the points which led to our decision. (The principal objective was to seek sympathetic consideration of the U. S. view of *status quo* for all services especially in the 4-27.5 Mc. portion of the spectrum.) In the amateur field, ARRL representatives also attended the IARU Region 1 meetings at Stresa, Italy, in 1956, and Bad Godesburg, Germany, in 1958, and the Mexican national amateur convention in 1958, similarly to outline the U. S. viewpoint but also particularly to urge other amateur societies to engage in preliminary negotiations with their own governments to seek favorable treatment of amateur assignments. Similar counsel appeared regularly in the twice-yearly IARU publication, the *Calendar*, issued by the League as the headquarters society of the Union.

¹ Whenever the terms "fixed" and "mobile" appear in this article, they refer to commercial and Government services, and should not be confused with amateur home or mobile stations.

Salle A of the "Batiment Electoral" was the only meeting room possessing an aura appropriate for a conference as important as the Administrative Radio Conference at Geneva. It was used primarily for Plenary Sessions and meetings of main committees.

Foreign Proposals

In mid-1959 the ITU published the first installment of a "Book of Proposals" listing all the changes proposed by various countries which had been received at that time; supplements were published as additional proposals arrived. It may be of interest at this point to summarize the proposals of other countries which sought changes (with one exception, reductions) in amateur bands, both those published in advance and those made formally at the conference itself. They represent only the formal written proposals and are not by any means an indication of the verbal support, considerable in numerous instances, on the floor of the conference itself, of these proposals by additional countries. (Refer to the chart for boundaries of Regions.)

1800-2000 kc. — India, Poland, and Russia proposed deletion of provisions for amateur sharing of this segment.

3500-4000 kc. — Argentina proposed splitting the band in our hemisphere, the lower half for amateurs, the top half for fixed and mobile. In Region III, Australia proposed only 3500-3700 for amateurs, 3700-3900 fixed and mobile. India proposed a maximum of 10 kc. for amateurs somewhere in the lower portion of the band! U.S.S.R. thought 3500-3650, still shared with fixed and mobile, would be adequate for amateurs.

7000-7300 kc. — Australia, Poland, and U.S.S.R. proposed 7000-7100 for amateurs, the rest for broadcasting exclusively (i.e., deletion of present amateur sharing of 7100-7150 outside our hemisphere). India wanted only 7000-7075 for amateurs. Austria, Belgium, France, Italy, Morocco and Netherlands proposed that western hemisphere nations conform to the agreement in the rest of the world and take the top half of the band away from our amateurs to make it avail-



able to broadcasting, with 7100-7150 also available to broadcasters sharing with hams. Ceylon, Ethiopia, Ghana, Libya, Malaya, Morocco, Pakistan and Tunisia joined in proposing 7000-7100 amateur, 7100-7300 broadcasting, *world-wide*.

14,000-14,350 kc. — Australia proposed to cut the amateur band to a 250 kc. width, and India wanted only 200 kc. for amateurs.

21,000-21,450 kc. — No changes proposed!

28,000-29,700 kc. — Belgium, France, Italy, Morocco and Netherlands proposed 28,000-29,000 for amateurs, the rest for fixed. Japan wanted to put fixed and mobile services in 29,200-29,700 kc. Australia, in a reversal of its viewpoint on some other bands, proposed to restore the band to its earlier full width of 28-30 Mc.!

50-Mc.-and-above. — No changes were proposed by nations in our hemisphere, and since these are primarily regional frequencies we won't burden this story with an outline of numerous proposals of other nations to cut back amateur frequencies in this portion of the spectrum, though we shall of course indicate the results later in this report.

Let us repeat, for clarity, that the above tabulation is of *formal, written proposals* filed by specific countries, and does not reflect amateur band-cutting sentiments expressed on occasion on the floor of the conference itself.

Toward the end of the preparatory work in the U. S., in mid-1959, the Government-industry conferences concentrated on examination of proposals of other countries and how, when they appeared inimical to our interests, they could best be combatted.

On To Geneva!

The U. S. delegation consisted of about 100 people — 30 official Government delegates, upwards of 50 industry consultants or advisers, and an office staff of about 20. It was headed by FCC Commissioner T. A. M. Craven, an old and skilled hand at international radio conferences (he was honored at Geneva with the unofficial title of "dean" of all delegates present). The Vice-Chairman was Dr. Arthur L. Lebel, Assistant Chief, Telecommunications Division, Department of State. Official Government delegates were named from the various military services, FCC, Office of Civil and Defense Mobilization, Federal Aviation Agency, Department of State, Department of Justice, National Bureau of Standards, U. S. Information Agency, and National Aeronautics and Space Administration. Consultants and advisers were in some instances also Government people, but mostly industry representatives from groups as AT&T, RCA, Mackay, Western Union, Aeronautical Radio, National Association of Broadcasters, etc. — and, of course, ARRL. Twenty-four of our delegation were hams or former amateurs.

And so, in August we all headed for Geneva.

Most of the meetings of the conferences were held at either the "Batiment Electoral" or the "Palais des Expositions." You've read sometime

or other, we suppose, about how Geneva is the international-organization center of the globe, with huge, beautiful buildings and elaborately-decorated conference rooms, and handsome furnishings for the comfort of delegates who must wrestle with the world's problems? Most ham conventions we've attended had considerably more spacious and comfortable accommodations, and any American ham club probably wouldn't have considered the "Palais" even for a second-rate hamfest (at one time there was a horse show taking place on the ground floor!). The handsome accommodations exist in Geneva, we found out, but other international conferences got there first!

Those persons attending the conference to represent amateur interests were, in addition to the authors, ARRL General Counsel Paul M. Segal (who, at his own expense, was present at the start of the conference): ARRL Canadian Division Director Alex Reid, VE2BE, a member (at League expense) of the official Canadian delegation: John Moyle, VK2JU, of the Wireless Institute of Australia, a member of the official Australian delegation; R. L. Newnham, G6NZ, Past President of the Radio Society of Great Britain and a member of the official U. K. delegation; and ARRL President Goodwin L. Dosland, W6TSN, who was present for a week in late October. Wayne Green, W2NSD, then editor of *CQ*, was present for a short period in mid-October. In addition, the Region 1 Bureau of the International Amateur Radio Union had several representatives present from time to time acting as IARU observers; they included John Claricoats, G6CL, General Secretary of RSGB; Per Anders Kinnman, SM5ZD; Otfried Luhrs, DL1KV; Harry Laett, HB9GA; Arthur Milne, G2MI; and Winn Dalmijn, PA0DD.

Conference Organization

The first week of conference meetings was occupied in purely organizational matters. Charles J. Acton (VE3AC), chief of the Canadian delegation, was named chairman of the conference; Dr. Manohar Sarwate, chief of the Indian delegation, and Juan A. Autelli (LU9DI), of the Argentine delegation, were named vice-chairmen. Gerald Gross (W3GG-HB9IA) acting secretary-general of ITU, was named conference secretary. Of course these plenary (full-scale) meetings were too large to tackle efficiently a detailed examination of each regulation, and so, in accordance with custom, a committee setup was organized as follows:

Committee 1 — Steering Committee. Consisted of the heads of delegations and dealt with overall administration and procedural problems.

Committee 2 — Credentials Committee. Examined credentials of each delegation and certified to the conference that the delegates were adequately authorized to transact conference business on behalf of their respective governments.

Committee 3 — Financial Control Committee. Kept tabs on the expenses of the conference for staff, facilities, printing, etc. — on the order of a million dollars.



VE3ATU's camera caught this group of hams at "Salle X," a popular gathering place during coffee breaks. L. to r., W1LVQ, ARRL Asst. General Manager; G6NZ, Past President, Radio Society of Great Britain; W0TSN, ARRL President; VK2JU, representing the Wireless Institute of Australia; W1BUD, ARRL General Manager.

Committee 4 — Frequency Allocation Committee. Dealt with the table of frequency allocations.

Committee 5 — Frequency Registration Procedure and International Frequency List Committee. Many stations in the fixed, aeronautical, broadcasting, maritime, etc., services must each obtain a frequency clearance from the International Frequency Registration Board, and this committee dealt with such matters.

Committee 6 — Technical Committee. Dealt with matters such as definitions, types of emission, bandwidths, etc.

Committee 7 — Operations Committee. Dealt with general operating matters such as calling and answering procedures, distress signals, etc.

Committee 8 — Drafting Committee. Had the job of editing, final translating, and integrating the decisions and reports of other groups into the final documents prior to signing.

At initial meetings of these groups, there were further breakdowns into subcommittees and later they, in turn, formed smaller working groups as necessary to tackle specialized problems (following the procedure outlined in the "Geneva 1959" article in September *QST*). In this report we shall treat primarily the activities of Committee 4 — Frequency Allocations, and its sub-groups.

U. S. Teams

The U. S. Delegation was organized along similar lines — a "team" for each committee. Most of the League's interest, and therefore effort, was in Team 4, headed by Albert L. McIntosh (W3ZM), until recently Chief of the Frequency Allocations and Treaty Division, FCC; now Frequency Manager, Department of the Army, and one of the outstanding veterans of radio conferences. Of the 26 regular participants in this team, incidentally, 12 were hams.

A meeting of the entire U. S. delegation was held each Monday at 8 A.M. At the same time subsequent mornings each week, individual

teams met for progress reports on accomplishments of subcommittees working groups at the conference the previous day or two, and to agree on the best approach for handling such problems as arose.

We should like to point out here that the designation "team" was more than name only; our group did indeed operate and cooperate as a real team, under the very capable quarterbacking of W3ZM, and there was but one common objective regardless of which particular Government or industry special interest each represented — to obtain international agreement, insofar as possible, on the U. S. proposals for the spectrum. When, as happened more often than we would have liked, a particular amateur band was in a hot spot under attack by other governments (and therefore in conflict with U. S. views), the entire team — Government and industry members alike — pitched in to do missionary work for the amateur. And when another service was being pinched, the team similarly went to work on that problem.

But back to Committee 4 of the conference. It soon organized itself, in the customary manner, by forming subcommittees or "working groups." The breakdown was by portions of the spectrum, as follows:

4-B 10-4000 kc.

4-C 4-27.5 Mc.

4-D 27.5-960 Mc.

4-E 960-10,000 Mc.

4-G 10,000-40,000 Mc. (or, in parlance the conference subsequently chose, 10-40 Gigacycles or Gc/s!)

In case you're worrying about missing letter designations, don't; they were specialized groups on general allocations problems and language. For example, one, 4-F, was devoted entirely to the style and number of footnotes to the allocations table, and its activity is a story in itself but much too long to be covered here.

The Broadcasting Threat

Before these working groups were turned loose, however, initial steps were taken on what was perhaps the most serious — and therefore the most important — problem we in allocations had to face during the entire conference: the desire of numerous countries to expand the bands available for high-frequency broadcasting. The U. S. was opposed to any such expansion. We also felt strongly that because it was an important and fundamental problem, it ought not to be parceled out in segments to each spectrum group but ought to be discussed and settled only in main Committee 4 — i.e., at high level. This turned out to be quite a battle. Initially, it was agreed, however reluctantly by other countries, that individual working groups could temporarily proceed on problems where h.f. broadcasting was not involved; meanwhile, a special *ad hoc* group consisting of representatives of only four countries was formed to study the h.c. matter and report back to Committee 4. The countries were U.S. S.R. (representing those in favor of more broad-

casting), U. S. (representing the diametrically opposing view), Ethiopia (representing the problems of "new and developing countries" who felt they had an insufficient share of present broadcasting space and wanted an expansion of allocations to solve that problem) and the Netherlands (generally representing the view that the solution was not to be found in an expansion of allocations but a review of usage of present bands aimed at greater efficiency in the employment of broadcasting frequencies). This tiny group held intensive, daily meetings for two weeks, all in secrecy. The amateur bands at 7 and 14 Mc. were vitally involved in the discussion because several foreign governments had, as we outlined earlier, proposed cuts in these ham bands — for the purpose of broadcasting expansion. Although not the only service in peril, ham bands were on the chopping block to an especially high degree during those vital two weeks, and we on Team 4 heaved a sigh of partial relief when the extensive report of that group appeared with no change proposed in this hemisphere and agreement only (so far as amateurs are concerned) to delete amateur sharing, in parts of the world other than this hemisphere, of the 7100–7150 kc. portion and make it available exclusively to broadcasting. The U. S. accomplishments in this *ad hoc* group are but one of many tributes we owe to the skill of our spokesman: again, W3ZM. We regret only that amateur radio in other parts of the world was not sufficiently strong to avert this further inroad by broadcasting. The report caused a considerable furor in Committee 4, the pertinent aspects of which we'll cover in subsequent discussion. For the moment, suffice it to say that Committee 4 finally agreed, after a few knock-down, drag-out sessions, to keep to itself all broadcasting problems and farm out to working groups only those matters not concerning with broadcasting allocations.

And there were plenty of those. Working Group 4-D alone, for example, eventually had ten official and three or four other informal special subgroups, all to handle separate problems. All in all, there were something like 80 individually designated such groups of the conference, and keeping daily track of them, their agenda and their meeting times and places was almost a job in itself.

Conference Procedures

Perhaps it would be useful at this point to describe briefly the physical setup at the working group meetings. At a head table sat the chairman, elected by the group at its first meeting; a representative of the International Frequency Registration Board; and a *rapporteur* selected by the chairman to keep notes of what transpired. At one side of the room was a series of booths in which were the translators and control operator. The delegates and advisers sat at long tables, in individual positions with a headset and control box to select a particular language, and a microphone switched on by the control operator when

a particular delegate was to speak. If the chairman (or an individual delegate taking the floor) spoke in English, skilled translators, "copying behind," converted the remarks into French, Spanish and Russian, each on a separate wire channel. Obviously, there had to be translators sufficient to convert each of the four languages into each of the other three. On the other hand, when the Russian spoke, one interpreter translated to English, and the others converted the English to Spanish and French! It was quite an operation, especially when so much technical terminology was involved.

The agenda for each meeting was printed and distributed as a document in advance. In the U. S. teams, depending upon the subjects involved, one or more industry or other Government advisers were present along with the team spokesman, sitting at his elbow or across the table, to permit quick consultations as the discussions proceeded. When amateur matters were on the agenda, of course, a League representative sat with our spokesman for that purpose.

A typical day at the conference for League representatives went something like this:

7:00 A.M. — plus or minus — up, dress, breakfast, check over documents for the morning's business.

8:00 A.M. — attend a Team 4 meeting at U. S. delegation headquarters (immediately adjacent to our hotel).

8:50 A.M. — grab a taxi to the "Batiment Electoral," frequently after a minor language difficulty with the driver.

9:00 A.M. — attend whichever of numerous conference meetings was the most important from the amateur standpoint.

10:30 A.M. — coffee break; pick up the previous day's output of mimeographed documents in our individual pigeonholes and examine them initially. Informal chats with other delegates.

11:00 A.M. — back to the conference meeting.

12:30 P.M. — morning meetings end; return to the hotel; sort out and study more documents for the afternoon meetings.

1:00 P.M. — luncheon.

2:30 P.M. — taxi again to the Batiment (or the Palais). Buttonhole foreign delegates on current problems.

3:00 P.M. — afternoon meetings begin.

4:30 P.M. — coffee break, again time for private talks with our own or other delegates.

5:00 P.M. — back to work at the conference meeting.

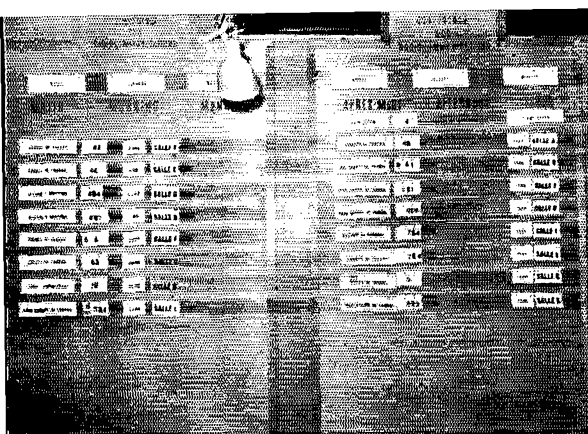
6:30 P.M. — conference meetings end for the day. Study bulletin board for next day's meetings, then back to the hotel.

7:30 P.M. — dinner (if you eat in less than two hours, the Swiss are hurt, feeling you aren't enjoying your meals!).

9:30 P.M. — back to hotel room for more careful study of documents, sorting out in preparation for next day's meeting. Pray for Saturday to come soon so we can catch up the backlog of paperwork. Eventually, to bed. (In the final weeks of the conference we ceased looking forward to Saturdays, for in an effort to finish by the mid-December deadline additional meetings were held not only in the evenings but also on week ends.)

The Results

Let us now outline, band by band, developments at the conference affecting amateur allocations. We shall need to be brief and cover only the highlights, but in some instances a matter which we shall dispose of in one sentence actually occupied weeks of intensive work at the conference with perhaps the entire U. S. Team 4 pitching in to help, more often than not after hours or in between formal meetings.



1800-2000 kc. The Atlantic City allocation for this band is shared between amateur, fixed, mobile and radionavigation in Regions II and III; no allocation in Region I but a footnote provision for amateur operation in certain countries, 10 watt limit. The new Geneva allocation makes no substantive change except in Region I, where happily several other countries — Czechoslovakia, Denmark, Finland, Germany and Nyasaland — joined in the footnote (No. 145; see text in the allocations summary). Continuance of the Region I footnote was in jeopardy for a while, however, when Denmark (even though she joined in the footnote later!), Italy and Sweden, in particular, expressed themselves as opposed to amateur use of this band, mostly out of concern over the possibility of interference to other services. Members of the IARU Region I observer team were especially helpful in furnishing ammunition for rebutting statements of several countries that amateur interference had been a problem. The language of the note was amended slightly to provide for closer liaison between Region I countries permitting amateur use, and in this form went through higher committees, along with the unchanged amateur-sharing allocation in other regions, with no subsequent great difficulty.

3500-4000 kc. Under present ACy regulations, this band is shared between amateur, fixed and mobile services for its full width in Region II, for 3500-3800 in Region I, and 3500-3900 in Region III. It is up to each national administration to decide how the frequencies are to be assigned to each service. Only in Canada and the United States do amateurs have exclusive use of the full 500 kc.

In Committee 4, a brief discussion took place on this band before sending it to a working group for study. Mostly this consisted of a formal introduction of written proposals by the country concerned as we outlined earlier. For example, U.S.S.R. offered its proposal to make the band 3500-3650, saying that its fixed service needs the rest exclusively. Argentina presented its proposal to split the band in Region II, the lower half for amateurs, the top for fixed and mobile; this was supported by Brazil and Paraguay, all pointing out that this arrangement already exists in southern South America through an area agreement.

The conference bulletin board contained each day's schedule of meetings of various committees and working groups. On this typical day there were eight meetings (each treating a different subject) in the morning, eight more in the afternoon. It was necessary to know the terms of reference of each, their status of progress, and whether or not the current meeting was considering matters affecting amateurs.

In Region III, the Philippines offered its domestic allocation of 3500-3600 for amateurs, 3600-3900 fixed and mobile, as a compromise between Australia's wish of 200 kc. for amateurs and India's proposal for only 10 kc. Indonesia supported India. Pakistan preferred the present basic sharing arrangement, arguing that exclusive allocations to each service might result in unequal band loading. Shortly, the Committee decided to refer the matter to Working Group 4-B.

In this group the U. S. spokesman was Joe Stewart, Radio Engineer, Coast Guard, and, on occasions when the amateur band was under discussion, ably assisted by A. Prose Walker (W4CXA), a former FCC engineer and now Manager of Engineering, National Association of Broadcasters (the domestic kind, we hasten to say, and not international!). Initial discussion concerning the 80-meter amateur band was largely a repetition of the discussion in main Committee 4, although somewhat more detailed, and it was soon decided to set up another special subgroup for further study of this band along with all other allocations between 2850 and 4000 kc. It was designated 4B6, and it was in this group's series of meetings where the actual allocation was eventually formulated, though of course it had to be approved by each successive higher committee.

In Group 4B6, most countries of Region I expressed themselves in favor of the *status quo*. In some instances this did not result from a pro-amateur feeling, but rather came from opposition to the U.S.S.R. proposal to set 3500-3650 kc. aside exclusively for amateurs; Italy, for example, did not want *any* portion of the band for amateurs on an *exclusive* basis. Russia, supported by the Iron Curtain countries, eventually agreed to maintaining the present allocation on a shared basis, and said she would ask for a separate footnote showing 3500-3650 for her amateurs (though this aspect was subsequently dropped). Prior to the Region I discussion, a letter from Otfried Luhrs, DL1KV, representing European IARU societies, was read to the assembly; it of course sought support for the continuance of the current allocation.

In Region II (our hemisphere), the principal subject of discussion was Argentina's proposal to

split the band as 3500-3750 for amateurs, 3750-4000 for fixed and mobile. This was supported by a number of South American countries because, as mentioned earlier, they already had agreed among themselves to such an allocation in their portion of the hemisphere. Between formal meetings, a number of private consultations took place between such delegates as LU9DL and LU3AF on the one hand, and W3ZM, W4CXA and W1BUD on the other, in attempts to reach agreement. With a particularly keen understanding of the problems which adoption of this proposal would cause for Canada and the United States, the Argentine representatives graciously agreed to let the present allocation stand but to add a footnote to call attention to the split-band allocation existing in southern South America. (To complete the Region II discussion of the 80-meter band at this point, we can say that after a number of additional informal conversations with the Argentines they agreed, when the subject was up for examination in higher committees, to drop the footnote and let the present basic allocation stand.)

In Region III there was somewhat of a tangle. Australia wanted to split the band (only 3500-3900 in that region) between amateurs and other services. New Zealand, an outstanding supporter of the amateur radio service throughout the conference, argued strongly for *status quo*. Several countries supported that view — because, as in Europe, they were opposed to any exclusive amateur allocation. Australia eventually agreed to accept a footnote splitting the band in her country, and India took a footnote for the 10-ke. band it wanted for amateurs at 3890-3900!

In this form the 80-meter allocation, so far as amateurs are concerned, went through higher committees as recommended by the working group and eventually was adopted by the Plenary session.

7000-7300 kc. This band is currently all amateur in our Region II; in other regions, the lower 100 kc. is exclusively amateur, 7100-7150 is shared between amateur and broadcasting, and the top half is all broadcasting. Maintaining the present allocation in Region II was perhaps our toughest job of the entire conference. Many countries not only wanted to delete amateurs from the 50-ke. shared segment but to force upon us in Region II their own allocation so it would be worldwide; in other words, they wanted North and South American nations to limit our amateurs to 7000-7100 kc. just as they do! The pressure came, of course, from a desire for more broadcasting frequencies. A principal problem was to satisfy the stated needs of many "new and developing" countries such as Burma, Ghana, Jordan and the United Arab Republic, who felt they did not have a fair share of broadcasting channels (because other nations registered their needs first and had priority). As we mentioned earlier, an *ad hoc* group of Committee 4 was appointed to study the possibility of expanding broadcasting frequencies and after two weeks of intensive sessions issued a report which, although

hardly settling the broadcasting matter, did bring the basic questions fully into focus; it also made one specific recommendation for a modest expansion in broadcasting allocations by deleting the amateur service from the present 7100-7150 kc. shared segment in Regions I and III. The specific language of the recommendation was as follows:

ANNEX 1

Band: 7,000-7,300 kc/s

The Ad Hoc Group carefully considered the proposals for the modifications of allocations to the bands in the frequencies 7,000 kc/s to 7,300 kc/s, and observed:

1) that the sharing of the frequency bands between amateur, fixed and broadcasting services is undesirable and should be avoided;

2) that while it is desirable to have a World-wide allocation in these frequencies, it was not found possible within the Ad Hoc Group to attain such an agreement for the band 7,100 to 7,300 kc/s;

3) that a general agreement would best be obtained therefore, through allocations as follows:

- a) World-wide: 7,000 to 7,100 kc/s for Amateur Service
- b) Regions 1 and 3: 7,100 to 7,300 kc/s for Broadcasting Service
- c) Region 2: 7,100 to 7,300 kc/s for the Amateur Service.

4) that a Resolution should be drawn up emphasizing:

- a) that the band 7,000 to 7,100 kc/s is allocated on a World-wide basis exclusively to the Amateur Service and therefore that the Broadcasting Service should be prohibited from this band, and broadcasting stations operating on frequencies in this band should cease such operations;
- b) that inter-regional Amateur contacts should be only in the band 7,000-7,100 kc/s and that the Broadcasting Service in the band 7,100 kc/s to 7,300 kc/s, in Regions 1 and 3, should make similar efforts so as not to interfere with the Amateur Service in Region 2; such being consistent with the provisions of No. 90 of the Radio Regulations.

This would improve the allocations available to Broadcasting in Regions 1 and 3 in the band 7,100 to 7,150 kc/s, and would at the same time improve the situation resulting from the different allocations within the regions. It would make available to the Amateur Service exclusively, on a World-wide basis, without infringements, the band 7,000 to 7,100 kc/s, therein resulting in an improvement of its allocation.

The report itself indicated that the Netherlands and U. S. A. were in agreement that the solution to the broadcasting problem lay not in an expansion of the bands but in a study of present usage to achieve more efficiency, and that in any event Committee 4 could take no action without knowing in exact detail what the requirements were; the view of U.S.S.R. was to expand the broadcast bands, mostly at the expense of the fixed service. Committee 4 discussed the report at a meeting which was supposed to complete the job on a Thursday morning, but was continued that afternoon by cancelling other meetings, and reconvened in extraordinary session on Saturday in an attempt to settle the matter. The main questions were (1) should broadcasting allocations be expanded and (2) should this question be referred to working groups or settled in full Committee 4? Our 7-Mc. band was caught in the middle, being the only specific frequency allocation mentioned in the report. A majority of countries concerned supported the reallocation of 7100-7150 kc. exclusively to broadcasting in Regions I and III

though several, notably New Zealand and South Africa, did so reluctantly because of the adverse effect on amateurs, and support was often conditional on the subsequent adoption of a resolution, such as proposed in the report, to protect amateurs in their 7000-7100 segment. Among others, India, Ceylon, Cuba and Pakistan were outspoken in their wish to make the allocation worldwide — i.e., force North and South America to permit broadcasting in the top portion of 7000-7300. Ceylon, Ethiopia, Ghana, Libya, Malaya, Morocco, Pakistan, and Tunisia joined in proposing 7100-7300 for broadcasting, also worldwide! India kept pounding on its written proposal to make the amateur band a maximum of 75 kc. in Regions I and III, but after considerable maneuvering this proposal was rejected by a vote of 12 to 35. The allocation of 7 Mc. as proposed in the report was then adopted by Committee 4 — i.e., status quo in Region II, amateurs eliminated from the 7100-7150 kc. shared band in other regions.

There remained the overall question of broadcasting allocations, but the Saturday meeting adjourned, in some considerable confusion, without settling the matter. Continuing on Monday, the Committee engaged in the somewhat extraordinary procedure of taking a secret ballot on which group would handle broadcast questions; by the close vote of 32 to 24 it was finally agreed to keep all 4-27.5 Mc. broadcasting questions in full Committee 4. Meanwhile, Committee 5, dealing with frequency lists and station registration, was asked to examine the question and determine whether the problem might not be solved by revising the channel assignments rather than reallocation of frequencies.

The agreement on our 7-Mc. band, then, was still subject to an overall decision on broadcasting allocations, which we shall report on later in this discussion.

14,000-14,350 kc. This band, amateur worldwide except for a portion used for the fixed service in U.S.S.R., came under study by Working Group 4-C, on which the U. S. spokesman was again W3ZM. This group promptly organized itself into smaller study groups, and one designated 4C2 tackled amateur bands in the 4-27.5 Mc. portion of the spectrum. However, the two proposals to cut the 14-Mc. band, from Australia and India, were predicated on an expansion of broadcasting frequencies so no discussion was permitted in this group nor in parent group 4-C, all such questions having been reserved to full Committee 4. Eventually, Australia withdrew its proposal, in large measure due to the efforts of John Moyle, VK2JU, representing the Wireless Institute of Australia as a member of the Aussie delegation. There was little support for India's proposal and, when it was later decided (as we shall detail subsequently) not to expand the broadcast bands, the 14 Mc. band remained unaltered.

21,000-21,450 kc. This band, currently exclusively amateur worldwide, was never under any serious threat. The United Kingdom wanted

the lowest 10 kc. set aside for space communications, as part of a telemetering system tying in with some 20-Mc. frequencies already in use. However, there was considerable opposition, led by the U. S. A., even to a U.K. compromise which sought only 2 kc. out of the amateur band, and the matter was eventually dropped.

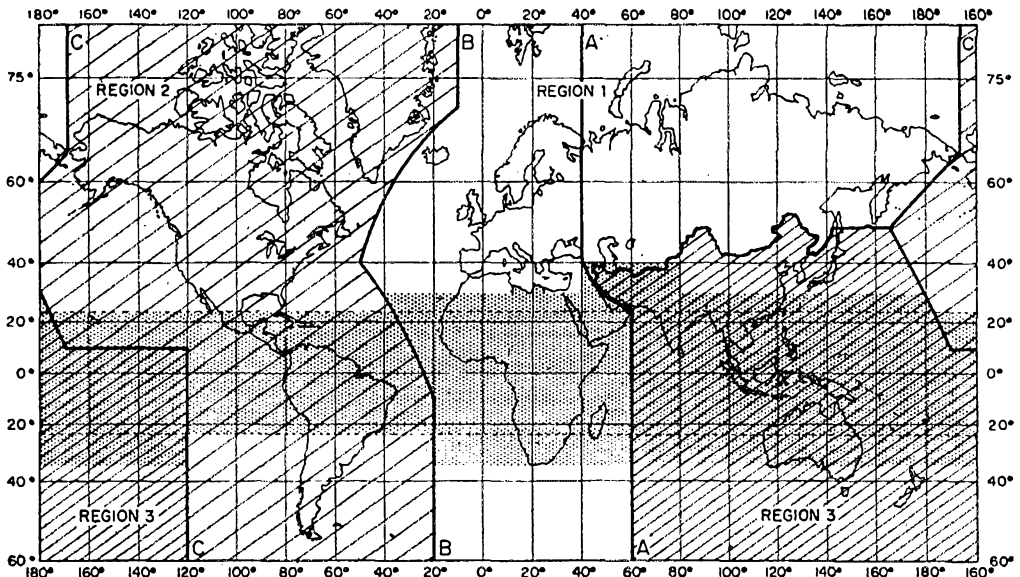
27-Mc. There is no longer an amateur band in the U. S. at this point in the spectrum, but a footnote to the present world allocation table makes provision for individual administrations in Region 2, plus Australia, New Zealand, South and Southwest Africa, to assign 26,960-27,230 kc. to amateurs. A similar footnote was continued in the Geneva table, on a permissive basis, though South and Southwest Africa deleted their names.

28,000-29,700 kc. To us, one of the prettiest things in the entire Geneva allocations table is the clean and simple entry of AMATEUR against this band. Despite combined efforts of the U. S. team, for many weeks it seemed that, even if we could maintain the amateur band in its full width, we would end up with at least a series of footnotes authorizing fixed and mobile operations in the top portion of the band in Belgium, France, Indonesia, Italy, Japan, Portugal and Switzerland. The final allocation resulted from extensive private negotiations between meetings of the conference, treating a problem which from the standpoint of jeopardy to the amateur service for the portion indicated was perhaps second only to the 7-Mc. battle.

Working Group 4-D, handling 27.5-960 Mc., had jurisdiction over our 10-meter band, and our very capable spokesman was Lt. Colonel Earl Holliman (W5EUE). Since the group tackled its problems in order of frequency, we quickly reached 28 Mc. — but under somewhat of a handicap because there was quite a tangle over 27.5-28-Mc. and the problem spilled over into our band. U. K., U. S. A., Canada, Argentina, Cuba, Brazil, New Zealand, and China sought to maintain the present band. But Yugoslavia suggested that the group examine 27.5-29.7 Mc. as a package, so that suitable meteorological aids and space service frequencies could be obtained in 27.5-28, and that the fixed service operations thus displaced from that segment could be accommodated by giving them a chunk of our 10-meter band; Sweden, Germany, South Africa concurred. France argued that 1700 kc. was too much for amateurs, and was quickly supported by Belgium, Portugal and the Netherlands. So we had quite a problem on our hands.

The Chairman put off discussion until a subsequent meeting, where the jockeying continued. Certainly a majority, however bare, of participants wanted to maintain the amateur band, but no agreement could be reached on a satisfactory allocation of the adjacent 27.5-28 Mc. Finally a separate study group, designated 4-D1, was appointed to examine the 27.5-29.7 portion of the spectrum as a package.

For some successive weeks, "Four-D-one" was unable to reach agreement, the problem being mostly meteorological aids, and the principal



The radio regulations divide the world into these three areas for regional allocations, mostly used for frequencies below 4 or above 30 Mc. which are normally limited in range. (The shaded area near the equator is a special zone for tropical broadcasting operations.)

stumbling block being Finland. This country apparently has a substantial industry turning out weather-soundings radio transmitters, which at one time were produced in the U. S. as "radio-sondes" and operated just below 28 Mc.; but twenty years ago, because of inherent instability in the frequency design, we decided the spectrum at that frequency was too valuable to use for such a wide-band (200 kc. and more) operation and so moved "met" aids up to around 400 Mc. Finland and supporters (principally Sweden) argued that equipment for this higher band was too expensive to produce and the lower-frequency allocation was needed. They also thought 1400 kc. would be plenty large for amateurs. Partially with the objective of keeping the 27.5-28 Mc. problem from getting completely out of hand -- i.e., from causing a reduction of the amateur band -- the U. S. A. withdrew a proposal it had made for a small band of 50-ke. for space communications purposes just below 28 Mc. (As a result of this kind of action, and additional strong amateur support by such countries as Canada, U. K., and Australia, the "met" aids problem was eventually settled without invading amateur frequencies.)

Meanwhile, at the other end of our band there was considerable pressure to lop off a hunk for fixed and mobile. On this and the met aids subject, the series of meetings continued; several times it appeared that agreement was reached, with our band untouched by "met" aids but with footnotes authorizing operation of fixed and mobile stations (outside this hemisphere). The U. S. A. had no choice, at that point, but to accept the apparent agreement as the best compromise which could be obtained for amateurs.

Yet at the very next meeting of the group, when the agreement was presented in writing as a document, Finland would take off like a radio-sonde (!) on the subject of met aids and round and round we'd go once again. Finally, about mid-point in the conference, the small group did complete its report, which again kept "met" aids out of our hand but included footnotes for certain fixed and mobile operations in Belgium, France, Italy, Portugal, Switzerland, Indonesia and Japan.

Outside of regular meetings, members of the U. S. team continued discussions with delegates from countries wanting fixed and mobile in further attempts to get them to delete the footnote provisions. It was only in the final moments of the conference that France announced it would permit deletion of its name from the footnote, and other countries involved immediately followed suit.

50-54 Mc. This band is now exclusively amateur in Regions II and III; no allocation generally to amateurs in Region I, but South and Southwest Africa, and the Rhodesias, have a footnote for exclusive amateur use in those countries. The allocation in Region I was unchanged at Geneva except that Belgian Congo, Ruanda Urundi and Nyasaland added their names to the footnote list of countries authorizing amateurs in 50-54 Mc. In Region II the band was never in any great difficulty, because of universal agreement among the nations of this hemisphere to continue it unchanged. Region III turned out to be a problem, despite the wish of China, Japan and Korea, in particular, to maintain the amateur allocation; other countries wanted to divert all or parts of 50-54 Mc. for

non-amateur services. Another special sub-group was formed to deal with the problems of Region III in this portion of the spectrum; the eventual conference agreement on 50-54 Mc. was to retain the major allocation to the amateur service, but footnotes (178f, g, h, i) provide other services in all or parts of the band in certain countries.

France and U.S.S.R. dropped their Atlantic City footnote authorizing amateurs to use 72-72.8 Mc.

144-148 Mc. The present allocation is 144-146 Mc. worldwide amateur, 146-148 additionally available in Regions II and III. At Geneva the allocation was continued, except that China, India and Japan will have fixed and mobile services also in the top half, and after mid-1963 Australia will shift its amateurs to 148-150 Mc. Once again the integrity of the amateur band was maintained in Region II. This was not accomplished without some difficulty. Sweden, which for some undetermined reason seemed to consider amateur bands as the place to put *any* overflow from other services, ran true to form in this case and wanted a chunk of our 144-meg. band for radioastronomy, but this proposal was eventually knocked down.

220-225 Mc. This band is amateur only in Region II, plus China, South and Southwest Africa, and the Rhodesias. The Region II allocation was amended, in accordance with the U. S. proposals, to add the radiolocation service (previously named "radiopositioning" in U. S. preparatory work). China and the Africas have dropped amateurs from this band; Rhodesia continues its provisions, and Nyasaland is newly added to the footnote (205).

420-450 Mc. This band is currently shared on a worldwide basis between amateur and aeronautical navigation (in Region II, limited to altimeters). Regions II and III at Geneva set up the band shared between radiolocation (priority) and amateur, as proposed by the U. S., except Australia and Indonesia have footnote provisions for other services as well. But Region I whacked up the band pretty thoroughly — though the basic allocation of amateur shared with radiolocation in only 430-440 Mc. will probably not work any practical hardship on European amateurs. See footnotes in the 211 series for variations from the basic allocation, including an industrial, scientific and medical spot frequency.

In the Region I hassle, there was at one time considerable sentiment in favor of the proposal by Netherlands and Switzerland, among others, for only 432-438 Mc. Sweden disliked the tentatively-agreed assignment for space communications and meteorological aids in the vicinity of 400 Mc., regularly kept proposing that these services be accommodated in the amateur band. Fortunately, these matters were eventually rejected by study group 4-D9, the special committee set up to examine 420-450 Mc.

1215-Mc. and-up. Since there was practically no change made at Geneva in amateur frequencies available in this hemisphere, we

won't continue a detailed summary of events but instead refer you to the excerpts from the new table of frequency allocations adjoining this article. The associated footnotes also indicate where various countries in other regions will be using these bands for alternative or additional services. The only changes for amateurs in Region II are (1) the addition of radiolocation as a primary service, in conformity with the U. S. domestic allocation and conference proposal, and (2) maintenance of the 3300-3500 Mc. allocation instead of 3500-3700 as proposed by the U. S. (we expect to be moved back to the 3300 spot on or before May, 1961, when the new international regulations become effective). To make this record complete, we should like to acknowledge the fine work of U. S. allocations spokesmen for this particular portion of the spectrum: USAF Major James E. Ogle (W4VVA) for Working Group 4-E, which dealt with 960-10,000 Mc.; and USMC Lt. Colonel Elmer Daniels for Working Group 4-G, which dealt with 10,000-40,000 Mc. Incidentally, the chairman of 4-G was FCC engineer Saul Myers (K4IWL).

The Final Battle

Most of the allocations decisions we have outlined in our band-by-band discussion were made initially at lower-level working groups, and had to receive the stamp of approval by parent committees. This endorsement was generally forthcoming without too many complications, except for the 4-27.5 Mc. portion of the spectrum. You will recall that Committee 4 had retained that segment under its own jurisdiction (except for non-broadcasting matters, which were few), and had asked Committee 5 to examine the question of broadcasting expansion. Committee 5 had frequency registration and station assignment problems under its wing. For example, Committee 5 had to determine whether the broadcasting requirements of various nations could be satisfied within the bands currently allocated to that service, perhaps by more intensive time-geographical sharing of frequencies, or by reduction of individual nation's requirements, or by other means. If Committee 5's answer came out yes, that would largely settle the matter. If Committee 5's answer were no, then Committee 4 would have to tackle the overall question as a major item of business — in effect reopening the entire spectrum between 4-27.5 Mc. for reconsideration.

The U.S. view was that there was no call for the conference to make changes in the allocation of spectrum space for h.f. broadcasting. This view was embodied in an appropriate resolution, whose presentation to C-5 and its subsequent masterly negotiation within that committee was the work of the U.S. spokesman Captain Paul D. Miles, Executive Secretary of the Interdepartment Radio Advisory Committee, OCDM, and an old and skilled hand in conference matters (he was U.S. spokesman on allocations matters at the

(Continued on page 170)

Geneva Amateur Allocations Summary

This is a summary of amateur entries in the Table of Frequency Allocations adopted by the Ordinary Administrative Radio Conference, Geneva, 1959. It contains excerpts from the table which relate only to amateur assignments and omits numerous footnotes, etc., concerned with other services. See the map illustration (p. 63) for regional boundaries. In this table, a radio service entry in small capital letters indicates the primary service; an entry in italics indicates a secondary (non-priority) service. The numeral indices following many service allocations refer to footnotes affecting the amateur service, and their texts appear below.

145 In Austria, Denmark, Finland, Ireland, Netherlands, F. R. of Germany, Rhodesia and Nyasaland, United Kingdom, Switzerland, Czechoslovakia, and the Union of South Africa and Territory of South West Africa, administrations may allocate up to 200 kc/s to their amateur service within the band 1715-2000 kc/s. However, when allocating bands within this range to their amateur service, administrations shall, after prior consultation with administrations of neighboring countries, take such steps as may be necessary to prevent harmful interference from their amateur service to the fixed and mobile services of other countries. The mean power of any amateur station shall not exceed 10 watts.

146a In Region 2 the Loran system has priority. Other services to which the band is allocated may use any frequency in this band provided that they do not cause harmful interference to the Loran system.

In Region 3 the Loran system in any particular area operates either on 1850 or 1950 kc/s, the bands occupied being 1825-1875 kc/s and 1925-1975 kc/s respectively. Other services to which the band 1800-2000 kc/s is allocated may use any frequency therein on condition that no harmful interference is caused to the Loran system operating on 1850 or 1950 kc/s.

153a In Australia, the band 3500-3700 kc/s is allocated to the amateur service; the band 3700-3900 kc/s is allocated to the fixed and mobile services.

153b In India, the band 3500-3890 kc/s is allocated to the fixed and mobile services; the band 3890-3900 kc/s is allocated to the amateur service.

158 In the Union of South Africa and the Territory of South West Africa, the band 7100-7150 kc/s is allocated to the amateur service.

165 In the U.S.S.R., the band 14250-14350 kc/s is also allocated to the fixed service.

172 In Region 2, Australia and New Zealand, the amateur service may operate between the frequencies 26960 and 27230 kc/s.

178 In Rhodesia and Nyasaland, the band 41-44 Mc/s is allocated to the fixed, mobile and aeronautical radio-navigation services; the bands 44-50 and 54-68 Mc/s are allocated to the fixed, mobile and broadcasting services; the band 50-54 Mc/s is allocated to the amateur service.

178a In the Belgian Congo and Ruanda Urundi, and the Union of South Africa and the Territory of South West Africa, the band 41-50 Mc/s is also allocated to the fixed, mobile and aeronautical radio-navigation services; the band 50-54 Mc/s is allocated to the amateur service; and the band 54-68 Mc/s is allocated to the fixed, mobile and broadcasting services. The band 53-54 Mc/s may be used for model control.

178f In Malaya, New Zealand and Singapore, the band 50-51 Mc/s is allocated to the fixed, mobile and broadcasting services.

178g In India, Indonesia, Iran and Pakistan, the band 50-54 Mc/s is allocated to the fixed and mobile services.

178h In Australia, the band 50-54 Mc/s is allocated to the fixed, mobile and broadcasting services; the band 56-58 Mc/s is allocated to the amateur service.

178i In New Zealand, the band 51-53 Mc/s is also allocated to the fixed and mobile services; the band 53-54 Mc/s is allocated to the fixed and mobile services.

196a In Australia, the band 132-144 Mc/s is allocated to the aeronautical mobile (OR) service until 1 July 1963, after which date the band 132-146 Mc/s will be allocated to the broadcasting service and the band 148-150 Mc/s will be allocated to the amateur service.

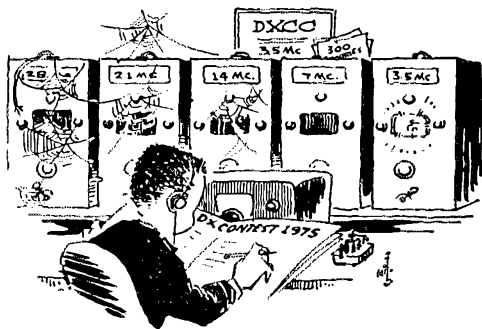
199a In China, India and Japan, the band 146-148 Mc/s is also allocated to the fixed and mobile services.

205 In Rhodesia and Nyasaland, the band 220-225 Mc/s is allocated to the amateur service.

211a Radio altimeters may also be used, temporarily, in the band 420-460 Mc/s until they are able to operate in a

(Continued on page 67)

Allocation to Services		
Region 1	Region 2	Region 3
1605-2000 FIXED MOBILE except aero mobile 145	1800-2000 AMATEUR FIXED MOBILE except aero mobile RADIONAVIGATION 146a	
3500-3800 AMATEUR FIXED MOBILE except aero mobile	3500-4000 AMATEUR FIXED MOBILE except aero mobile (R)	3500-3900 AMATEUR FIXED MOBILE 153a 153b
7000-7100 AMATEUR		
7100-7300 BROADCASTING 158	7100-7300 AMATEUR	7100-7300 BROADCASTING
14000-14350 AMATEUR 165		
21000-21450 AMATEUR (27 Mc. — see note 172)		
28-29.7 Mc. AMATEUR		
47-68 Mc. BROADCASTING 178 178a	50-54 Mc. 178f 178g 178h 178i	AMATEUR
144-146 Mc.	AMATEUR 196a	
	146-148 Mc. 199a	AMATEUR
216-223 Mc. AERONAUTICAL RADIONAVIGATION BROADCASTING 205	220-225 Mc. AMATEUR RADIOLOCATION	
430-440 Mc. AMATEUR RADIOLOCATION 211a 211b 211c 211d 211e	420-450 Mc. RADIOLOCATION Amateur 211a 211f 211g	
1215-1300 Mc. RADIOLOCATION Amateur 215 215a 215b 215c		
2300-2450 Mc. FIXED Amateur Mobile Radiolocation 220 220a 220b	2300-2450 Mc. RADIOLOCATION Amateur Fixed Mobile 220 220c	
3400-3600 Mc. FIXED MOBILE Radiolocation 224g	3300-3500 Mc. RADIOLOCATION Amateur 224c	
5650-5850 Mc. RADIOLOCATION Amateur 227a 227b 227c 228		
	5850-5925 Mc. RADIOLOCATION Amateur 228	
10,000-10,500 Mc. RADIOLOCATION Amateur 230d 230e		
21,000-22,000 Mc. AMATEUR 231d		



A Prophetic Look Toward Coming Years of Low Solar Activity

BY JOHN CHAMBERS,* W6NLZ

After Sunspots—What?

Many of today's amateurs have never known anything but phenomenally good propagation, thanks to several years of the highest solar activity on record. All of us, even the oldest, have been living in a long period of generally high sunspot numbers. It will not always be that way. Here is a thought-provoking discussion of amateur radio's problems in the coming years, when solar activity may be lower than we have ever known.

Look in *QST* of 25 years or more ago and you'll see 28 Mc. listed as a u.h.f. band. Openings were so rare as to be a curiosity. What sensational DX would be worked next? Would WAC ever be made on 10? It was, but not until 1937, when W6FQY was the first to accomplish this astounding feat!

Many people today attribute the phenomenal DX now worked so regularly on 28 Mc. and occasionally on 50 Mc. to improved techniques. It is true that our transmitters, receivers and antennas are much improved today, but this is only part of the story. We must also admit that conditions have been extraordinarily good.

If we examine the record of solar cycles (which, incidentally, goes back to 1749) it is easy to see that in this generation we have been living in lush times for h.f. propagation. In fact, substantially paralleling the advent of radio, since 1900 we have seen almost constantly-improving conditions. Interspersed along the way were nulls of the well-known 11-year cycles, but the general trend of solar activity has been upward. We have just passed over the peak of the most violent solar cycle in the 200-year record. Where do we go from here?

The Long View

In order to get some idea of what may be in

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store, examine the past record. In it we find that there are "cycles of cycles"—with groups of about four successive high-activity periods followed by a similar number of low ones. Great peaks appear in 1787 and 1870, and in both cases they were followed by long stretches of low activity. Sunspot numbers exceeded 140 only in these years, until 1947. There was a low peak in 1927 and a much higher one in 1937. The peak in 1948 was a record, up to that time. It was the second in a rising series that almost certainly hit its high in 1958.

Examining the rate of fall of the long curve, and extrapolating this to the present, we gather that things should be fairly good again in 1968-9. Probably activity will drop from the current cycle, to perhaps something about like 1947. The interesting part is conjecture about what comes after 1970. Should history repeat itself, the next two and probably three cycles will have very low peaks. This will carry us past the year 2000, and out of the life spans of many of today's amateurs.

What does "very low" mean? It means no F_2 -layer DX on 50 Mc. (It is quite possible that the cycle peak of 1948 was the first in the 200-year record high enough to open the 50-Mc. band for this kind of propagation.) It means very few, if any, 28-Mc. openings. The 21-Mc. band may be a good deal like 50 Mc. was in 1957 and 1958, if that good. The 14-Mc. band will be dead much of the time.

The Dwindling Spectrum

The coming low of 1961-2-3 will give us a good chance to learn how to cope with the problem, for problem it is. We have had a phenomenal growth in all radio services; now, by the force of Nature, all long-distance users of the radio spectrum, spread from 3 to 30 Mc., will be shoved down into the range from 2 to perhaps 15 Mc., at best. This means more QRM for both amateurs and commercials.

Not that the QRM isn't bad enough already! But consider how it will be at a time when, by the time you get home from work, 14 Mc. will be dead. Everyone will be bearing down on 3.5 and 7 Mc., and maybe even sometimes only on 3.5

Mc. The little guy is going to be squeezed harder than ever. As never before, clever modulation schemes will become important. The carrier will go the way of the rotary gap, and for much the same reasons. C.w. will assume a new role of importance, because of its fantastic narrow-band capability. It is a good trade-off of operator skill for equipment complexity.

This isn't going to be the complete solution, however, especially if amateur radio continues anything like its present growth rate. Where, then, do we turn? Obviously to v.h.f. and to v.h.f. techniques applied to 21 and 28 Mc. Tropospheric and ionospheric scatter will be used, not as a novelty as is presently done on 50 and 144 Mc., but as realistic communications media for amateurs.

V.H.F. Techniques for H. F. Communication

Let's consider ionospheric forward scatter. Most people think of scatter in terms of 1000-foot rhombics and gigantic transmitters, for this is what has been generally used. These rhombics have gains of 18 db. or so, but they are not high-gain arrays, for unit of volume, as compared with Yagis. And the power levels of 10 to 20 kw. — where do they leave us? Such power is common on scatter circuits, but it and the big rhombics are used to attain a degree of reliability of 95 per cent

or better. In amateur communication we need no such reliability.

An interesting scatter circuit has been in operation between Nova Scotia and the Azores, a 1411-mile path, on 36 Mc. This employed twin-5 Yagis and 1.8 kw. This begins to look more like ham radio, yet the circuit showed a signal level in excess of 13 db. over the noise level 80 per cent of the time. For 5 per cent of the time the signal level was 60 db. above the noise. At such times a power of 1.8 milliwatts would have done the job!

I don't intend to go into the parameters of scatter here. What is important to amateurs is that we just haven't given the forward scatter mechanism a fair trial in amateur radio. Perhaps this is because the need has not been pressing. Nature has granted us excellent conditions for the formative period of great expansion. She may soon cease to cooperate, and the time may soon be at hand when what has been up to now only an experimenter's plaything in amateur radio will become your only chance for a reasonably QRM-free QSO.

This seeming catastrophe may yet turn out to be a blessing in disguise. We have the means to become acquainted with ionospheric scatter right now on 50 Mc. Perhaps it would be well to give it more of a try. It could be the saviour of 21 and 28 Mc. later on!

QST

Geneva Allocations Summary

(Continued from page 65)

band allocated to the aeronautical radionavigation service or until they are no longer required.

211b In the United Kingdom, the band 420-450 Mc/s is allocated, on a primary basis, to the radiolocation service and on a secondary basis to the amateur service.

211c In Greece, Italy and Switzerland, the band 430-440 Mc/s is also allocated to the fixed service and mobile, except aeronautical mobile, service.

211d In Austria, Portugal, the F. R. of Germany, Yugoslavia, and Switzerland, the frequency 433.92 Mc/s is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of $\pm 0.2\%$ of that frequency.

211e In Norway, the band 435-440 Mc/s is also allocated to the fixed service.

211f In Indonesia, the band 420-450 Mc/s is also allocated, on a secondary basis, to the fixed service and mobile, except aeronautical mobile, service.

211g In Australia, the band 420-450 Mc/s is also allocated to fixed service until the frequency assignments in this band for fixed service stations are transferred to another band.

215 In Albania, Bulgaria, Hungary, Poland, Roumania, Czechoslovakia, and the U.S.S.R., the band 1215-1300 Mc/s is also allocated to the fixed service.

215a In Belgium, France, Norway, the Netherlands, Portugal and Sweden, the band 1215-1300 Mc/s is also allocated to the radionavigation service.

215b In China, India, Indonesia, Japan, Pakistan, Portuguese Overseas Provinces in Region I south of the equator, and in Switzerland, the band 1215-1300 Mc/s is also allocated to the fixed and mobile services.

215c In the F. R. of Germany, the band 1250-1300 Mc/s is allocated to the amateur service.

220 The frequency 2450 Mc/s is designated for industrial, scientific and medical purposes except in Albania, Bulgaria, Hungary, Poland, Roumania, Czechoslovakia and the U.S.S.R., where the frequency 2375 Mc/s is used. Emissions must be confined within ± 50 Mc/s of the frequencies designated. Radiocommunication services operating within these limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.

220a In the United Kingdom, the band 2300-2450 Mc/s is allocated on a primary basis to the radiolocation service and on a secondary basis to the amateur, fixed and mobile services.

220b In the F. R. of Germany, the band 2300-2350 Mc/s is allocated to the amateur service and this service is excluded from the band 2350-2450 Mc/s.

220c In India, Japan and Pakistan, the band 2300-2450 Mc/s is allocated on a primary basis to the fixed, mobile and radiolocation services, and on a secondary basis to the amateur service.

224c In China, India, Indonesia, Japan and Pakistan the band 3300-3500 Mc/s is also allocated to the fixed and mobile services.

224g In Austria, Israel, Netherlands, F. R. of Germany and the United Kingdom, the band 3400-3475 Mc/s is also allocated, on a secondary basis, to the amateur service.

227a In the F. R. of Germany, the band 5650-5775 Mc/s is allocated to the amateur service and the band 5775-5850 Mc/s is allocated to the fixed service.

227b In China, India, Indonesia, Japan and Pakistan the band 5650-5850 Mc/s is also allocated to the fixed and mobile services.

227c In Albania, Bulgaria, Hungary, Poland, Roumania, Czechoslovakia and the U.S.S.R., the band 5800-5850 Mc/s is allocated to the fixed and mobile services.

228 The frequency 5800 Mc/s is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of ± 75 Mc/s of that frequency. Radiocommunication services operating within those limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.

230d In Japan and Sweden, the band 10000-10500 Mc/s is also allocated to the fixed and mobile services.

230e In the F. R. of Germany and Switzerland, the band 10000-10250 Mc/s is also allocated to the fixed and mobile services; the band 10250-10500 Mc/s is allocated to the amateur service.

231d In Albania, Bulgaria, Hungary, Poland, Roumania, Czechoslovakia and the U.S.S.R., the bands . . . 21-22 Ge/s . . . are also allocated to the fixed and mobile services.

Happenings of the Month

14-MC. PHONE EXPANDED

Effective March 10, 1960, the Federal Communications Commission amended the amateur rules to expand the 20-meter space available to phone operation by 50 kilocycles, so the voice band is 14,200-14,350 kc. At the same time, FCC eliminated use of F-1 emission in the new segment.

This action was in response to petitions filed by the American Radio Relay League, as instructed by the ARRL Board of Directors. The initial petition suggested that the additional 50 kc. be restricted to holders of Advanced or Extra Class licenses, but later the Board amended its views in a subsequent filing which dropped the suggestion for a license restriction. FCC then issued a notice of proposed rule-making to seek expressions of general amateur opinion. The arguments received therefrom, including those of the League, in FCC's judgment adequately supported the proposed change and so it has now been adopted.

The text of FCC's order appears at the end of this department.

W3GG NEW ITU SECRETARY-GENERAL

We are delighted to report that the new Secretary-General of the International Telecommunications Union is Gerald C. Gross, W3GG-HB91A. Amateur radio service can well be proud that one of our number has achieved such eminence in the telecommunications regulatory field.

"Jerry" Gross is the first American to hold the ITU post and brings to it a wealth of background experience. He started hamming in the 1920s, built one of the first college broadcasting stations in the U. S. at his alma mater (Haverford), spent his summers as a commercial marine op. He joined the Bureau of Standards and ran the standard-frequency transmission system, then in 1928 transferred to the Federal Communications Commission where he served as chief of various divisions until active Naval duty, with the rank of Captain, in World War II. He was an important member of practically every U. S. delegation to radio conferences, starting right with the 1927 Washington conference which was the first to

Gerald C. Gross, W3GG-HB91A



deal with short-waves, until 1945 when ITU chose him as vice-director and he moved to Switzerland. The 1947 Atlantic City conference appointed him assistant secretary general, and he took over the top job in an "acting" capacity upon the death of his predecessor. The Geneva conference selected him for the permanent post from a number of applicants from various parts of the world.

HAITIAN 3RD PARTY TRAFFIC

Add one more country — Haiti — to the list of nations with which the U. S. has agreements permitting amateurs to handle traffic internationally on behalf of third parties. Effective February 5, an exchange of diplomatic notes was accomplished on behalf of amateurs in both countries, of course with the customary limitations that messages must be unimportant (except in actual disaster) and no compensation may be received. The entire list again: Canada, Chile, Costa Rica, Cuba, Ecuador, Haiti, Liberia, Mexico, Nicaragua, Panama, Peru and Venezuela.

SASKATCHEWAN LICENSE PLATES

A lot of Saskatchewan residents will take a double look at some of the new license plates which will be issued this year, for this province has now been added to the long list of Canadian and U. S. areas where amateurs have their call letters as motor vehicle license plate markers. This achievement is the work of the Saskatchewan Amateur Radio League, with headquarters in Regina, and acting president VE5LU says about 200 ham plates will be issued this year.

14-MC. PHONE ORDER

In the Matter of

Amendment of Section 12.111 (d) }
of Part 12 of the Commission's } DOCKET NO. 12780
Rules to Permit Radiotelephony }
Between the Frequencies 14,200 }
kc. and 14,350 kc. }

REPORT AND ORDER

By the Commission: Commissioners Doerfer, Chairman; Lee, and Craven absent.

1. On February 18, 1959, the Commission issued a Notice of Proposed Rule Making in the above-entitled matter as a result of a petition filed by the American Radio Relay League, Inc., 38 La Salle Road, West Hartford 7, Connecticut. This Notice was duly published in the Federal Register (24 FR 1427, February 26, 1959) wherein all interested parties were invited to file comments for or against the proposal. The time for filing such comments and replies thereto has now expired.

2. The Commission wishes to commend those amateurs who commented in this proceeding for the soundness and intelligence of their filings. Numerically, there was almost an equal division between those who favored the proposal as opposed to those who were against with the former slightly in the majority. However, both sides generally recognized the validity of the other's arguments with the result that the bulk of the comments presented thoughtful analyses of the proposal: should radiotelephony (A3 emis-

sion) be permitted between 14,300 kc. and 14,350 kc.? So many comments were received from individuals, clubs, and organizations representing large numbers of amateurs that it is impractical to discuss each one individually. Additionally, many foreign amateurs submitted some excellent comments. The Commission will discuss below some representative comments on both sides of the question; however, all properly filed comments were given careful consideration.

3. Comments in opposition to the proposal:

A) Kenneth K. Bay, Lynchburg, Virginia, sets forth a representative argument against adoption of this proposal. He points out that although the entire 14,000-14,350 kc. band is available for United States radiotelegraphy, such operation, as a practical matter, is concentrated in the 14,000-14,150 kc. portion. The reason for this is that the remainder of the band has been taken over by radiotelephony, both United States and foreign (the 14,300-14,350 kc. segment is presently utilized solely by the latter). Permitting our amateurs to use radiotelephony in this part of the band would mean that "the foreign radio telephone activity which formerly occupied 14,300 to 14,350 kc. would shift to the region of 14,100 to 14,150 kc., thereby reducing the portion of the band available to radiotelegraphy." "This, it is argued, would be the foreign radiotelephony user's means of escape from our radiotelephone interference. It is contended that the solution for radiotelephony operators is to turn to "spectrum conserving modes of transmission such as s.s.b." rather than to seek additional radiotelephony allocations.

B) R. F. Moren, Graham, North Carolina, pointed out that closing this segment of the 14 Mc. band to foreign radiotelephony operations (even the proponents of the proposal did not seriously question the conclusion that United States amateurs using A3 emission will drive out their foreign counterparts) will reduce the amount of messages from abroad intended for the families and friends of our military personnel stationed overseas. Along with Loren G. Windom, Civil Defense Director of Ohio, and many other amateurs, Mr. Moren feels that if the proposal is adopted, "The good will which now exists between the U. S. hams and those in other parts of the world will, to a large extent be snuffed out by removing the only portion of the band available to our friends overseas that is essentially free of interference from U. S. phone stations."

C) Some amateurs expressed objections which were identical to those of foreign radiotelegraphy individuals and organizations who filed opposition comments. This group points out that this is one of the two remaining segments in this band where radiotelegraphy is possible. By informal cooperation among the users, both the telephony and telegraphy operators have been able to utilize this 50-ke. portion with some success. If this proposal were adopted, "DX stations would be completely covered over . . . [and] would be forced to seek a new place on the band, perhaps just below 14,200, but . . . that would not go over very well with stations operating on that segment now, and so the hassle would continue with no real solution." It is felt that the net result of permitting United States amateurs to use A3 emission between 14,300 kc. and 14,350 kc. will be to drive foreign radiotelephony amateurs into the lower portion of this band and will thus hurt both United States and foreign radiotelegraphy operations.

4. Comments in favor of the proposal:

A) Dr. Earl W. Weston, Detroit, Michigan, argues that adoption of this Notice will aid rather than hurt our foreign relations. He regards radiotelephony as a superior means of communicating with other amateurs here and abroad as opposed to the mere signal contact obtained by radiotelegraphy. Also single sideband radiotelephony operation "is reputed to travel well on relatively low power and is of narrow bandwidth. Hence DX s.s.b. stations should be able to either break into round tables or find space to squeeze between." To enable radiotelephony users in this country to "spread out a little more" will result in better communications.

B) Jack L. R. Williams, Rochester, New York, along with a large number of other amateurs, states that the segment of the band in question is presently

occupied by a small number of stations. (It should be noted that although estimates of the amount of usage in this portion of the band vary, even the opponents of the proposal concede that its main function is for foreign telephony operations, rather than for domestic telegraphy. It should be further noted that United States amateurs are approaching the 200,000 mark while there are approximately 80,000 in the rest of the world.) He queries whether it is fair to tie up so much space for so few. Others expressed the fear that such limited usage might result in this portion of the band being lost for amateur operation at some future International Conference.

C) Finally, the American Radio Relay League, Inc., West Hartford 7, Connecticut, points out that expansion of radiotelephony privileges into this portion offers at least a partial solution to the dual problem of a rapid increase in the number of amateurs coupled with a constantly growing trend toward radiotelephony. While admitting that such expansion will result in a corresponding reduction of space for foreign radiotelephone operation, the League concludes that "the demonstrated need of U. S. amateurs for additional radiotelephony space at 14 megacycles is the paramount factor."

5. Summary:

In essence, the arguments against the proposal are: (a) it will reduce the amount of space in this band available for United States radiotelegraphy operations, and (b) it will hurt foreign radiotelephony transmissions. The contentions of the proponents are: (a) more space is needed for United States radiotelephony and this need is constantly increasing, and (b) this portion of the 14 megacycle band is now being used sparsely, particularly by our DXers.

6. Conclusions:

The Commission is of the opinion that the amendment proposed in the Notice of Proposed Rule Making should be adopted. The comments have adduced sufficient evidence to warrant the conclusion that American radiotelegraphy use of the frequencies between 14,300 kc. and 14,350 kc. is limited. The question then resolves itself into a determination of United States v. foreign radiotelephony. While recognizing the advantages which are available to foreigners in the 14,300-14,350 kc. band, the Commission wishes to point out that non-United States radiotelephone operation can still be conducted on the frequencies below 14,200 kc. However, at the present time, the space for A3 emission in the 14,000-14,350 kc. band is plainly inadequate for the United States amateur. Therefore, the Commission would be remiss in its duty to act in the public interest if it did not attempt to find additional space for the large number of new and old amateurs who are turning more and more to radiotelephony. To be consistent with its rules regarding other portions of the amateur bands below 30 Mc. where radiotelephony is permitted, the Commission is also amending Section 12.111(d) so as to eliminate the availability of F1 emission between 14,300 and 14,350 kc.

7. Accordingly, IT IS ORDERED, pursuant to the authority contained in Sections 4(i) and 303 of the Communications Act of 1934, as amended, that Part 12 of the Commission's Rules be and is amended, effective March 10, 1960, as set forth in the Appendix attached hereto.

FEDERAL COMMUNICATIONS COMMISSION

MARY JANE MORRIS,

Secretary

Adopted: January 27, 1960

Released: January 29, 1960

APPENDIX

PART 12 OF THE COMMISSION'S RULES, AMATEUR RADIO SERVICE, IS AMENDED AS FOLLOWS:

Section 12.111(d) is amended to read as follows:

§12.11 Frequencies and types of emission for use of amateur stations.

(d) 14,000 to 14,350 kc., using type A1 emission, 14,000 to 14,200 kc. using type F1 emission and on frequencies 14,200 to 14,350 kc. type A3 emission or narrow-band frequency or phase modulation for radiotelephony.

457

25 Years Ago
this month

March 1935

... This was the issue that carried the now-famous editorial on what makes hamming. To quote the core paragraph:

"The central trait is the means of communication with others on equal terms, of finding friendship, adventure and prestige while seated at one's own fireside. In picking his human contacts out of the air the amateur is not seen by them. . . . He is not known by the company he keeps nor by the clothes he wears but by the signals he emits. He enters a new world whose qualifications for success are within his reach. A good homemade set gives him more prestige than a commercially-manufactured one. There are no century-old class prejudices to impede his progress. He enters a thoroughly democratic world where he rises or falls by his own efforts. When he is W9XYZ, a beginner, the radio elders help him willingly, and when he becomes W9XYZ the record-breaker and efficient traffic handler, he willingly helps the younger generation. Without a pedigree, a chauffeur, or an old master decorating his living room he can become a prince — of the air. At the close of the day, filled with the monotonous routine of the machine age, he can find adventure, vicarious travel, prestige and friendship by throwing in the switch and pounding his signals into the air."

. . . It was good 25 years ago and it's just as good today. . . . In the same issue, Robert Wilson, W1FJ, W2EBM, recounted his adventures as radio man on a round-the-world flight in a private plane carrying just two men . . . technical articles included a review of grid-bias modulation for the general purpose transmitter, a design for a photographic recorder, grid-bias modulation for 100-watt power amplifier and a new audio power amplifier — the 203-A Class-B modulator with 6B5 driver. . . . And British Columbia hams won kudos for their service when a January blizzard smothered the area and blocked railroad lines into Vancouver for nine days.

Silent Keys

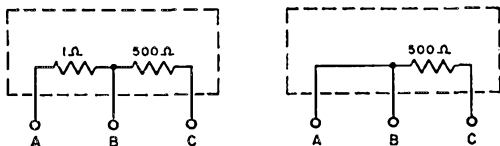
IT IS with deep regret that we record the passing of these amateurs.

- W1DRU, John R. Faunce, Wrentham, Mass.
- W1KLE, Glenn L. Mellen, Framingham Center, Mass.
- W1PI, Fred C. Bigelow, Derry, N. H. (formerly Hyde Park, Mass.)
- W1QUQ, Walter C. Ross, Springfield, Mass.
- WA2BLE, Ernest Lovell, jr., Pedricktown, N. J.
- W2HYP, Merton A. Standish, Canandaigua, N. Y.
- W2KOJ, Richard H. Butler, Scotch Plains, N. J.
- W3TBO, Charles Streichert, Collegeville, Pa.
- W3LZP, George Alvin Irrgang, Collingsdale, Pa.
- W3PJJ, Charles C. Dieffenbacher, Pittsburgh, Pa.
- W3VSL, Harry G. Miller, Collingsdale, Pa.
- W3ZTN, Fred Burgstaller, Philadelphia, Pa.
- W4AD, Gordon L. Hight, Rome, Ga.
- W4ECV, Raymond V. Clark, Miami, Fla.
- W4NUB, Anna L. Hand, Bay Minette, Ala.
- W4PTC, Arthur Harlow Merryday, Palatka, Fla.
- W4SXB, Julius B. Seielstad, Foley, Ala.
- W4VO, John H. Sessler, Rome, Ga.
- K5MEE, Pennington E. Thibodaux, jr., Poncha-toula, La.
- W6APS, Dr. Milford H. Nelson, Santa Cruz, Calif.
- W6GCX, Gerritt Vandekamp, San Diego, Calif.
- W6UC, Andrew W. Martin, Carmel, Calif.
- W7GSR, Frances E. M. Morgan (Mrs. Frank M. Morgan), Seattle, Wash.
- W7KMJ, Ulrich S. Thalheimer, Phoenix, Ariz.
- W8BWK, Alfred R. Dimmack, Wheeling, W. Va.
- W8BYX, Leroy A. Jones, Trenton, Mich.
- W8EM, Edwin S. Heiser, Detroit, Mich.
- W8HTP, Brooks M. Walker, Zanesville, Ohio
- W8KMZ, Duke R. Lake, Detroit, Mich.
- W8WLV, Francis J. Kollarits, Shaker Heights, Ohio
- W9DSX, William Earl Rohlfing, Osman, Ill.
- K9ETW, Rex W. Curtis, Indianapolis, Ind.
- K9TQG, Kermit K. Kunath, Creston, Iowa.

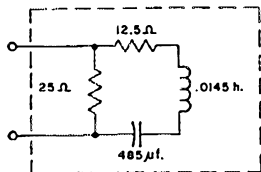
Quiz

Mr. D. W. Orahoad of United Air Lines in Chicago sends us this black-box problem:

Our hero knows that his three-terminal black box has one or the other of the configurations shown below. To find out which configuration it has, our hero has only the assistance of a 1½-volt dry cell, a 0-1 milliammeter with an internal resistance of 100 ohms, and a junk box with a wide assortment of 20% tolerance resistors. How does he determine the configuration, using a minimum number of the junk-box resistors?



the voltage-current product equalled the power at 60 cycles suggested the series-resonant circuit, and the current at 100 cycles permitted the reactance to be calculated and then the *L* and *C*.



Strays

Bart McCarthy ("Mac"), long-time amateur examiner for the Boston, Mass. office of the FCC, became a Silent Key in December, 1959.

Last month's black-box problem can be solved by the circuit in the next column. The d.c. passed only through the 25-ohm resistor. The fact that

K7ETV's first contact on January 1, 1960 was K1III — his second, minutes later, was W2III.

Speculations on Communications With Other Planet Civilizations

BY DANA W. ATCHLEY, JR.,* W1HKK

DURING our lifetime several events have occurred which have had tremendous significance to us all. The first nuclear explosion in 1945 and the Soviet's Sputnik I are two striking examples. Reception and eventual change of intelligent information with some sort of civilization now in existence on another planet certainly would be an event of tremendous importance to us all. I believe that such an accomplishment appears to be most possible within the next decade. Since this subject should be of utmost interest to all radio amateurs I will attempt in this short article to bring you up to date on the basic premises for such startling speculations and, of more importance, what is being done to bring such an event to reality.

Life on other Planets

Before embarking on the radio communications involved it is necessary to establish that there is a reasonable probability of life existing on other planets capable of generating radio signals. Although such speculations have been going on for years, within the past three months three excellent articles have been published which put the problem clearly in focus. The first was published in the British journal *Nature* (September 19, 1959, page 844) by Giuseppe Cocconi and Philip Morrison of Cornell University. This paper was quickly followed by an article in the January, 1960, issue of *Sky and Telescope*, by Frank D. Drake. "How Can We Detect Radio Transmissions from Distant Planetary Systems", and another in the January 2, 1960, issue of the *Saturday Review* by John Lear entitled "The Search for Intelligent Life on Other Planets". This article is a digest of these three with a few "amateur" type speculations of my own.

Concerning life on other planets, the following highly simplified concept is advanced: Stars (such as our sun) are mixtures of hot gases and have been in existence for finite times. It would appear that the formation of planets and eventually "life" is some sort of function of time, temperature, and ingredients. If the proper elements are put in the "pot" and cooked long enough things happen and eventually something like a human could be produced. Billions of years are required to produce intelligent beings from a "potful" of organic molecules.

Astronomers have examined the spectral distribution, temperature, and age of many "seeable" stars and have come up with varying estimates of the probability of planets within the vicinity of these stars having some sort of life that could eventually generate radio transmissions.

* President, Microwave Associates, Inc., Burlington, Mass.

These estimates range from one star in four to as low as one star in a million with such qualifications. These odds have seemed high enough so that at least one qualified organization is getting ready to try to receive such transmissions.

An Active Program

As far as I can determine the only active program is under the direction of Frank D. Drake of the National Radio Astronomy Observatory at Green Bank, West Virginia. Drake has spent much of his 29 years in radio astronomy. He received his undergraduate training in physics from Cornell and his graduate training, resulting in a Ph.D. in radioastronomy, at Harvard. He states that he has never become a radio amateur because he is "too busy" but he is quite interested in the reaction of the amateur to his program.

Drake has proposed a very interesting premise which would indicate that we electronically oriented types are very fortunate to have picked this particular century of centuries to have come into existence since 50 years ago there would have been no place for our talents and 50 years from now electronics as applied to communications will become as pedestrian as a 60 c.p.s. generator. I quote directly from his article.

"What search frequency would be best? Consider what might be called the principle of technical perfection. It is only about 50 years since radio communication was invented, yet we have already very nearly achieved technically perfect instruments, and within 50 more years we should have them. By technical perfection we mean that the limits of communication-system sensitivities are not set by deficiencies in the apparatus, such as receiver noise, but by natural phenomena over which man has no control. This is a state in which further improvements in apparatus will not improve the operational results.

"A century is only about a hundred-millionth of the age of our galaxy. Thus, on the galactic time scale, a civilization passes abruptly from a state of no radio ability to one of perfect radio ability. If we could examine a large number of lifebearing planets, we might expect to find in virtually every case either complete ignorance of radio techniques, or complete mastery. This is the principle of technical perfection. Our civilization may be one of an extremely small minority in transition between the two possible states — this, in fact, may be the only major feature in which man is unique.

"Therefore, it may be logical to assume that the civilizations we might detect possess complete mastery of radio already. The transmissions we seek will obviously be very powerful ones, in which large information transfer over long dis-

tances is being attempted. Frequencies will be chosen for which the natural limitations on performance are least. Two of these limitations are important: galactic radio noise emission, and noise from the planetary atmosphere, if reception from beneath the atmosphere is being attempted.

"Both these emissions insert noise into the receiver, and have the same effect as though the receiver itself were noisy. The graph (Fig. 1) shows for the earth the radio-sky temperature produced by each of these sources of noise, and their combined effect. This last would be the excess receiver noise temperature of an otherwise perfect receiver. Obviously, the best frequencies to use for our search are those where this total sky temperature is least.

"For instance, from beneath the atmosphere of a planet like the earth, the band from 1000 to 10,000 megacycles per second would be the optimum for reception of long-range transmissions. If, however, reception is being done from above the atmosphere, as the principle of technical perfection and our own success with satellites suggest, frequencies above 10,000 megacycles are also good candidates."

The almost unanimous recommendation for the choice of a "search" frequency is the region around 1420 Mc. (21 cm.). In 1951 Dr. Harold Ewen, then at Harvard, and now the very active president of the Ewen-Knight Corp. in Natick, Mass., discovered that in the vast, cool regions of space there is considerable radiated energy at approximately 1420 Mc. This radiation comes from the collision of neutral, highly kinetic hydrogen atoms which although they have a density of only 1 per cubic centimeter occasionally collide and one collision in eight is of the type that radiates at 1420 Mc. This radiation is strong enough so that depending on the aperture of the dish of the radio telescope, it can be detected at great ranges. Dr. Drake estimates that as many as

15 radio telescopes throughout the world are observing 1420-Mc. outer space radiation on a 24-hour basis. Astrophysicists such as Cocconi and Morrison of Cornell have postulated that since the interest in the 1420-Mc. radiation of cool, interstellar hydrogen is so strong here on earth, scientists on other planets must also be probing this region to learn more about their galaxy. Hence they have suggested that transmissions very near this frequency might be used to contact our earth. Drake, who is also an astrophysicist, and who probably had no real alternate candidate frequency for such a search, has embarked on a very ambitious program on 1420 Mc. which I will cover in the latter part of this article.

A Couple of Approaches

Before doing so I would like to advance two obvious, but non-astrophysical approaches to the problem. Drake has made the reasonable assumption that some of the most likely civilizations on other planets have long since passed through the critical 100 years of radio development. Is it not logical that a similar critical period exists during which a civilization undergoes the transition from being confined to the ground to having thorough mastery of the space region within a reasonable distance from his own planet. It would seem to me that some such other planet has long since categorized our earth as a suitable candidate for "civilization brewing" and has been watching us and other suitable planets on a routine, automatic basis from sophisticated radio-telescopes on stable space platforms outside of their own atmosphere.

If such is the case, we can make two further assumptions. First, that like any good radio amateur listening for DX, they will transmit back near the frequency they first heard on a regular

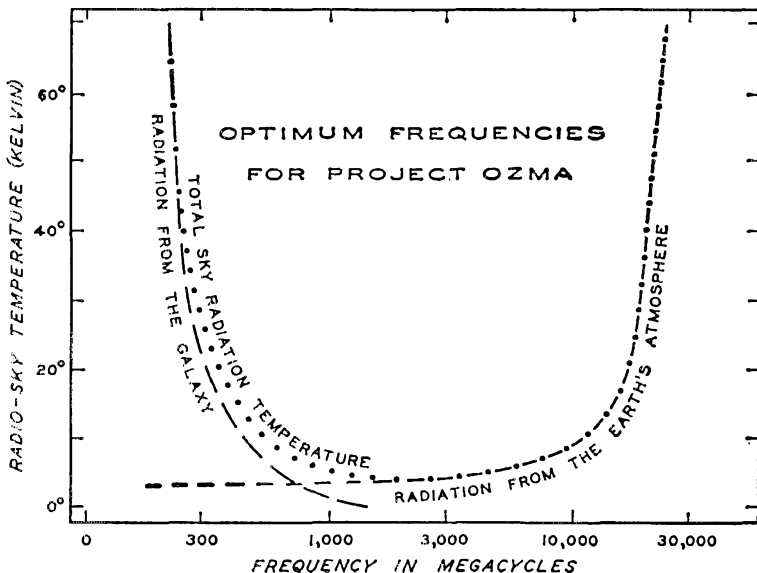


Fig. 1
(Figs. 1 and 3 courtesy Sky and Telescope)

basis, and, second, that the millimeter wave region which has advantages which I will shortly describe is available to them both for transmission and reception.

I believe that most of the earlier transmissions from our earth were confined by the ionosphere due to their relatively low frequency. However, sometime around 1936-1938 enough power was radiated routinely on frequencies above 30 Mc. that some of it escaped to outer space where, depending on the sensitivity of the other civilization's receiving installation, it may have been heard. The first British coastal radar chain and the Yankee network 49.3-Mc. 500-kw. e.r.p. f.m. station W43B on top of Mount Asnebumskit are two good examples of stations that might have gotten "through." Drake, who has almost completely ruled out the possibility of signals coming from other planets within our solar system, has stated that he will concentrate his initial listening to the regions near the two solar-type stars Tau Ceti and Epsilon Eridani which are 11 light years away. If we assume that the round trip then takes 22 years, it is interesting to note that $1938 + 22 = 1960$. Since this might be the big year, on a long-shot basis it might be very worthwhile to listen to the region from 30 to 50 Mc. with suitable arrays pointed toward these stars when the m.u.f. is lower than 30. With the present earth state of the art of receiving equipment plus the high background noise (see Fig. 1), we must rely on the transmitters on the other planet being most powerful to overcome our deficiencies.

Drake believes that the sought-after-signals will of necessity be narrow band and with no spectacular form of modulation. Doppler shift will be evident due to the relative motion of the receiver and transmitter. This shift plus direction may be the distinguishing characteristics of this signal.

Unfortunately, because of previous experience the civilization on the other planet may decide that it is too difficult to try to contact us during our 100 years of transition to radio maturity since during this period they may have to compensate for our lack of an outside-of-atmosphere space platform, plus our inadequate receivers, transmitter, and perhaps unsophisticated correlation detecting schemes.

If he does elect to wait until we mature, the first communication will probably not take place at 30 Mc. or 1420 Mc., but more than likely between two outer atmosphere space platforms operating with very high power in the millimeter wave region above 30 kMc. Here we will have the obvious advantages of no atmospheric absorption plus the capability of generating, with relatively small antennae, very high effective radiated powers over very narrow beam widths. In addition, the vast number of megacycles available in this region would provide bandwidths for very fast rate of intelligence delivery per second. However, unless something really new shows up, we will still be inhibited by what now appears to be the remarkably slow speed of light in exchanging such intelligence.

Project Ozma

Enough of such speculation. Let us return to Drake. With luck in March, 1960, the National Radio Astronomy Observatory in Green Bank, West Virginia, will be listening near 1420 Mc. from an 85-foot telescope such as shown in Fig. 2.

The following rule of thumb applies to reception of 1420 Mc. The distance in light years at which strong present-day transmitters can be detected is about equal to the diameter of the parabolic reflector in feet divided by 10. Thus, Drake's telescope could pick up present-day "earth" style transmitters at a distance of 8.5 light years. The fact that he is concentrating on stars at 11 light years distance implies that he is hopeful that the engineers of the Tau Ceti and Epsilon Eridani planet systems have progressed far beyond our present techniques.

Drake's project is called Ozma after the beautiful princess of imaginary Oz. His system is quite complex and is described by him in his recent article as follows.

"A block diagram (Fig. 3) is given here of the Ozma radiometer, which operates near 1420 megacycles. It is essentially a highly stable narrow-band superheterodyne receiver, which utilizes the principles of both the Dicke radiometer and the d.c.-comparison type (see November 1959, *Sky and Telescope*).

"Two horns are placed together at the focus of the parabolic antenna, in order to eliminate terrestrial interference to some extent. These horns give the antenna two beams, one to point at the star under study, the other off into space near the star. As the electronic switch connects first one horn and then the other to the receiver, the telescope will look alternately at the star and at the sky beside it. Any radiation from the star will then enter in pulses whose duration is

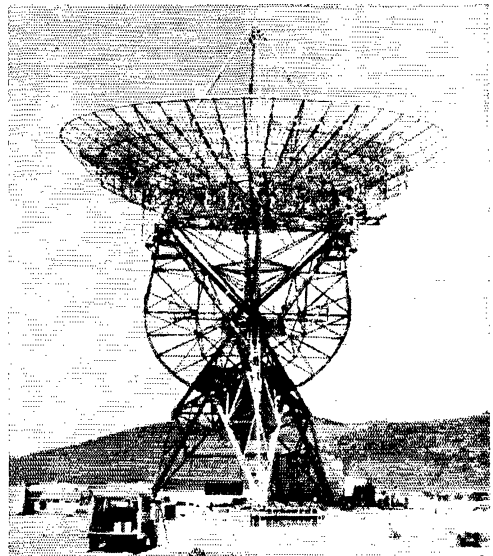


Fig. 2—A typical radio telescope.

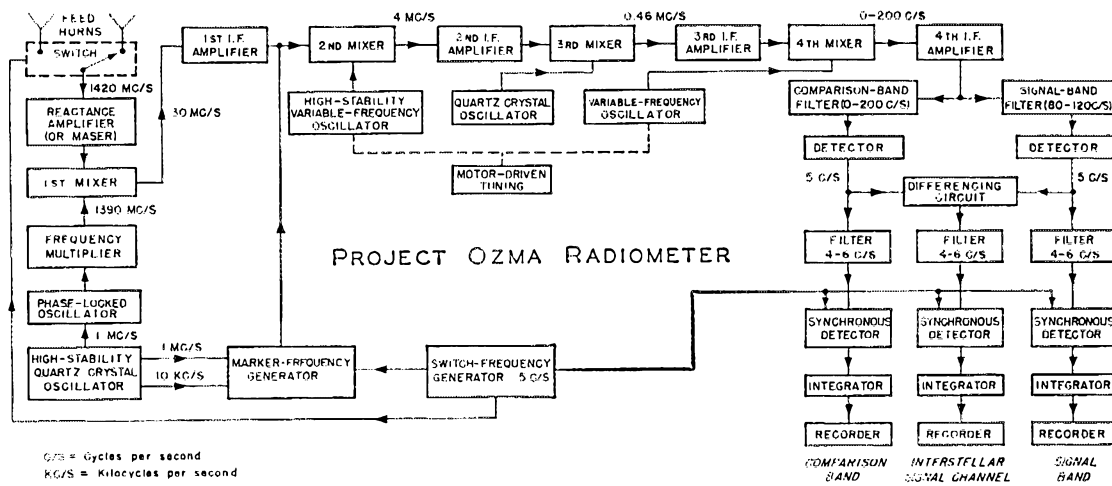


Fig. 3

controlled by the switch. The synchronous detectors near the output end of the circuit will respond only to pulses synchronized with the switch, thus detecting only the desired signal. Receiver noise is eliminated, and also terrestrial disturbances.

"Interference generally enters a radio telescope antenna through the horns directly, without a reflection from the paraboloid. In that case, both horns should receive the interfering signal with the same strength, and when the switch changes from one horn to the other there will be no change of level in the interference entering the receiver. As a result, the interference signal is not pulsed, and the synchronous detectors ignore it.

"In the present receiver, immediately after the switch there comes a reactance [i.e., parametric] amplifier, to be replaced later with a maser. The amplifier, which gives the radiometer high sensitivity, was built by Ewen-Knight Corp., while the electronic switch was made by H. Hvatum of NRAO.

"The signal then undergoes four frequency conversions, this many being necessary because the final intermediate frequencies are very low, due to the narrow bandwidth requirements. The frequency received by the radiometer is directly dependent on the frequencies of the four oscillators, whose output signals beat with the true signal to produce the intermediate frequencies. In our specifications all four oscillators must hold their frequencies constant to better than one cycle per second on 100 seconds, if the over-all received frequency is also to be that constant.

"This is a most difficult requirement for the first oscillator, because its final frequency is about 1390 megacycles and it therefore must remain constant to one part in a billion. This accuracy is achieved by means of a special quartz crystal oscillator, the crystal being kept at a very constant temperature in an oven within an oven. The output of this oscillator is multiplied

in frequency to give the desired final frequency. "A marker-frequency generator is used to provide weak signals from the output of the very stable oscillator at many fixed frequencies. These signals are inserted into the receiver for determining the exact frequency on which the receiver is operating, allowing the detection of Doppler effect.

"After the fourth intermediate-frequency amplification, two filters pick out a broad band of noise, called the comparison band, and a narrow one designated the signal band. The gain of these filters is adjusted so that when very broadband noise enters them their total outputs are equal. When these outputs are passed into the differencing circuit, its output is zero. However, a narrow-band signal fills only some of the frequencies of the filter for the comparison band, but all of those in the signal-band filter. The output of the narrow-band filter is then greater than that of the broad-band one, and there is a net output from the differencing circuit. This use of the d.c.-comparison circuit makes the radiometer respond only to narrow-band signals. As drawn here, the radiometer is set up for signals for about 40-cycles-per-second bandwidth. In the actual receiver, the electronic filters have variable bandwidths that may be quickly adjusted to desired values.

"The filters placed before the synchronous detectors pass only the frequencies to which the detectors will respond, and reject other frequencies that might cause them to operate improperly.

"We see that an output from the final synchronous detector will occur only when receiving a narrow band signal from a direction in which one of the antenna beams is pointing—the desired interstellar signal. The integrator only averages the signal strength over a chosen interval. The other two synchronous detectors and integrators connected directly to the comparison band and signal-band channels monitor the performance of the radiometer."

Role of the Amateur

The amateur might well ask what position he could play in such an ambitious project. Such installations as just described don't lend themselves to back yard installations or amateur pocketbooks. Two suggestions are put forward:

If your interests are really strong in the field, perhaps the best approach is to get a job at a radio astronomy observatory. The January issue of *Sky and Telescope*, for instance, has an advertisement seeking a radio operator for its 85-foot telescope.

Secondly the building of a microwave radio telescope is a good type of club activity. The writer knows of several such projects which will shortly be in operation for amateur moon-bounce communications on 1296 Mc. (One of these is operated by Sam Harris, W1FZJ.) Incidentally, Drake would like to use amateur 1926-Mc. moon-bounce transmissions for calibration signals.

Although the previous authors on this subject have demonstrated remarkable restraint on this score, I believe that it would not be appropriate to close this article without some speculation of what might transpire on that eventful day when Drake (a really appropriate name) or some future space-listener actually hears a signal bearing intelligence from another planet.

I am sure that he will have considerable difficulty in verifying its source first to himself, then to his sponsors and eventually his nation. Actually, unscrambling the intelligence will be a job that will need more than the classic Rosetta Stone

that linked the Grecian and ancient Egyptian languages.

Drake stated that if the signal is very weak, requiring integration techniques to establish existence, he will agitate for use of a larger dish, such as the big Navy 600-footer which is now under construction. However, if the signals are strong enough, they will obviously be recorded and analyzed by the best cryptographic methods available.

The problem of attracting the attention at the other end over a span of, say, 22 years seems almost insurmountable. I could conjure up many more potential problems of a technical, data handling, and psychological nature. However, the rewards to the nation and total earth population could more than balance the difficulties encountered.

It is dangerous to assume that the inhabitants of other planets are similar to us. However, there must be some important common denominators. A look at such a civilization as ours even 50 years ahead not to mention thousands of years in the future, must provide solutions to medical, social, technical, and many other problems that would greatly benefit mankind . . . perhaps the cure of cancer and a cheaper version of the Beefeater Martini.

I wish to thank the editors of *Sky and Telescope* and Frank D. Drake for their help in this article and to express my appreciation of the many ideas on this subject provided by Dr. Harold Ewen of Ewen-Knight, Inc., and Messrs. F. S. Harris and H. Cross of Microwave Associates, Inc. QST

First Amateur Transatlantic Picture Transmission

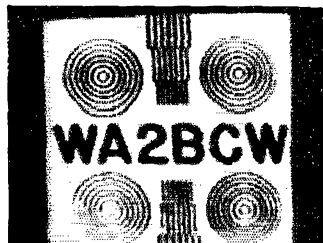
ON December 20, 1959, during the final test of a series conducted on November and December week ends, a recognizable picture was received at G3AST, Yeovil, Somerset, from a transmission by WA2BCW, Elmira, N. Y. — so far as we know, the first time transatlantic picture transmission has been accomplished by amateur radio. The picture was transmitted by WA2BCW's slow-scan cathode-ray system (MacDonald, "A New Narrow-Band Image Transmission System," *QST*, August and September, 1958) on 29,500 kc., special authorization having been secured from FCC for temporary use of this mode of transmission on the 10-meter band. The accomplishment demonstrates the feasibility of long-distance picture communication on the ham bands by narrow-band methods — the signal doesn't take up any more spectrum space than the legitimate bandwidth of a voice signal.

The achievement is all the more remarkable because the transmitter power was only 25 watts, and since transmissions were "blind" on a fixed frequency there was no way of dodging the QRM that goes with an "open" 10-meter band on a Sunday afternoon. The accompanying photograph of the received picture, reproduced from a tape recording of the signal as heard by G3AST on a simple dipole antenna, is snowy because of QRM rather than a poor signal-to-noise ratio.

Further tests are being planned by WA2BCW, FCC willing, and one thing that both sides of the Atlantic are looking forward to is establishing the first *two-way* picture communication. The obstacles are not simply technical since in Britain, as here, there are regulatory problems to be overcome. Keep an eye on *QST* and an ear out for WIAW for further news as it becomes available. QST

Left: The historic first ham-transmitted transatlantic picture as transcribed from a tape recording made by John Plowman, G3AST. Center: Picture as transmitted by WA2BCW. Right: Demonstration set-up of the slow-scan

system at the Radio Hobbies Exhibition held in London in November. This exhibit of G3AST's equipment attracted a great deal of attention at the show, and there is now an enthusiastic group of "slow-scanners" in Great Britain.





YL NEWS AND VIEWS

CONDUCTED BY ELEANOR WILSON,* W1QON

YLRL ANNIVERSARY PARTY RESULTS

Participation in the twentieth YLRL Anniversary Party was down a bit from the record-breaking 1958 party. Nevertheless, those who were on hand for the contest last November (11th and 12th — phone section; 18th and 19th — c.w. section) seemed to have the usual grand time contacting old contest friends and meeting new ones.

This year a contestant could work only 30 hours of the 36 hour period in each of the two sections. YLRL Vice President and chief log-checker Gladys Eastman, W6DXI, reports that a number of contestants made "overtime contacts" which had to be invalidated. Also, in some cases contestants totaled multipliers incorrectly, mainly because each ARRL section rather than each state could be counted as multipliers.

On to the winners! For reaping the highest combined phone and c.w. score Doris Anderson, K5BNQ, received the new Coreoran award, and for her first place phone score Doris was awarded a gold cup. A gold cup was also awarded to first place c.w. winner Joyce Polley, K0IKL. Certificates were issued to second and third place phone winners Annette Thompson, W4LKM (operated W4CWV) and Barbara Houston,



Top AP winner Doris Anderson, K5BNQ, won both first place phone and combined phone and c.w. honors. The very active YL from Broken Arrow, Oklahoma, has been a YLRL District Chairman and past president of TYLRUN.

K5YIB; and second and third place c.w. winners Lillian Byrne, K2JYZ, and Audrey Beyer, K5PFF. Certificates were also issued to the top scorer in each U. S. district and to the top DX YL scorer.

SCORES

Only the station and the total score is given below. Complete score information, including number of contacts made, sections worked, and power multiplier, if used, will appear in the *YLRL HARMONICS*.

C. W.

W1ICV.....1848	K2CUQ.....180	K4HXB.....2295
K1LJV.....1680	W4BIL.....1899	
W1YPH.....1334	W3TSC.....2125	
K1ADY.....165	W3URU.....1398	K4SAF.....1511
	K5SPD/3.....1283	K4LSI.....1031
K2JYZ.....2828		K4TFL.....825
K2ZQG.....1920	W4ILF.....2305	W4UF.....782

K4DNL.....140	W7GUQ.....1980	K9DXK.....1392
	W7HXE.....1953	
K5PFF.....2700	K7EQM.....990	K0IKL.....3885
K5YIB.....2683	W7FDE.....949	
K5TXQ.....2520	W7WHV.....625	CR7LU.....5
K5BJU.....2205	W7DIF.....31	JA1YL.....108
K5BNQ.....2021		KA2HA.....45
	KL7ALZ.....906	K6QPG/KW6.53
K6OWQ.....2109	KL7BLL.....31	OA4HK.....90
K6BUS.....1550	W8WQE.....1522	VE3AJR.....2809
W6UHA.....1519	W8NAL.....575	VE3DKY.....2204
W6PCA.....1295	W8OTK.....473	VE5DZ.....945
K6VUE.....400	W8SJP.....238	VE7ADR.....1426
W6CEE.....261		VK3KS.....6
W6QGX.....240	W9MLE.....2432	
WA6CCR.....88	K9AVK.....1538	
	K9TUD.....1463	
W7PUV.....2253		

* YL Editor, QST: Please send all news notes to W1QON's home address: 318 Fisher St., Walpole, Mass.

First place c.w. winner in the AP was Joyce Polley, K0IKL, of Minneapolis. Joy's winning rig was a homebrew single 813 modulated by 809s and driven by a Knight kit to 150 watts with an RME 4350 receiver and 80 meter trapped long-wire and Hygain 40-10 vertical.

QST for



Phone

W1ZEN...8450	W5LGY...1890	W8RIR...1856
K11ZT...6038	K5JGC...1849	W8WUT...1755
W1ICV...3784	K5MZX...1375	W8VRH...1560
W1SCS...3772	K5TXQ...1183	W80TK...1313
K1DWH...2498	W5RZJ...553	K9CQF...8188
W1YPT...1983	K5MXO...219	K9QGR...4920
K1ADY...553		K9JVL...3105
	W6QGX...11,100	K9JDE...2890
K2JYZ...11,025	K6KCI...8680	K9LLK...2868
K2CUQ...974	W6GGX...7155	W9VNG...2593
W2OWL...659	K6OQD...6580	W9GME...1238
W2EEO...24	W6CEE...5344	K9TUD...935
	K6EXQ...5220	
W3URU...8414	W6WDL...4818	W6SZH...7685
W3MDJ...5336	W6UHA...4738	K8GIC...6105
W3JST...4750	W6WBH...3981	K8HEU...5885
K5SPD/3...3369	K6UHI...3612	K8IKL...5198
	W6AOE...3400	W6VTX...2774
W4CWV/LKM	W6CCR...3285	K8EVG...1908
	K6ANG...3250	W6VDM...1400
W4SGD...10,850	W6JMS...2646	W6ZWL...1400
K4TGA...9686	W6PCN...1150	K8KLG...1290
W4HLF...8775	K6VUE...750	K8BMS...1170
K4DNL...6250		K8AMR...960
K4RNS...5612	W7TGG...7128	CR7LU...180
W4KZT...5003	W7DIC...5850	DL6VM...350
W4WPD...4950	K7GEB...5555	J1Y1L...2414
K4CZP...4488	W7FDE...5536	KA2HA...1788
W4BIL...3848	W7HXE...5250	K6G6A...1026
W4UF...3569	K7CHA...4848	KP4APX...1235
K4SLI...3373	K7EBY...3998	K6QPG/KW6
W4IYV...158	K7IVK...3705	3423
	W7CSQ...2975	LU4DMG...1452
K5BNQ...15,031	K7GQI...2275	OA4HK...260
K5Y1B...11,948	W7DFI...2170	OH5SL...740
K5BJU...11,844	W7HWV...1885	VE3AJR...800
W5DRI...10,325	W7GGV...1789	VE3DDA...240
K5OPT...10,004	K7ADI...1495	VE6YW...1380
W5JCY...7865	W7NJS...236	VE7NW...5681
W5WXT...7595		VE7ADR...4600
W5ZPD...5400	KL7ALZ...6688	ZP5JP...1121
K5IMD...3753	KL7BLL...1958	Z55OB...1400
K5RUT...3025		
K5PFF...3015	W8HUX...6956	
K5RJJ...2635	W8ITF...2356	

Combined C.W. and Phone

K5BNQ...17,052	W6UHA...6257	J1Y1L...2522
K5Y1B...14,631	W4BIL...5747	W7WHV...2500
K5BJU...14,049	K5PFF...5715	K9TUD...2398
K2JYZ...13,853	W1ICV...5632	W7DIF...2201
W6QGX...11,340	W6CEE...5605	KL7BLL...1989
W4HLF...11,170	K5SPD/3...4652	KA2HA...1833
W3URU...9812	K4LSI...4404	W8WUT...1830
K8IKL...9083	W4UF...4351	W80TK...1786
KL7ALZ...7594	K5TXQ...3703	K2CUQ...1154
W7HXE...7203	K6QPG/KW	K6VUE...1150
K4DNL...6690	3476	K1ADY...718
W7FDE...6185	W6CCR...3373	

How fast can you copy code? 20, 30, 15 or 5 w.p.m.? Eileen Kline, KØILM, of Chillicothe, Missouri, recently certified at 55 w.p.m. in the Connecticut Wireless Association high-speed code program. The only woman to certify in the program to date, Eileen copied one minute solid out of a five-minute transmission at 55 w.p.m. from W1NJM. See complete details on this C.W.A. high speed program p. 94 this issue. (The ARRL code proficiency program only goes up to 35 w.p.m.)

KØILM picked up some of her extraordinary code speed when she worked as radio operator for the Army during the war. The XYL of KØJYV, Eileen normally operates around 7040 kc. with 350 watts and a W9TO keyer. (photo via W5FRZ)

TOP SCORERS

C.W.

First — KØIKL.....3885
 Second — K2JYZ.....2828
 Third — K5PFF.....2700

Phone

First — K5BNQ.....15,031
 Second — W4CWV (W4LKM).....12,658
 Third — K5Y1B.....11,948
 Combined phone and c.w. winner
 K5BNQ.....17,052

1960 AWTAR

The 1960 All Woman Transcontinental Air Race will start at Torrance Municipal Airport, Torrance, California, on July 9 and will terminate at New Castle County Airport, Wilmington, Delaware, on July 13. Mrs. Betty Gillies, W6QPI, of San Diego, will again serve as chairman of the Board of Directors of AWTAR. The 1960 race route will take the women pilots from Torrance, Calif., via Needles, Calif.; Prescott, Ariz.; Winslow, Ariz.; Albuquerque, N. Mex.; Amarillo, Texas; Oklahoma City, Okla.; Fort Smith, Ark.; Memphis, Tenn.; Chattanooga, Tenn.; Johnson City, Tenn.; Roanoke, Va.; and Wilmington, Del. Chattanooga and Roanoke are "must stops" for all aircraft.

Carolyn Currens, W3GTC, of Norristown, Pa., will supervise the AWTAR amateur radio net for the third year. Carolyn would appreciate offers of radio assistance from YLs who live in the cities along the flight route. To date the only city chairman named is K3HOC, Livy, for Wilmington, Delaware. W3GTC expressed the hope of making the AWTAR radio net all SSB this year.

Please contact W3GTC, P.O. Box 523, Norristown, Pa., if you would like to assist in this exciting annual operation.

New Certificate

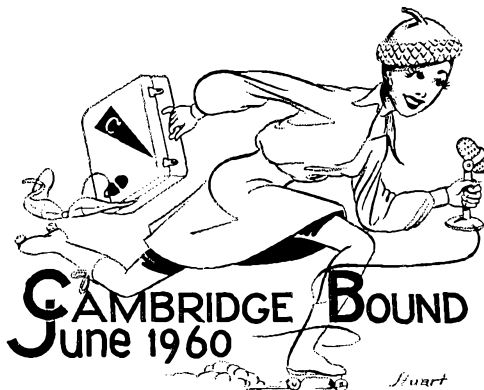
Is your OMI seldom heard on the air? Is the time he spends on the air inversely proportional to the amount of time you spend on the air? Announcement of the following new certificate should do something to make the long-suffering old boy feel needed again — to restore part of the prestige inevitably lost when you became a ham too.

In casting about for a novel subject for a certificate, *Western Radio Amateur's YL* editor, Jean Kincheloe, K6OQD, came up with the novel idea that closed the quest. Jean's thought is "to honor those valiant, patient OMs who keep us gals on the air — the OMs who have XYLs who are hams too." All in favor kindly move over and let the OMI rediscover his good old hobby.

The "Seldom Heard OMI Certificate" is awarded by *Western Radio Amateur Magazine*. Custodian is Jean M. Kincheloe, K6OQD, 6825 North Brightview Drive, Glendora, California. Contact is required with 25 OMs whose XYLs are licensed amateurs at the time of contact. All contacts must date on or after January 1, 1960. Any band and type of emission may be used. At least five states or coun-



tries must be represented. The contact must be with the OM himself, *not* with the OM's XYL. Submit list arranged in alphabetical order by OM's call with his XYL's call alongside and showing the date and frequency band of the contact to custodian mentioned above. No QSL cards are required. Stickers will be given for each additional 25 contacts. Rules for obtaining the stickers are the same as for the original certificate.



It's the Third International Convention of the Young Ladies Radio League that Miss WRONE is dashing to, of course! Hundreds of YLs are expected to follow our aerial right into historical old Harvard Square in Cambridge, Massachusetts, come the third week end in June.

The Women Radio Operators of New England will serve as hostess club for the YLRL. Marking the third such event, the two previous international conventions sponsored by the YLRL were held in Santa Monica, Calif., and Chicago, Ill., in 1955 and 1957.

Onie Woodward, WIZEN, and Mildred Doremus, WISVN, are coordinating activities for the big days, June 17, 18, and 19. The program includes reception, luncheon, banquet and entertainment. OMs are invited to the banquet on Saturday and to the picnic on Sunday at the country home of Helen, W1HOY, and Sam Harris, W1FZJ, in suburban Medfield. Ye Olde WRONE Gift Shoppe, a special convention project, will sell YLRL pins, stationery, and souvenirs. Prizes will be plentiful, and a handmade

bedspread containing some 30 squares, each depicting a YL certificate, will be awarded.

Site of activities will be the Hotel Commander just across the common from Harvard University in Cambridge. YL registration fee of \$10.00 includes coffee hour, luncheon, and banquet on Saturday. OM registration for the banquet is \$5.00. The informal gathering at W1HOY's home on Sunday is included in all tickets. Special hotel convention rates, reserving all rooms on one floor, should be made through the Convention Reservation Committee; Eunice Gordon, W1UKR, 55 Malibu Drive, Springfield, Mass. The special rates of \$8.00 for a single room with bath and \$15.00 for a double or twin bed room with bath are in effect only until May 1 (in order that all rooms may be reserved on one floor). Convention tickets may also be purchased from Eunice Gordon, W1UKR, at address given above.

Activities get under way Friday, June 17, at 2:00 p.m. with registration and informal reception. More details, including banquet speaker and additional program notes, next month. CU in Cambridge!

QST-

YL-OM Contest Reminder

PHONE Contest —

Starts: Saturday, Feb. 27, 1960, 1:00 P.M. EST
Ends: Sunday, Feb. 28, 1960, 12 Midnight EST

C.W. Contest —

Starts: Saturday, March 12, 1960, 1:00 P.M. EST
Ends: Sunday, March 13, 1960, 12 Midnight EST

See last month's column for complete contest rules.

Strays

There were almost more hams than orange blossoms at one wedding in Billings, Mont. K7BFJ was the bride; K7JAU, the groom; K7BKH, the mother of the bride; K7AEZ, the bride's father; K7EFP, best man; W7YHS, an usher and W7EPZ kept the guest book. The bride and groom met through amateur radio and courted via the air-waves.

YLRL NETS AND ROUND TABLES

PHONE

Freq. Kc.	Day	Time	Name and NCS
3890	Monday	1500 PST	Monday YL, W7HHH
7225	Monday	0900 EST	Bustle, K4IFF
7235	Monday	0900 MST	Clothes Line, K9MINI
28,800	Monday	2000 EST	WRONE, W1DCZ
3900	Tuesday	0830 EST	Blue Ridge, K4CZP
29,130	Tuesday	1300 EST	Hairpin, K6JPY
51 mc.	Tuesday	2000 EST	R.I.Y.L., W1GSD
3900	Wednesday	0830 EST	Yankee Lassies, W1UKR
3900	Wednesday	0830 CST	Welcome, W8ATB
7220	last Wednesday	1100 PST	Rotate NCS
14,260	Wednesday	1300 CST	SSB, K5BJU
21,390	Wednesday	1300 EST	Cross Country, KZ5VR
146.1	Wednesday	1900 PST	L.A. YL, K6BUS
3915	Thursday	2000 PST	Chirp, K6HHD
7215	Thursday	0900 EST	Friendly Party, W3UUG
7235	Thursday	1000 CST	Texas YL Roundup, K5BWM
7260	Thursday	0900 EST	Georgia Peach, K4DNL
14,240	Thursday	1400 EST	Tangle, W4SGD
7250	Friday	0900 PST	Roundtable, W6QGX
29,000	Friday	2200 CST	LARK, W9BCA

C.W.

3750	Monday	1200 CST	LARK, W9MYC
7150	Wednesday	0930 CST	K8EDH
7104	Thursday	0900 EST	K4CZP
50,160	Thursday	2000 EST	K4PPX
7185	Friday	1330 EST	KN4ANR

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Hmmm:

The OMs down at Tobin's were comparing their rakesmanship quotients the other night with unspectacular but amusing results. W9GAS, who has a fine stand of Kentucky blue under his antenna, turned out to be the most successful rakesman in the crowd. But this could throw no light on why the present influx of gardening enthusiasts into amateur radio. Man, you hear them going at it hot and heavy these days in phone round tables all across the land, repeatedly exhorting each other to "Rake, rake!"

Now W1DGL further arouses our curiosity with an inquiry on the X-raying of dogs. John recently logged several 14-Mc. phone fellows eagerly calling for such equipment, apparently without success. Most of the callers interspersed DX QSOs between their requests for fluoroscopy, leading W1DGL to surmise that the illness of their pets was not of an emergency nature.

We're intrigued by the need for X-ray apparatus specifically tailored to our four-footed friends. Wouldn't ordinary people-type X-rays do? But this is an era of specialization; possibly the science of roentgenology now requires a special approach to dogdom. The creatures are rather hairy, you know, and generally horizontally polarized.

Perhaps we could minimize the need for "CQ Dog X-rays" by publishing in *QST* suitable how-to-build-it information on a satisfactory canine X-raying device. And how about the kit manufacturers? Every dog fancier really ought to have such a machine available, for a DX hound who has swallowed his microphone is something sad to behold.

The field of "firsts" is always a favorite for banter among DX men. Popular VR2BC, formerly VP1GG, relays a quaint claim on this theme.

"At 1200 GMT on December 31st, VR2DC got in QSO with VR2s CC DI and DP on 7 Mc. They can fairly lay claim to having the world's first QSO for 1960 and the new decade, since 1200 GMT is 2400 in Fiji."

Any UAOs on the western flank of the Date Line care to challenge? And how about "lasts" while we're at it — who scored the final QSO of 1959 and the old decade?

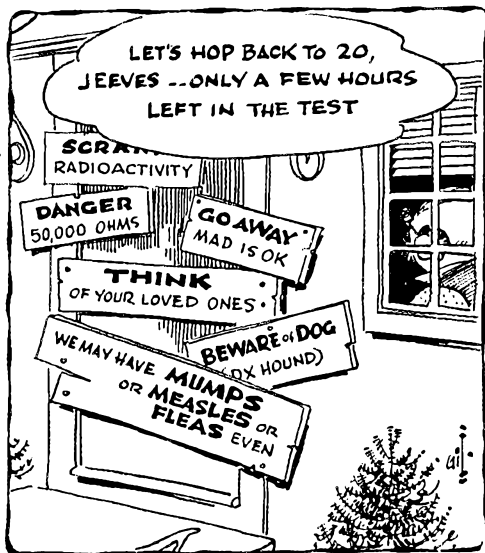
What:

That reminds your conductor of the two Christmas days he had in 1945, steaming homeward from the Philippines on a Liberty. Couldn't persuade the commander to break out a second set of roast turkeys, though. But that's beside the point, which is: How's DX? Not bad — not bad at all, according to the tenuous and tortuous "How's" grapevine. The opening week ends of our current ARRL DX Ruckus could have been a little more productive, but there is more,

much more, sport to come. It's already March, OM, and we leave those winter DX doldrums far behind in anticipation of the usual spring rally. To your dials! Pegasus awaits. . . .

15 Novice considerations deserve a crack at leadoff position on your "How's" Bandwagon. This bailiwick's days of ionospheric prosperity are numbered, so WV2s EJE (20/9 countries worked/confirmed), GHD IDMI, KN3IJP/KA2, KN4s FWJ APE (31/9), KN5UMC, KN7YI, KN8s NHC (38/20) and QEX (38/14) waste no time catching stuff like DM2AEH, DU7SV, EA1GZ, EI4B, FQ8AF, FS7RT, GM3UM, HHP4B, JA1ACB, KA2s CB HA KS, KL7s CEE DG, KP4APB, KZ5s EJ HK LDN, LA5AD/p, LU8EN, OQ5s BT PS, PI1KMA, PJs 2AA 2ME 3AD, SPs galore, SV6WJ, T12s CMF LA, UB5KCD, UA9TA, VE8DJ, VPs 7NS 9EX, VQs 2CZ 3CF, WH6DKN, WL7s CYR DCC, WP4s AST ATO, WV6IKG/KH6, XE3AR, YU3JN, ZE4JJ, ZL2GH, ZS1EB and the customary collection of X-ray and the customary collection of one crystal and a dipole, proving that patience and persistence can make up for lack of a shack full of gear.

15 c.w., Generally speaking, has lost little ground to the bear sunspot market so far. "She opens late, folds early, and I'm plagued by QRN a-plenty," laments K7GCK. But Mike, W1s BPW LAV, K1HRM, W23VZ, K4TBA, K5TER, W6JQB, K6CJF, WA6CRQ, W7s DJU POU, W8s KX YGR, K8s GJD POU, W9s IHN JIN WNV ZYD, K9LIO, W0DEL, K0s OSV OSW and EL4A swap Rs with AP4M (21,075 kc.) 1600 GMT, CEs 3UV (40), 9AF, CNe 2AY 2BX 8IX, CQ2s LE RC, CR5AR (70) 21-22, CT1DJ, CX2BT, DM2AZL (29), DU7SV, EL4A, FA8TT, FE8AH, FQ8s AF AG AH, GC3s CGK HFE 16, GD3UB 18, HCUJW (50), HP1SB, HR6AB, IT1TAL, JA6 1AJU 2AB (72), 3IS 5LQ 2R, 80F 9FV (100) 5, KA2s CB DJ, KCs 1BL 6AGL/nm 6FAE (55), KM6BI, KR6s JM MD, KV4CG, OAs 3D 4FM 4HK, OD5LX, OQ5s IG 19, PS, OX3NK, PZ1AU, SPs 6KBE 16, WM, ST2R, T2CAH, UAs JNA 0KID, UB5QF, UC2AX, UD6AM (50) 15, UO5AA 16, UQ2AB 15, VPs 2AR 5AIE (25), 7BF (85), 7NE 7NT 8EH (90), 8ET 9EU, VQs 2JMX 3CF 4EZ (10) 20, VR3W, W5EZE/KG6 (73), XE1PI, YV4CI, ZB2I 20, ZD2JKO 20, ZEs 6JT 8JG 8JJ, ZP51P, ZSs 3AH (35) 22, 3I) 7AI and 5A2CV. . . . Fifteen phone stock tumbled sharply on the international exchange. "Hardly sensational" is the way EL4A puts it. Ken, K6LAE and W0HJN list PZ1AX (225) 1, VP4MI (210) 21-22, VR2BC (200-220) 2, YN9DL (225) 18, ZD1s AW 1, EO (215) 1, ZS9G (180) 20 and 9M2GA (225). The spring surge should be setting in shortly to help things out for a while but there's no doubt that the late-'50s 21-Mc. boom is now behind us.



* 4822 West Berteau Ave., Chicago 41, Ill.



The land of snowy sports, smorgasbord, and Ingo's right-hand bombshell supports a significant segment of our DXing fraternity. From left to right across these facing pages are (top row) SMs 7AVA 6AJN SRM 1BVQ 7BVO 5AQV, (bottom) SMs 5BT 7Q 6BD5 7CNA 1BSA and 5AHK. Sweden's reputation for ham hospitality is unsurpassed, so if you ever find yourself in this fair kindgom by all means trace the feed line of the nearest rotary beam.
(Photos via Ws 1SVR 7DUJ 7GYR 7PHO and 0VFM)

10 phone, on the other hand, hangs on tenaciously, aided by W2JGF, K2TAP (165/90 on 28-Mc. voice), W4YQB (150/141 likewise), K4TEA, W5ERY, K5TER, W6NKE, EL4A, G2RS, VE1PQ and s.w.l. E. Hamill. They managed CNs 2AQ (400) 16, 8JK, CRs 4AP 6BJ, CT2AN, CX8BM, EL6N*, GC2RS, HC6KA, HH2AR, H5CA, HKs 1HV 3LX 6AR, HDs 1CA 31A, HR1H (240), JA1s AET AEQ/B RDP, BHR BOW BRD BRJ, BTH CEY CIB, JAs 2SB 2XW 3AUD 3110 61V 7GB 9CQ, K6s MOG/KG6 QPG/KW6, KA2s GI PC, K6NA*, KM6B1*, KR6s AP AM CE IA IIV, KW6CQ, KX6AF, LX1DC, LZ1EBE, MP40A, OE1HZ, SP5XM, TF7WEE, TL2s LI VE, UA6NP, UB5VO, UI7FA, UO5SA, UO2AN, UR2BU, VESAB, VKs 2AM 5MS 9CP (400), VP2 1HA 7BE 7NT 810 (400), 9EC, WA6DFH/mm, XE1CCS, YVs 1BS 1CAA 1WV 4CB, YQ2KAM (350) 17, YS1LA, YVs 1CS 5AY, ZC4DP, ZD3E (300), ZE7JK (350) 18, ZLs 1ASG 1KW 1UM 2BE 2UD 3AF 3OB 3PT 4KD, 5A3TR and 9M2GA. But the real fillip comes from those Russian v.h.f. imports to 28 Mc., such as RA5 1GN 1KBW 3AGJ 3AGO 3AKT 3PKN 3VGR 6XAA 9CAR 9HAA 0CAY, RB5s BPT KFN, RC2ASB, RD6s ADR KAR, RH8ABC, RL7KBT, RN1AA, RO5BDG, RP2s ABA ABQ KCK KNL NCH and RR2RCK. Asterisks (*) in these phone paragraphs indicate single-sideband users.

10 c.w. piteously pleads "Don't leave me, fellas!" W1-BPW, K2s TBU UYG, W3AEQ, W4ZM, K4TEA, K5QPG, W6NKE, K6CJF, K8GJD, W9s OGY WNV, K9s OSV OSW and EL4A stand by their 28-Mc. guns because of CE1AD, CN8J, CO2QR, CRs 5AR (120) 21, 7IZ (53), ET2US, FA8IH, FO8s AF HA (85), GB2RI just England, GC2FZC, HK0AI of San Andres, JAs 1ANP (100) 23, 1BR1 1BHT (35) 23, 1YL 2RP (60), 5HN (75), 6AA (118), 6AGA, OE3CZ, OO51E, OX3NK (42), TI2s CAH (100) 19, CMF, UA6LI (55), UB5VR, VE8RG, VO2s 2LW (105) 15, 3HH, W5FZB/KG6 (95) 23, XE1s P RY, ZC4IP, ZD2-GUP, ZEs 2KL 3JT 6JN and sundry ZL/VKs. This month's ARRL Test c.w. week end could be 28-Mc. c.w.'s last really fancy thing for quite a spell, so hit it hard, men.

20 c.w. disregards propagational prophets of gloom, as a rule, so W2s DOD GVZ (256), JWK, K2UYG (125/105), W3s KGB INH (90/58), W4UO, K4TEA (126/104), K5s QPG TER (115/92), W6s JQB KQ PHF, K6s CJF LAE (174/159), WA6CRQ, W7s DJU LZP POU (38/12), K7HDB (24/13), W8s KX (174/159), YGR, W9s

CLH (58/36), HHN JIN WNV (109/75), ZYD, K9GDF (40/29), W0DEI (186/177), K9s OSV OSW RHE, VEs 1PQ 7CQ (213/188) and EL4A appropriated CE9AJ, GM2QN, GN2BK (70), COs 2AP 7NR 8PH, CRs 4AX 5AR (85) 4, 7AN 7CH 7IZ (59) 21, VL DJ-YL, DM2AMG, DU2s 1OR (61) 19-20, 7SV (80) 9, FAs 8CF (8) 23, 9AP 9GC 9AB, EL4A (20) 6, ET2US, F9UC/FG (75) 16, FAs 9IH 9UO 21, FB8s CJ (40) 15, CK (5) 15, NX (50) 4-12, FF8CR, FG7XC, FO8s AC (40) 5, AX 3, FO8HE, FR7ZD, GD3-FBS (30) 16, HAs 2AM 5BT 3CG, UB9YG/mm in the Pacific, HCs 1IT 1JW 2AM, HE 5CN, HL9KE (30) 15-17, HK3TH, HR2FG, HR1MM, IS1JNL (40) 22, IT4GO (30) 16, JAs 1CN 1DN 1HP 2UR 3AB 6AFG 7KY 8JA (35) 23, JT1AB (30) 1, KAs 2KC 5MC 4, KGs 1BH 1BX 4AB 6AAY (70) 5, 6AHY (75) 7, 6FAE 5, KL7DIE/VE8, KM6BR, KR6AF, KV4AA (80) 23, far-northern LAs 1NG/p (18) 20 of Jan Mayen, 3SG/p (37), 4UG/p 5AD/p 8FG/p, far-southern LU2Z1 (10) 3, LZ1s AF KBA, OO5s 1G KJ (44) 17, RH, OX3s DJ 1R, PJ2s AW ME of Sint Maarten, PY7AFN (50) 1 of Fernando de Noronha, PZ1AP (10) 4, RAEM of Moskva, SLs 2AD 8AY/mm, SPs 3DG 5AH 6WM (15), 8KAF, ST2AR, SU1MS, TFs 2JWEN 2WRQ 3AB 3MP 5TP (10) 1, UA9s AU CN FH JR ZY OH, UA0s AS AZ KCK KFG KFI KID KOA KUA KZA mostly around 4, UB5s in quantity, UC2s CB KAR (46), UF6AJ, UJ8AC 4 with a YL at the key, UL7s FA (80) 17, GP KAA KBA, UP2KBC, VEs 6AAE/SU at Gaza Strip, 8DX 8RX 8TU 0NL, VKs 9RO (60) 7 of P.T., 0IT on Mac Is., 0RII (40) 16 of Wilkes base, VPs 2DY 2KT 2KH 3IG 4LA 4WD 5BL 6AP 7NT 8BK (10) 4, 9EP 8AA/mm, VO2s 2AB (80) 16, 2WR (20) 16, 3CF 4AP, VRs 1B (35) 4, 3W (5) 7, VSs 4FC (10) 15, 6AZ 6EA (80) 16, 9AJT, VU2s CE DR VK (40) 17, MIS NR RA1 (60) 15, XZ2s BB TH, YN1BS, YO2BM, YS1O (25) 13, YU300/mm, YVs 5EZ 5GO 6BI, ZB2N (80), ZDs 2IHP 3S (90) 16, 9AK, ZERJG, ZK1AK (50) 8, ZL3VH/3 (80) at Chatham's, ZM6AB (85) 5, ZP5AY, ZSs 3AH 7M, 4S7s EC (60) 17, NG, 4X4s DK JR and 7G1A of Guinea. The openings surely have been short and spotty, most unusual at times. Also, compass bearings have changed southward for countries south of the equator, a deflection of 15 to 30 degrees on received signals." Those are observations of W7DJU, and from what other Sevens have to say, our Northwest will be hit first and hardest by the declining sunsplatter. W6PIIF/P08AW opines, "DX, though not as common as last year, is still very much available. However, a good beam at a respectable height



with a clear shot at the horizon is necessary, for the usual angle of signal arrival these days is somewhere around 10 degrees." (Horace Greeley might have put it "Go up, young man, go up.")

20 phone tags along. Lots of stuff pounding through, all right, but the percentage of rarities who regularly tune the W/K subband is small except for contest periods. Anyway, K2UYG, W4IUO, K5TER, W6KG, K6LAE, VE6s 1PQ and 3DZL account for CN8CS 5, CT2AH 22, CX2CO*, EL4A 7, FB8BC (135) 13, FO8AC (150) 9, HC1JU*, HP1GP*, KC4USB*, LA3SG/p (311) 14, PZ1AX* (315) 21, T2WYR*, UA1AG, VE2AIG/SU, VP6s 2AR 3IG, VO2SB YS1MMI*, ZD7SA, ZE7JZ (175) 16 and last but not least, as the old tag goes, 9N1GW*. The little stars (*) blink for sideband specimens.

40 c.w. "is open very FB almost every morning," says EL4A. "Not too good," argues K5TER. W2WAS is of the opinion that "We used more DX on 40. Most DX stations concentrate only on 20, and we could use more Caribbean and South American activity." Those three stalwarts, W1BPW, K2TBU, K5JVF, W6s JQB NKE, K6s BX KDS, WA6CRQ, W7s DJU LZP, K8GJD, W9s JJJ WNV ZYD, ISWL and listener A. Rugg turn the 7-Mc. spotlight on such possibilities as CM8EM, CO6s 2JP 2PY (14) 5, 7RV, CP1CJ (7) 23, CT2AI, CX2TF, DU7SV, EA8CG 7, EL4A (7) 8, FA8s BG (32) 6, RJ, FP8AP, HA5DH, HK7MM, IT1AGA, JA1s ALU BTG BZS CEI CID CIU CJF CKB CMG CMY CPM CVV DJD DNI DZC LE LF NM WU, JA2s AGH AIX AJP BP KX UJ WB, JA3s ANH AVD BCO BDP REK BGF BJF FV IS, JA4s HM PE TC VQ VR ZN, JA5MU, JA6s ACZ AFL AGJ AKY EU ZB, JA7s IJ JQ/7 LX VJ WB XF, JA8s BP DS/1 GU JC JD HG HO MS OY WX, JA9s IV MT, K6GAG (20) 2-23, KM6BJ, KR6MD, LA6U, LZ1s AF KZG KRU, OA4FM (10) 11, OF6s 1RZ 6KZ, MP4TAF, PJ2AN, PY6s 2BEZ 2BIS 2BV6 7AN 7NS 7SJ, SP6s 8MJ 9GJ, TI2s CMF WR, UA6s 6FQ 9CM 9KAB 0AZ 0FF 6IK 0IM (5) 5, 0KDA (30) 16, 0KID (90) 4, 0KUV 0SP, UB5s FJ KCV UT WF, U18s IM KAB, UJ8KAA, UM8KAB, UN1AA, UO5PK, a fistful of VKs plus 2K9XK, VP6s 2KH (38) 7-8, 4WD 7NT (5) 23, 9BO, VO6s 2V 4AP, VR6s 2DK 3Y, V5ICN, W5YQO/VE8, XE3BL, seeds of all Y fellers, YV4s AC CI, ZB1NR, ZC4IP, ZE8JW, ZLs in all call areas, ZY6s 10 (7) 14-4, 6DH, 4X4s DH (1) 1, FK and FU. . . . Novicewise, KN5VUY claims a QSL from VU2CQ for a 7-Mc. QSO of last October. Sakes alive!

40 phone is a puzzle for W/K/VEs, it seems, but ISWL DXplorers report 7-Mc. voice activity by CN8s AM AR BF CD CS JX, CO8OK, EA8s BC CR, HA7KLL, HI8MAR, HZ1AB, LZ1VW, OH0NC*, PY6s 4A1A 7NC, PX1PA, UA6s 1AB 1DZ 6LI 9CM, UB5s CI KCE KGF LV WN, UP2s KCB KNP, UO2AN, UR2s BU KAE, YO1SF, YV6s 3AS 3CY 5BD 5HM, 4X4s FV GB and 5A2CV. Come, fellows, any QSOs?

75 phone comes through neatly for the sideband crowd, W1FRR reporting: "W1s BU and FRR have been holding nightly schedules with Europeans. Those most often worked are G6s 2MF 3CWL 3LFF and GW5TJ, CN8IX, DL4AS, DL3WV, G3s DDK and JPE are also worked, plus numerous others. Over fifty Europeans were worked in December, as well as ZL1ACG. W1s FOS HKK and ZBT have joined forces on this side. We'd appreciate some publicity in this work to attract other DX stations to 75 and 80 s.a.b. We W1s transmit between 3825 and 3830 kc., tuning below 3800 for DX." OH0NC*, OK1H*, LX1DC and UB5CI are other European 75-meter entries listed by ISWL and K8GJD.

80 c.w. "is really booming," to quote K2SPG. And EL4A says, "I've been trying hard on 3.5 Mc. but no one will listen hard enough. I hear the East Coast boys almost any morning if the QRN is not too rough." Jim, Ken, VE2HN, A. Rugg, ISWL and VERON recommend CO2QR, DL6s 1FF 8BB, JA3JM, MP4QAO, OK3s DG MM, OY7ML, PA6s LOU VDV, UA6s 3MB 6MK 9CM 9JY, UC2AU, U18BS (14) 20, UL7JA (14) 18, UO2AN, UR2CB, VP6s 3AD 7NE, curious ZA5DM (1) 19, ZC4IP and ZL3JT for your 3.5-Mc. dots and dashes.

160 c.w., after dismal December doings, really came to life in January. W1BB reports DJ1BZ, DL1FF, G6s 2IM 3PU 5JU, OK3EE and ZL3RB poking through on 1.8 Mc. at various U.S.A. points. Our Ones, Twos and Threes scored scattered two-ways with Europe and a peculiarly selective skip was observed. While DL1FF was pouring in along with DJ1BZ and OK3EE, no G6s were heard — hummm! (Other DX reported on 160: G2SU, G6s ABM/p CNM ERYN FPQ LBM LQ MEK NEDY NEO NLN, G6s AG MY NC PW, G6s GM HB, OK1FV and a spurious Y64. Who's who on 1.8 Mc. on our side? W1s AW BB BJL EFN GDB IGU JNO PPN, K1KSH, W2s EQJ GB GGL KFR TR, UVD WFL, K2s BWR DSW, W3GQ, W4s NAD UUP, W5s KWL SOT, W6s KIP LN YC ZH, K6s HXT RAN RIF, WA6CDR, W7WJF, K7HDB, W8s ANO FHE GDQ IQS JIN QHW QVI VYD, K8s HBR/8 ONP, W9s EGQ OJH PNE PWU, K9s DAVY 1DK ABR ONG, W0s GBV IFH NWX TQD ZOU, VE6s 1HJ 2AY 2AZI, W1s 3RWY and 3QU are in W1BB's book as active this season. By the way, Stewart, W2EQS and friends have suggested a 160-meter QSO party for the 11th-13th of this month — be there if you can — and an FP8 may be on hand to add to your multipliers in the closing sessions of the 26th ARL International DX Competition. Reel out that long wire!

Where:

Africa — "As of January 12th I am W/K QSL manager for ZD2JKO who promises to be very active. Please mention my for the usual self-addressed stamped envelopes." This from W4MCM, and for the benefit of non-W/Ks w0

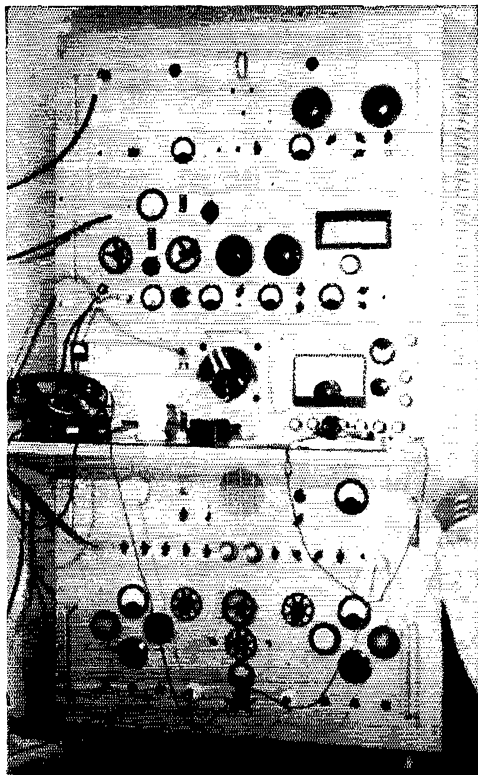
list ZD2JKO's direct address in the roster to follow. ZD2-JKO adds, "My name is an essential part of the direct QTH because some 250 people work at the research station and a call sign alone would not find me. I am grateful to W4MCM for his kind offer concerning W/Ks and I shall airmail a copy of my log to him weekly, or fortnightly if a week is lean." "There must be some error regarding QTH listing of W6KII and K6KII," writes W6IOM. "The Dunsmuir Amateur Radio Club, W6KII, is receiving many QSLs for VQ6LQ which should be sent through K6KII." No errors involved that we know of, except possibly on the part of QSLers who are thrown for a loss by the *Call Book's* curious lumping of U.S. calls by suffix instead of prefix. As it stands now, Ws and Ks can expect to receive each other's mail quite regularly. . . . To date EL4A (W7VCB) has some 9000 QSOs in the book with 500 QSLs to show for it. "I continue to QSL 100 per cent upon receipt — direct by air if sufficient IRCs are enclosed, otherwise via bureau." . . . WVDXC mentions PA9UN's dispatching ZF3JA/ZD6 QSLs en masse via the bureau route. . . . FA9UO comments to W9WNV: "IRCs are a considerable help when one signs a 'rare' call and must reply to 100 or 150 QSLs per month. I make it a point to QSL 100 per cent direct in reply to cards received, but this is quite a weight on the budget." "I prefer to QSL direct," states 5A1TN, "100 per cent upon receipt." . . . EA4FX of URE writes, "We ask all amateurs who worked EA9IA in Sidi Inni and who have not received QSLs, to send their cards to URE. Those who wish confirmations direct should include International Reply Coupons."

Asia — "I am pleased that I will receive my DXCC certificate this month," writes W2FSA, referring to her recent activities as KR6HI. "If I owe anyone an Okinawa QSL I will be happy to send one on receipt of advice to this effect. As KR6HI I tried to send QSLs to all contacts but in the rush of packing and returning to the States I feel I may have missed some." . . . FFARL tells K6CJF of apparent KA2KH piratings. . . . W6PIH hears from 4S7NG (whose new address follows): "Sorry about this bad QSL situation but it all came about because I had to go to England suddenly last May. I returned in November and will QSL 100 per cent as soon as I have straightened things out." . . . W6YY understands that 9N1GW began hitting the mail with QSLs beginning in mid-January. WGDXC has it that "QSL service might be a little slow for the boys who work 9N1GW two or more times." . . . SCDXC notes that ex-4S7FJ awaits QSL inquiries back home at G3IDC, ex-4S7KD likewise at the QTH to follow. "Soon there will be no RAF personnel remaining in Ceylon, so activity should drop considerably."

Oceania — "VK0CC, now QRT from Macquarie Island, will continue to have QSLs handled by VK4FJ," informs s.w.l. A. Fallert, assisting Stateside dissemination. "I've handled over 700 U.S.A. cards for Ray. He tells me there's another large bundle on the way, but from now on they'll become fewer and fewer until everyone is taken care of." . . . Regarding the ex-PKs roster in January's column, s.w.l. L. Waite of NNRC discovers that the contemporary W2EJV knows naught of PK3EJ doings nor the current whereabouts of the preceding W2EJV licensee. . . . Ex-KA8KW, now KH6DMP, declares, "I'll QSL 100 per cent with new color photos of Hawaii as soon as they come from the printer." Wonder if Jerry can keep the pictures up to date with all the topographical changes taking place around there. . . . KR6MD (K2GAS) tells W1VG you can skip IRCs and self-addressed containers. For one thing, Dick uses king-sized QSLs. . . . WIA's *Amateur Radio* lists VK0s GB and JM available at Mawson and Davis antarctica bases, respectively, while VK0s IB and IT rough it on Macquarie. . . . Collector's item W6KUF/mm (see "Whence") is readying 5000 cards for 100-per-cent response.

Europe — VE7ZM undertakes LA3SG/p's North and South America QSL duties, according to W6YY, while LA6VC handles the rest of the world. . . . K6CJF nominates CT1JY and DU7SV as QSLers of the Month, both being fast with the air mail when supplied IRCs. . . . W2TTA assures W1WPO he has contracted for no Gibraltar QSL chores. . . . ON4GM, who delights in working W/Ks by the logful on A3, iterates his request that only the QSL address in our October '59 column be employed. . . . Amateur radio bibliophiles be apprised that the 1960 *RSGB Amateur Radio Call Book* now is off the press. British Isles amateurs are its theme.

Hereabouts — QSLs for the KS4AZ uprising of Ws 3KA 4JNE and 4KFC should go to W3KA, s.a.s.e. requested from W/Ks. IRCs from overseas applicants. Ralph rightly insists that GMT notation be used. . . . W3CTN declares he handles no Swan Island station's QSLs at this time, and VS1Q tells OVARA inquirers we can forget about YS4RA. Cruel world! . . . "Anyone requiring QSLs from VESMX for W/K/V/E Contest QSOs can raise me through ISWL, RSGB or direct." Jack's U.K. address follows. . . . Canadian s.w.l. A. Rugg says it's possible for W/Ks to employ Commonwealth Reply Coupons (six cents each) for defrayal of postage at overseas Commonwealth points, Financial Branch, Post Office Department, Ottawa,



SP6FZ has one of the most impressive home-built amateur stations we've ever come across. Jan writes, "I am an electronics engineer specializing in biophysics and electronics in medicine. For 35 years all my receivers, transmitters and measurements equipment have been home-made." This compact console includes transmitting, receiving and measuring gear for all bands 3.5 through 420 Mc. SP6FZ entered the ham ranks 'way back in 1924 as TP4R, then signed SP3AR and SP1AR, had his WAC certified in 1930, and scored his first 400-Mc. QSO in 1936. Right now Jan heads for the 200-country DXCC mark when he's not tooling around Poland's countryside in his favorite beetle.

is the authority to consult concerning CRCs. . . . VP7-NE (W9QXF) enjoys birdwatching at RCA Missile Base 4 down Eleuthera way and assures thorough QSLing for all QSOs from the QTH to follow. . . . Back from a Bermuda visit, W3INH says, "RSB's membership is very keen on QSL activity and a systematic QSL clearance is run at all club meetings to ensure fast replies." . . . Ws 2IGF and 9RKPF offer QSL managerial assistance to deservingly overseas rarities. . . . W1CRA, through W1WPO, says ex-VP1SD will review his logs and QSL records when he gets settled in new Alberta digs. Patience, please. . . . VP2LO (G3JJS) comments: "I have heard a number of Stateside fellows complaining about DX stations who insist on IRCs for direct QSL reply but it must be realized that

the expense of 100-per-cent direct QSLs can be prohibitive. The finances of the average amateur in this part of the world are very slender, and about nine of every ten QSOs result in QSL requests. My own stock of cards has run out, incidentally, and November-December 1959 contacts will have to await my return to England. All contacts will be acknowledged." Contrary to earlier specifications, K3CFR declines responsibility for VP2LO QSL matters Bear in mind, if you will, that the entries in the catalog to follow are necessarily neither accurate nor "official". But they may speed up your next DXCC endorsement sticker, so help yourself, OM:

- ex-CN8EG-WIPWK, S. Vacca, KH6DJP, 3917 Kidd Dr., Honolulu 18, Hawaii
 CT1JY, Rva. Tanente Espanca 44, r/o-D, Lisbon, Portugal
 CT1SSB (to W2BIB)
 CT3AK, A.H.D. Trigo, P.O. Box 257, Funchal, Madeira
 DL4SH, H. P. Smith (W0CLC), C Btry., 1st How. Bn., 15th Arty., APO 177, New York, N. Y.
 FB8CJ, Box 770, Tananarive, Madagascar
 FE8AH (via K11VT)
 FM7WU, H. Fontaine, P.O. Box 61, Fort de France, Martinique, F. W. I.
 GW3ITD/ma, M. R. Davies, HMS *Puma*, GPO, London, England
 H18JSM, J. S. de Marchena, P. O. Box 521, Ciudad Trujillo, D. R.
 H18TBW, T. Willers, Box 155, Ciudad Trujillo, D. R.
 HK7MM, Box 172, Bucaramanga, Colombia
 HL9KR, J. Derrick (W0CQK), 1246th AACs, APO 970, San Francisco, Calif.
 ICIAGC (to IIAGC)
 IEISMO (to ITISMO)
 K1HX/VO1, W. H. Perry, 1933-2, AACs Sqdn., APO 864, New York, N. Y.
 K4AAV/VO2 (to K4AAV)
 ex-KA8KW, Col. G. E. Branch, KH6DMP, 623 Sperry Loop, APO 915, San Francisco, Calif.
 KG1BL, APO 23, New York, N. Y.
 KL7BRD, Box 1111, Douglas, Alaska
 ex-KL7CXR, W. Schneider, P. O. Box 1567, Sauterue 29, P. R.
 KN3JJP/KA2, W. B. Johnson, Box 1544, APO 994, San Francisco, Calif.
 ex-KR6HI (to W2FSA)
 KR6MCB, USN-MCB 11, FPO, San Francisco, Calif.
 KS4AZ (to W3KA)
 LA3SG/p (see text preceding)
 LA5GC, T. Heibreen, Bomannsvikyn, Nesoddhoga P. O., Norway
 LU9HAA, G. Woods, Paseo Colon 439, Buenos Aires, Argentina
 MP4QAK, P. O. Box 56, Doha, Qatar, Arabian Gulf
 OD5LA, c/o U.S. Embassy, Beirut, Lebanon
 OQ5KJ, J. Eeckhout, P. O. Box 469, Kolwezi, Belgian Congo
 PZ1AX, Box 1842, Paramaribo, Surinam
 ex-ST2KO (to ZD2JKO)
 ex-SV0WB (to W4SSG)
 UA0LO, Box 29, Vladivostok, U.S.S.R.
 VE6AAE/SU (via VE6EO)
 ex-VE8MX, J. Campbell, 48 Abbey Dr., Bangor, Co. Down, North Ireland
 VK9GW, G. Williamson, Telegraph Office, Samaria, T.N.G.
 VK9TK, Rev. T. Keller, Catholic Mission, Kuru, New Ireland
 ex-VP1SD, S. D. Thompson, P. O. Box 68, Minburn Village, Alberta, Canada
 VP2DY, Box 63, Roseau, Dominica, W. I.
 VP2LD, Castries, St. Lucia, W. I.
 ex-VP2LO (to G3JJS or via RSGB; see text preceding)
 VP3IG, I. Gouveia, House 726, East Ruinveldt, Box 331, Georgetown, B. G.
 VP7NE, A. Kiracoe (W9QXF), RCA-PAA, Eleuthera AAFB, c/o Patrick AFB, Florida
 VP9RR (via VP9BDA)
 VR3Y (to G3MEY)
 VS1AQ, L. K. Ayre, 31 Berrina Rd., Singapore 10
 ex-VS1BB (to G3KXN)
 VS6EA, 24B Carnarvon Rd., Kowloon, Hong Kong
 W4ZGD/VO1, J. L. Cadien, ATC, RATT 15, Navy 103, FPO, New York, N. Y.
 W6KUF/mm, CWO J. E. Serpa, USS *Yorktown* (CVS-10), FPO, San Francisco, Calif.

- W6RVO/VO1, C. McFeeley, 1997 AACs Sqdn., APO 862, New York, N. Y.
 WA6EDM/KG6, S. Parker, USNAS, Navy 943, FPO, San Francisco, Calif.
 ex-XW8AH, S. Waggoner (W8UTQ), c/o U.S. Embassy, Tunis, Tunisia
 YN1AB/4, H. G. Heinrich, via Mission Catolica Siuna, via Managua, Nicaragua
 YN1XW, c/o U.S. Embassy, Managua, Nicaragua
 YN4FSC, T. Hermano, Box 10, Bluefields, Zelaya, Nicaragua
 ex-ZD1FG (to G3NUZ or via RSGB)
 ZD2AMS/FD8 (to ZD2AMS)
 ZD2JKO, Dr. M. Dransfield, Regional Research Stn., Ministry of Agriculture, Samaru, Zaria, North Nigeria (W/Ks via W4MCM)
 ex-ZD3BFC-MP4BCL (to G3BFC)
 ZD3S, Box 251, Bathurst, Gambia
 ZE2KG, 30 Seventh St., Gwelo, So. Rhodesia
 ZE8JJ (via W6UNP)
 ZM6AP/ZM7-ZM7DA (via W7PHO)
 ZS3AH, A. M. Horn, Vox 297, Windhoek, Southwest Africa
 ZS6ALD, W. A. Rothero, SAAF Tel. Cen. AFS, Waterkloof, P. O. Lyttelton, Pretoria, So. Africa
 4S7EC, Box 907, Colombo, Ceylon
 ex-4S7FJ (to G3IDC)
 ex-4S7KD, Sgt. Denham, 114 Sgts. Mess, RAF, Colerone, Bath, Wiltshire, England
 4S7NG, N. Gunasakera, 48/9 Ja Ela, Ceylon
 5A1TN, D. F. Eyman, CAMS Box 496, APO 231, New York, N. Y.
 5A5TA, P. O. Box 638, Tripoli, Libya
 9M2EZ, D. Parker, 5 Edgar Rd., Ipoh, Malaya
 9M2Z, GN GO GP GO, Soobraan Camp, Taiping, Malaya

The preceding directory was contributed by Wis CRA ELR UED WPO, K1LVW, W2s DOD JGF WAS, K2s GAS QXG ULT UTC, WA2GWF, W3INH, W4HVV, K4TEA, K5LLJ, W6s JQB KG PHF YY, K6s CJF LAE, W7LZF, W8s KX YGR, KN8NHC, W9s IHN JJJ OGY WNV, K9LIO, W0DJE, K0RHE, KL7AZZ, VP2LO, International Short Wave League, Japan DX Radio Club, Malayan Amateur Radio Transmitters Society, Newark News Radio Club, Northern California DX Club, Ohio Valley Amateur Radio Association, Southern California DX Club, VERON'S *DXpress*, West Gulf DX Club, Willamette Valley DX Club and the Wireless Institute of Australia. You'll note abbreviations of those club names elsewhere in these pages in acknowledgment of other information of potential interest to the readership. Come again!

Whence:

Europe — The popular and annual USKA (Switzerland) *Helvetia-22 DX Contest* looms on next month's DX agenda, beginning 1500 GMT on the 2nd and terminating at 1700 on the 3rd. "Stations outside Switzerland will try to work as many amateurs in each of the 22 Swiss cantons (states) as possible, c.w. to c.w. and phone to phone." The serial swap consists of the usual five-digit (phone) and six-digit (c.w.) figures — RST001, RST002, etc. — and each QSO per band with a given HB station nets you three points, these to be multiplied for final score by the number of band-cantons worked (maximum possible by combined c.w. and phone effort, 44 per band). Swiss stations usually tie caution indicators to their calls as follows: AG, Argovie; AP, Appenzell; BE, Berne; BS, Basle; FT, Fribourg; GE, Geneva; GL, Glarus; GR, Grisons; LU, Lucerne; NE, Neuchatel; NW, Unterwald; SG, St. Gall; SH, Schaffhouse; SO, Solcure; SZ, Schwyz; TG, Thurgovie; TI, Tessin; UR, Uri; VD, Vaud; VS, Valais; ZG, Zoug; and ZH, Zurich. For a shot at flashy H-22 Test merit certifications offered to the two highest scorers in each W/K/VE/VO call area (and each DXCC country) shoot a copy of your log off to USKA Communications Manager HB9CM postmarked no later than April 20, 1960. "Entries will only be accepted if submitted on separate sheets for each band, using only one side of the paper, and with the [signed] declaration: 'I certify that my station was operated strictly in accordance with the rules and spirit of the contest, and I agree that decisions of the council of the USKA will be final in all cases of dispute.'" Check with HB9CM, too, for details on qualifying for the coveted Helvetia-XXII certification, one of Europe's most difficult "WAS" achievements. This year's

"DXCC" No. 22 falls to G8JR, first G-lander and first 1960 claimant to meet the simple specs on page 69 of your July 1959 "How's". Collecting QSLs from ARRL DX Century Club members in 100 or more countries is scarcely less difficult now than it was three years ago when we first brought the matter up. Say, has anyone yet confirmed QSOs with DXCC members in all fifty United States? Regular overseas participants in the League's yearly DX Competitions ought to have the inside track on this one. No, don't send us the QSLs—a photo of the first "WAS-DXCC" collection will suffice.

March 1960





version of the VERON (Holland) PACC DX Contest occurs on the week ends of April 30th-May 1st (c.w.) and May 7th-8th (phone). PA9VB informs that particulars will be the same as last year except for starting and ending times. Details will appear in next month's QST. That May 7th-8th week end will be a busy one for contesters. U.S.S.R.'s Radio Amateurs Federation also schedules its usual Radio Day world-wide DX competition for that period, details to come DLICR and cohorts are determining DXcursional feasibility pertinent to the Athos Republic, that autonomous religious community constituting one of the governmental departments of Greece. . . . W1BDI relays word that Stanford (Calif.) Radio Club members will try DXing from the other side with a DJ9 label. W4PC entertains the same idea for this summer. . . . "Worked HB9YG/mm on his way to Japan," remarks W8KX. "Who says the Swiss have no navy?" The SP DX Club offers non-European DXers certification for QSOs with ten of its members, contacts to date after October 1, 1959. W2JWK lists some candidates: SPs ZAP 2BE 3PL 5GX 5HS 6PZ 7HX 8AG 8CK 8HR 91T and 9RF. Ten IRCs should go with each application, and we suggest you check details with the club through PZK, P.O. Box 424, Lodz 1, Poland. By the way, SP6PZ welcomes personal visits from W/K/Vs passing through Poland. W2JWK finds fun fluent in a half dozen languages. . . . K2ULT is assured by GW3ITD/mn, a maritime-mobilizer on 28 Mc., that his status is entirely legitimate despite the jazzy suffix. . . . KP4KD and W9YD are intrigued by recent press publicity poured on Lundy Isle, a tight little domain in Bristol Channel off Devonshire. Lundy's population is 13, it issues its own postage stamps, pays no taxes, tolerates neither telephones nor autos, and vociferously maintains independence of Devon's mainland jurisdiction. Lundy's two square miles are just about right for a wallowing rhombic, come to think of it. . . . W7POU regularly sends DX stations into WAS raptures on 15 meters. For instance, DL6ZZ: "Aha - after 3500 U. S. QSOs I finally work Utah!" At SM5WT's behest, W2GVZ forwards facts re two fresh Sweden certifications attainable by W/K/Vs. They are 100-SM and 100-SM5, tags sufficiently self-descriptive. Thorough specifications are available from SM5WI. . . . NCDCX observes that HV1CN works 21,100 or 21,410 kc. almost daily around 1600-1800 GMT, especially scouring 21,400-21,450 kc. for replies. Easy and basic with the English. OMs. . . . IC1AGC, IE1SMO and other unorthodox Italian calls embellish our DX vista from various exotic Mediterranean isles.

Asia - Shnazy Novice-type DX possibility, gang: "I operate 15 meters as KN3JJP/KA2 and I think I can safely say that I am the only Novice on the air in the Far East." Walter's QSL address appears in "Where". . . . KR6MD, aroused by ZM6AP/ZNI's recent Pacific success, mauls over Daito Islands and Farece Vela DXpeditionary possibilities. . . . Some sort of hamfest brewing in Turkey, judging from this month's mailbag. We 1ARR 9DMV, Ks 4EXT 9PDI and other W/Ks are converging on TA-land for tours of varying length. K4TEA says K4EXT's dad is getting into the act, too. Still no official green light for amateur radio from Turkish authorities, though so these lads will have diplomatic ambassadorial work all cut out for them. Meanwhile, down on the WGDXC ranch, there is mention of activity by one TA3AI in Ankara. Ex-KA8KW looks for old on-the-air buddies as KH6DMP on the low end of 20 c.w. . . . XZ2TH tells WITS he has worked all United States but can't shake QSLs loose from Miss., Nev. and N. Dak. Apparently Tim will have to work those three all over again with his 150-watt 813, HRO and dipole. . . . VS9OC of Oman operates nearly daily around 2300 GMT on 14,020-kc. c.w. or 14,180-kc. phone. . . . W0DJE/9, G8FC reportedly schedules VS9OC Tuesdays on 21,025 kc. at 1415 GMT. . . . W8KX salutes JA3AB's 28-Mc. c.w. efforts at tickling QRP 10-meter W/Ks, completing many a WAC thereby. . . . Ws 2DOD 9IHN and KL7AZZ forward

VE8MX was operated by Jack Campbell at Cape Parry just south of Banks Island, N.W.T., where the problem of getting out of bed in the morning often is best solved by wearing it. Jack has just happily returned to County Down's comparatively tropical climate and a probable new G13 call.

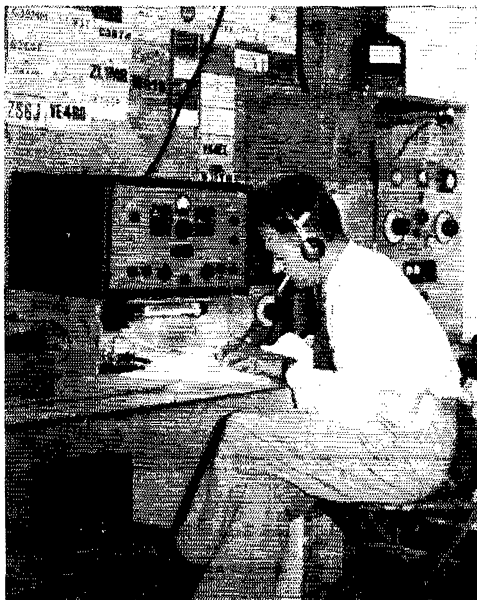
notes on HL9KR (W0CQK), lately quite popular on 14,040, 21,045 or 28,070 kc. between 1900 and 2200 GMT. John's gear is in Osan, so he's usually QRT on week ends when home in Seoul. HL9KJ appears on the same frequencies at odd intervals. . . . W6YY reports W1CJ preparing for extensive action in Khatmandu as 9N1CJ with a six-element eggbeater and one sideband. . . . AC4AX, all set with a BC-610 and diamond, awaits official enthusiasm for a new Tibetan DX offensive. . . . Cullings on the Asian front courtesy NCDCX, SCDCX, WGDXC and WIA: OK7HZ may find opportunity to gather QSOs in Yemen, Iran, Iraq and Afghanistan this month or next. . . . AP2BI and W4ANE are determined to do something about the notorious unworkability of East Pakistan. . . . This 9N1 flurry brings to mind such neighboring possibilities as ACs 3PT 3SQ 4AX 4SQ and 5PM. Anybody on in Shangri-La? . . . W4BPD launches himself into DXpeditionary orbit this month, aiming for operational stops at Red Sea's Kamaran Isle, the Kuwait-Saudi Arabia neutral region, Adalabra and any other juicy pads that dare get in his way.

Africa - "I have started operations on DX bands as ZD2JKO with 45 watts, phone and c.w., 80 through 10 meters. I'm generally active on ten and fifteen between 1400 and 1800 GMT, on twenty meters around 1900-2100. Occasionally I shall be on 7 Mc., 0300-0530 GMT. Aerials are a dipole for 20, and a long-wire for other bands. In my first day on the air I worked all W/K call areas, so I should be giving quite a few 'first ZD2a!' Over 80 per cent of the Stateside boys say they have never worked Nigeria, although six of the fourteen ZD2 licensees are active." You may have worked Mike as ST2KO and/or G3JKO. . . . W4ZMI, working Gaza Strip's VE6AAE/SU around 7090 kc., asked the chap why he wasn't in "kilowatt alley" on 40's low edge. "He replied that he couldn't carry on a decent QSO there because of all the dear old DX hounds calling him while he tries to copy the chap at the other end." So it pays to tune the odd corners of 7 Mc. occasionally. . . . "Been on the air for a few weeks here," writes 5A1TN, "with a DX-100, SB-10 and TA-33 beam, enjoying myself very much. I'm on the air about three hours each day on 10 or 20 sideband. Quite a change, this being able to blast away at DX in their own territory (outside the U. S. phone subband!) Like most Stateside transplants, though, I really enjoy chatting with home. . . . Ex-ZD1FG stopped off at G3NUZ long enough to work W4HVQ and a few other colleagues, then whisked off for New Zealand. . . . W6KG encountered OQ5KJ trying out a new Congo QTH where he tackles a plant automation assignment. . . . Add ZE7JK (Mrs. ZB7JD) to your YL-type DXCC candidate file. VE1QP finds her pounding through on 28,350 kc. around 1800 GMT when the skip is favorable. . . . K6LAE observes VQ2AB back in the slots on c.w. and sideband after a six-month U.K. holiday. Dick also admits that ZD1EO shuts down next month. . . . EL1X (W6FHB) discloses through K2UTC that he has a KG1 call coming up. . . . "Let's devise some kind of award for ZS10 as the most active ZS on 20 c.w. when the 0400 GMT path is open," suggests W8KX. ZS10 also gains current fame for outstanding transoceanic work on 7-Mc. phone and c.w. . . . More Africa tidbits via W8KX: ZS6C, 70 years young, contrives transistorized equipment for some truly QRP DX records. CR4AX's driving ambition is to score WAS separately on bands 10 through 80 meters. . . . K2UTC is told that ZD2FNX closes down in Lagos to return in June. . . . Rockbound 5A5TA is located in the desert midway between Tripoli and Benghazi. K2UTC notes John active almost daily at 1730 GMT, 21,220 kc. W0RKP gives the recent ZS61E/ZS8 DXpeditionary recap as 1358 QSOs with 63 countries, 950 contacts with W/Ks. Well done for a seven-day stint under mediocre conditions. . . . Liberian report thanks to EL4A: "My latest month's contacts totaled 1360, down somewhat from the previous month. The dry season is at hand now and there are many fish waiting to be hooked out in the bay, so next month's score may slump further." Ken reports that EL2Z and others of the 11-meter gang occasionally suffer severe QRM from U. S. Citizens Band transmissions. . . . IRLI and WGDXC offer these Africa items: Ex-XW8AH (W8UTQ) awaits hamming go-ahead in Tunisia where only two stations are privileged at this time. . . . ZS2MI vows to put Marion Island on 21 Mc., 1900-2000 GMT, as often as time and generator fuel will permit. . . . ZS6ATA interests himself in the possibility of a sideband guest appearance in Mozambique. . . . CR6a

BX CA and DB point for portable-style DX work in Pointe-Noire, a near-by area of interesting jurisdictional geography.

Oceania — W6KUF/mm (ex-W1DBO), operating aboard USS *Yorktown* with the U. S. Pacific Fleet, states, "I may not be rare DX, but to the best of my knowledge we are the only U. S. Navy aircraft carrier currently operating maritime mobile. Some of the fellows we work are thrilled at hearing aircraft take off during QSOs. I have permission to be /mm until August." Joe runs a KWM-2 into a trap dipole mounted 115 feet above the waterline. There are some two dozen licensed amateurs aboard *Yorktown*, all of whom may yet get a crack at operation as W6KUF/mm. VR1B tells W6KG he'd welcome a shot at another rare spot but the new XYL softly says, "NO!" They return to Australia in a year or so. W0BTD learns that a N. Dak. QSO will go a long way toward clinching VR1B's WAS. From CR10AA to K2UYG: "I'm going on leave for a while and then will return to Timor to begin regular activity. Amateur radio now is prohibited here but the ban will be lifted soon." KH6DJF (ex-W1PWK) finds it novel to be both a rare state and a rare country for many DX contacts. "Man, are there really more JAs than W6/K6s? I worked 26 Japanese stations with an indoor antenna in my first few days on the air. It's wonderful here when the band is closed between the States and the rest of the world. Rare Pacific and Asian OMs seem to hear nobody but me when the skip falls short of California! Heaven should be so good, nearly enough to make a guy give up YLs and stay home. The other night I heard a W5 call 'CQ DX' and VR3Y came back to him, but no QSO. W1FH probably would have heard the VR3's bed sheets rustle as he got out of the sack to turn on the rig. But I guess Charlie no longer needs VR3." "VK0IT, replacement on Macquarie, says VK0WH also is on the island but does not have a rig set up as yet." This item from W2GVZ who is collecting more DX diplomas than you can shake a wad of wallpaper cleaner at. Via W3FCB: "WS4FC, 14,010 kc, at 1445 GMT, asks word be passed along that he calls 'CQ USA' every day." And one 3-by-3 should be enough, Chang. "Just completed a recapitulation of my 1959 DX activities," remarks VR2BC. "Not very impressive with only 17 'new ones' worked to bring me to 159/155. VR2BC was active on 274 days for 2916 QSOs." The organs of OVARA, WGDXC, WIA and WYDXC produce these Oceania addenda: VK2WI's s.s.b. on 7 and 14 Mc. gave a DX tone to WIA's January convention in Sydney. A VR6CC sidebar probe was indicated by K7GLE. VR1B anticipates a sidebar session. K6CQV reportedly basks in Pago Pago, operational intentions undetermined. VK3ATM of Melbourne University seeks other school stations on 15 and 20.

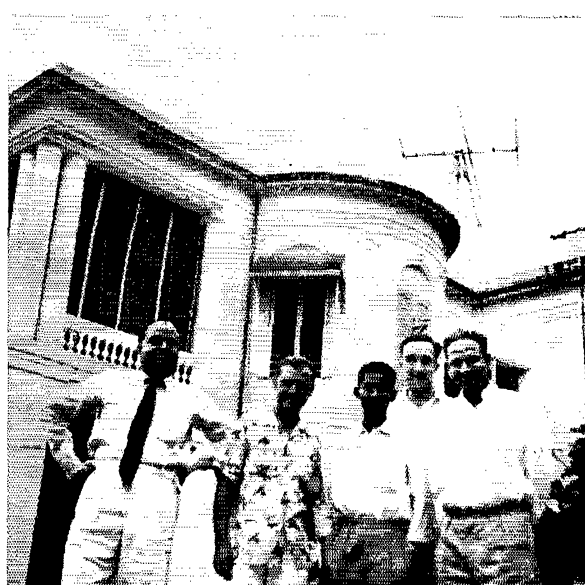
Hereabouts — VP7NE (W9QXF) writes from balmy Eleuthera: "I'm now on 15, 20, 40 and 80 c.w. running 65 watts to a DX-35 and v.f.o., with BC-454 and 51-1 receivers, plus a long-wire antenna. Much fun!" W9IHN's 38th birthday was a howling success. HL9KR came through with Chuck's 200th country. DU7SV was KP4KD's 5000th non-W/K/VE/KP4 contact. Ev suggests that KN signals be properly observed for the benefit of all. It's a valuable procedure signal slipping into misuse. W1KYK opened his *First Westerner*, biannual organ of Las Vegas's First Western Savings and Loan Association, and was greeted by a KG1DT testimonial on "How to Save on an Iceberg." First Western claims 15,000 savings "QSOs" — WAS, 51 countries and one ice island. Arctic traffic specialist W9NZZ also received commendation in the write-up. VP2LO made all his St. Lucia noise in the final weeks of 1959 with a mere 15 watts. He used a crystal-controlled rig on 7 through 28 Mc., a surplus-style TCS receiver with crystal converters for 14, 21 and 28 Mc., and a 150-foot long-wire radiator. VP2LS, active on 10 phone, hopes to put VP2LO's rig to work as a mobile installation. VP2LO, who returns to G3LJS around this time, writes, "VP2LD has recently been licensed and should be heard on twenty c.w. soon. Steve is a commercial operator and prefers his c.w. around the 30-w.p.m. mark." "Was on s.s.b. for a year but the memory and fun of c.w. was too strong," confesses DX digger K2YXC. "I've returned to 'The Art.'" And W8KX muses, "I wonder whether some



FA9UO keeps himself available on c.w. DX bands through such feats of ingenuity as the use of a hacksaw blade for big bug reed, and ill-suited receiver parts for rig repairs. No radio bargain counters in El Biar. (Photo via W9WNV)

OTs are tiring of phone round table, for I've noticed a fresh batch of two-letter calls on 20 c.w." W0LUB offers to certify your QSLs for contacts with 70 United Nations member countries. Check with Tom for full particulars. W6MZA/K6IPO zoomed back from a pleasant visit to Norway, and W6KG caught W6HB winning in from a three-week Japan stay. W6AM lists So. Calif. DX Club's 1960 officers as W6UED, pres.; W6EYB, v.p.; W6GMC, secy.; W6TZD, treas.; and W6OSU, director. W3OGP/mm tells WIAEW that shipmate VP5BH soon will be signing VP5BH/mm aboard SS *Ore Regent* on South American runs. W3OZA also is aboard. Newly activated KG4AB offers Guantanamo on 7, 14 and 21 Mc., c.w. preferred. From W1ELR: "YN1AB/4 went to much trouble to get on the air at Siuna where all gear goes in by air or river boat. He runs 10 watts to a dipole, specializes in c.w. on 14,012 and 14,034 kc., and should be active a month or more." Rediscovering 7-Mc. DX, K6BX recalls hamming in Hawaii as K6HLP in '35 when he worked 588 stations in 72 hours on forty. "Was ARRL's Seventh International Relay Competition. K2TBU favors homework sessions with intermittent DX escapades at the key of Lehigh University's W3AEQ. W3INH's December visit to Bermuda (Continued on page 166)

VU2RG (ex-AP2N) forwards this photo of the VU2ANI/5 gang and well-wishers just before departure for Port Blair. On VU2RG's Madras premises, left to right, are VU2s AR AS NR AK and RM. The latter three headed for the Andamans & Nicobars December 26th and fired up on 20 c.w. shortly after their arrival New Year's Day. In VU2ANI/5's first week of operation the trio managed 860 QSOs with some 70 countries on c.w., a.m. and s.s.b.





CONDUCTED BY EDWARD P. TILTON,* WIHQ

IN this section of *QST* there has been, for some 14 years, a subsection called *OES Notes*. Here are chronicled the doings of ARRL Official Experimental Station appointees. What is OES? How do I become one? What happens after I receive the appointment? These are questions frequently asked. Here are a few answers.

Holders of OES are ARRL members, active on bands from 50 Mc. up. Preferably they should be interested in the experimental aspects of v.h.f. communication, though this is not mandatory. The term "experimental" can be given a broad interpretation, to cover anyone willing to do his part in the furtherance of the art of v.h.f. or u.h.f. communication.

The appointment is administered by the Section Communications Manager. (You'll find a directory of SCMs, by ARRL Divisions and Sections, on page 6 of every issue of *QST*.) He is a hard-working volunteer leader and administrator of ARRL affairs in your Section. If you don't already know him, it's time you got acquainted. He's a good man to know. Ask him for the application form for the OES appointment. From then on, it's up to you.

As OES you summarize your v.h.f. observations and results each month, on a convenient form provided for the purpose. You send the report to the SCM. He finds it helpful in keeping informed of doings in this specialized phase of amateur radio in his territory, and may extract tidbits for his monthly contribution to the Station Activities section of *QST*. He forwards the report to ARRL, where it is read by various members of the Headquarters Staff, including your conductor, in whose hands the OES file finally rests. (More about OES and other ARRL appointments in *Operating An Amateur Radio Station*, available on request from Headquarters and in August 1959, *QST*, page 83.)

The OES idea came about as a means of putting the dedicated v.h.f. enthusiast in closer touch with ARRL. Its aim was to build an "elite corps" of v.h.f. men who would work together, and with ARRL, to speed v.h.f. and u.h.f. development. Certainly many OES have done their level best toward this end.

Announced without fanfare in March, 1946, *QST*, the appointment has kept pace with growing v.h.f. activity and interest. Today there are more than 500 holders, but there should be more. The list of really active OES should be longer than it is, too. Perhaps it should include you.

For the OES there is the rewarding feeling of being a member of a team. As one of the ARRL

V.H.F. Editor, *QST*.

50 Mc. WAS

1 W0ZJB	19 W30JU	38 W7ILL	57 W1SUZ
2 W0BJV	20 W6TMI**	39 W0DDX	58 W1AEP*
3 W0CJS	21 K8EDX	40 W0DD	59 W5LFH
4 W5AJG	22 W55FW*	41 K9DXT	60 W6NLZ**
5 W8ZHL	23 W0ORE	42 W6ABN	61 W7MAH
6 W9OCA	24 W9ALU	43 W6BAZ	62 W8ESZ
7 W6OB	25 W8CMT	44 VE3AET	63 W2BYM
8 W0INI	26 W0MVG	45 W9JFP	64 W7ACD
9 W1HDQ	27 W0CNM	46 W0QIN	65 K6PYH*
10 W5MJD	28 W1VNH	47 W0WVN	66 W4HOB
11 W2IDZ	29 W0ELY	48 K8ETD	67 K8JJA
12 W1LLL	30 W7HEA	49 W0PKY	88 K8RNO**
13 W0DZM	31 K8GOG	50 W8LPD	69 W8QWT*
14 W0HVV	32 W7FFE	51 W8ZTW	70 W6EQD**
15 W0WKB	33 W0PFP	52 W6CGG	71 K6VLM**
16 W0SMJ	34 W5BJI**	53 W2RGV	72 K6GOX**
17 W0GWV	35 W2MEU	54 W1DEI	73 W6EDM
18 W7ERA	36 W1CLS	55 WIHOY	74 W8JCI*
	37 W6PUZ	56 W6ANN	75 W6LLU*

*49 states	**50 states				
VE7CN	45 VE4HS	41 LU9MA	26 LA7Y	20	
KL7AUV	44 SM6ANR	30 ZS3G	26 VQ2PL	18	
VE1EP	42 C02ZX	30 CT1CO	24 JA8AO	18	
XE1GE	39 SM7ZN	29 O06FW	21 JA8BU	17	
VE2AQM	38 PZ1AE	28 LA9T	21 JA1AAT	17	
KH6UK	37 SM16BTT	28 U03DCA	20 JA1AUB	16	
EL2W	37 ZE2JV	26 SM5CHH	20 VP5FP	7	

team you will be kept informed of latest developments in your chosen field. Frequently news with v.h.f. angles breaks too late to be reported effectively in *QST*. When this happens, it is made the subject of a special bulletin, transmitted by W1AW, and sent to Official Bulletin Stations throughout the ARRL Field Organization. Copies of such bulletins are also sent to OES. Typical example as we write: a bulletin relating to scheduled 50-Mc. operation from Fletchers Ice Island. This news is reported below -- but OES appointees had it late in January. Some of them helped to spread the word by transmitting the bulletin on one or more v.h.f. bands for several evenings.

The appointment is a channel to Headquarters and your SCM, by which you keep both informed with a single monthly report. Where your news is not of dated nature the regular report serves this dual purpose adequately. When something with a time angle develops it can make *QST* one month sooner if you send it direct to the writer at ARRL Headquarters, with a copy to the SCM. (Deadline for this department is about the 20th of the month. Information in our hands by that date will appear in the *QST* you read one month later.)

OES is also a channel to other v.h.f.-minded amateurs. You put down your ideas for improving v.h.f. gear, antennas or operating techniques, and these find their way into *QST*. They may be used in this section, or in *Hints and Kinks*, or occasionally they blossom into full-fledged *QST* articles. If not used in *QST* they may appear in the *OES Bulletin*, a production of the Communications Department for OES only. Presently

the *Bulletin* is issued at least once a year. It could come oftener, if interest and appointee contributions warrant.

We are often asked why some OES are mentioned regularly in *QST*, while others seldom or never make it. To get the answer, put yourself in the other reader's place. What do you find interesting or useful? Certainly not that W7XXX has a new Communicator, or that K3ZZZ is thinking of trying to get on 10,000 Mc. Too often OES reports waste everyone's time with this sort of thing, or worse. But suppose W7XXX works out a neat trick for improving the performance of his Communicator. Perhaps he has worked some unusual DX with it, under extraordinary conditions. If so, he's news. If K3ZZZ has built two 10,000-Mc. rigs and will lend one to a willing co-worker he can make *OES News*. Novel ideas for doing any of the countless things v.h.f. men want to do, whether the suggestions have to do with equipment, antennas, or operating, are always welcome.

So are details of schedules you may be keeping regularly — but be sure to give information that will help others to make use of your work. Reports of exceptional DX with low power, or with simple gear; examples of rare forms of v.h.f. propagation, or variations on the better-known forms; details of activity developing in areas where it has been low or non-existent are all grist for the OES mill. Tell us about new v.h.f. clubs, or club projects with v.h.f. angles — and give enough information so that what you say may be used for ideas by others.

You don't have to be a scientist or an engineer, or even an amateur of long standing to make a good OES, though we'd be glad to have more OES in any of these categories. Every ham's accomplishments have angles that interest others. Swapping live information is the lifeblood of many a radio club. It could serve OES aims much better than it does. Why not give it a try? If you have an active and continuing interest in the world above 50 Mc., your SCM and ARRL Headquarters will be glad to hear from you.

KG1FN Back on 50 Mc.

The ice-floe breakup that eliminated Ice Station Charlie, as reported recently in the news, forced a change of plans by W1JJD and W1FVY, whose KG1FN story graced the lead pages of January *QST*. Instead of setting up at *Charlie*, they are due to be back on Fletchers Ice Island before you read this. During February and March, possibly longer, KG1FN will be in operation again on 50.04 Mc. Running higher power than before, they will make automatically keyed transmissions as consistently as possible.

Operators will pay particular attention to the period between 0400 and 1000 GMT (2300 to 0500 EST; 1800 to 2400 T3 time) this having been the most productive time during their previous stay. Tests will be made on 144 Mc. when conditions appear propitious. More extensive facilities for checking propagation conditions will be available than before. These include a TV receiver furnished by K6EDX, and a receiver covering 20 to 400 Mc. Better make a habit of turning the beam north — and don't forget to use the h.f.o. Watch late-evening auroras, particularly if signals are strong and relatively free of flutter. Please report any reception or two-way work with KG1FN to ARRL at once, giving time, date, beam heading and signal strength and quality.

220- and 420-Mc. STANDINGS

220 Mc.

W1AZK.....	9	3	412	W4UMF.....	11	5	420
W1HDQ.....	11	5	450	W5RCI.....	8	5	700
W1OOP.....	12	4	400	W6NLZ.....	3	2	2540
W1RFU.....	11	5	480	K6CTG.....	2	2	240
W1UHF.....	11	4	385	W6MMU.....	2	2	225
W2AOC.....	13	5	450	K7ICW.....	1	1	250
K2AXQ.....	8	3	230	K8AXU.....	8	5	680
K2CBA.....	10	4	325	W8LJG.....	9	5	475
K2DIG.....	4	3	140	W8LPD.....	6	4	480
W2DVF.....	14	6	740	W8NRM.....	8	4	390
W2DZA.....	12	5	410	W8PFT.....	8	4	550
W2NTY.....	8	4	200	W8SVI.....	6	4	520
W3AHQ.....	4	3	180	W9PQC.....	8	4	740
W3FLY.....	8	4	296	W9JCS.....	5	2	340
W3LCC.....	8	5	300	W9JFP.....	9	4	540
W3LZZ.....	15	5	425	W9OVL.....	5	2	290
W3RUE.....	6	1	225	W9UKD.....	4	1	605
W3UJG.....	11	5	400	W9ZIH.....	5	2	270
W3ZRF.....	5	4	112	KH6UK.....	1	1	2540
K4TFU.....	8	4	400	VE3AIB.....	7	4	450
W4UBY.....	7	5	320				

420 Mc.

W1HDQ.....	8	3	210	K2UUR.....	5	2	110
W1RFU.....	8	4	410	K3EOP.....	6	3	250
W1OOP.....	9	5	390	W3FEY.....	5	2	225
W1UHF.....	3	2	400	W4HKB.....	2	3	520
W2AOD.....	6	4	290	W4VVE.....	6	4	410
W2BLV.....	11	5	360	W5RCL.....	5	3	600
W2DWJ.....	6	4	196	W7LHL.....	2	1	180
K2CBA.....	5	3	225	W8HCC.....	3	2	355
W2DZA.....	5	3	130	W8HRM.....	5	2	390
W2NTY.....	3	2	100	W9GAB.....	7	4	600
W2OTA.....	5	3	150				

Here and There

Lost: a famous 50-Mc. DX station. The special authorization for 50-Mc. operation held by CT3AE, Madeira Islands, ran out at the end of 1959, after a season of diminishing DX. Jose worked only South America in the last few months of his tenure on 50 Mc. Now he is busy setting up for serious work on 144 Mc. A kilowatt amplifier is in the works, and CT3AE will be gunning for a new world's record, and a possible 144-Mc. QSO with U. S. A. Could he be the last location for it!

Anyone for moonbounce on 50 Mc.? With worldwide DX less likely, now that we are over the solar activity peak, interest in lunar reflection as a means of working 50-Mc. DX is on the increase. W0KAV, Raytown, Mo., says that he will be on each evening around 1800 CST, when the moon is in a favorable position. He will be transmitting on 50.025 Mc., c.w., and would appreciate hearing from anyone who is successful in hearing his signals via the lunar route. K0ITF, Kansas City, Kan., is also in on these tests.

VE7AIZ, Victoria, B. C., has been running listening tests on pulses of 50-Mc. signal sent by W7RDY, Everett, Wash. No positive identification of the moon-reflected signal has been made, but there were indications of some return in several of their attempts. W7RDY runs 600 watts input and stacked 6-over-6 Yagis. VE7AIZ has a 10-element Yagi for reception.

W6BJI, Fresno, Cal., reports signs of F₂ DX on 50 Mc. early in January. Gib heard signals from the second call area for about 25 minutes starting at 0930 PST Jan. 3. Strong signals broke through from Florida between 0925 and 0947 Jan. 5. He says that VE8BY, Yellowknife, Sask., is putting on an automatically keyed signal beamed south. He has been on 51 Mc. already, but a frequency in the first 100 kc. will be used shortly.

VE7AIZ heard strong signals on 49.61 and 49.64 Mc. from out over the Pacific Jan. 3. Alan says that the KG1FN story in January *QST* reminded him of contacts he had back on June 28-29 with W0EOZ and W0ZRT/9, both of North Dakota. These were strong clear phone signals, but the W0s reported that everyone else they heard had the usual aurora distortion. W6BJI reminds us that JA7EV reported reception of a W8 around 2300 JST, during an early 1958 aurora. The JA was beamed on the aurora belt at the time.

Think high power is a must on 6? W3JTE/5, Pineville, La., doesn't agree. He has a homebuilt job built from the description in October, 1958, *QST*, and recent editions of the ARRL *Handbook*. He worked 37 states, Cuba and Mexico in 4 months — with 11 watts input and a 5-element beam.

From Bill Craston, Secretary, call not given, comes word of a new 6-meter group in Eastern Ohio: the "Sunday

2-METER STANDINGS

Figures are states, U.S. call areas, and mileage to most distant station worked

W1RZ	32	8	1300	W5SWV	10	3	600
W1AZK	27	8	1205	W5YYO	5	3	1330
W1KCS	24	7	1150				
W1RFU	23	7	1120	W6WSQ	14	5	1390
W1AJR	23	7	1130	W6NLZ	12	5	2540
W1HDQ	21	6	1020	W6DNG	9	5	1040
W1MMN	21	6	900	W6AJF	6	3	800
W1ZY	19	6	875	W6LZL	3	3	1400
K1CRQ	19	6	800	W6MNU	3	2	950
W1AFO	17	6	920				
K1AFR	17	6	675	W7VMP	15	5	1240
W1CLH	17	5	450	W7JRG	10	4	1040
				W7CJM	5	2	670
W2NLY	37	8	1390	W7LHL	4	2	1050
W2CXY	37	8	1360	W7JJP	4	2	900
W2ORL	37	8	1320				353
K2GQI	33	8	1200	W8KAY	38	8	1020
W2AZL	29	8	1050	W8SDJ	35	8	990
W2BLV	27	8	1020	W8PPT	34	8	985
K2LEJ	27	8	1060	W8IFX	34	8	980
W2AAJ	25	6	960	W8LOF	33	8	1060
W2DWJ	23	6	860	W8RMH	32	6	910
K2HOD	23	7	950	W8WVJ	30	8	1080
W2PAU	23	6	753	W8SWG	30	8	1000
W25MI	22	6	840	W8RHW	29	8	860
K24PH	22	6	910	W8LJD	29	8	850
W2LVL	21	6	700	W8WRN	28	8	960
W2RXG	20	6	700	W8NOH	26	8	975
W2UPH	19	7	880	W8DX	26	8	720
W2RQV	19	6	720	W8LJC	25	8	800
W2WZB	18	7	1040	W8JWV	25	8	940
W2ESK	18	5	850	K8AXU	24	8	960
K2RLG	17	6	980	W8LCY	21	7	610
				W8RLN	21	7	610
W3RUE	30	8	975	W8OTK	17	7	550
W3TDF	29	8	1050	W8NRM	17	7	550
W3GKP	29	8	1020				
W3KCC	28	8	1110	W9KLR	41	9	1160
W3SGA	28	7	700	W9WOK	40	9	1150
W3EPH	22	8	1000	W9GAB	34	9	1075
W3BYF	22	6	660	W9AAG	32	8	1050
W3LNA	21	7	720	W9REM	31	8	850
W3NKM	20	7	750	W9ZIE	30	8	830
W3LZD	20	7	820	W9LYC	27	8	950
				W9EQC	27	8	820
W4HJQ	38	8	1150	W9OJL	26	8	910
W4HHK	35	9	1280	W9ZHL	25	8	700
W4ZXL	34	8	950	W9BPV	25	7	1030
W4AO	30	8	1120	K9AQI	24	7	900
W4LTL	30	8	1160	W9PBD	24	8	820
W4MKJ	28	8	850	W9LFL	22	7	825
W4UMF	28	8	1110	W9KPS	22	7	690
W4VLA	26	8	1090	W9CUX	21	7	800
W4EQI	25	8	1040	W9HJV	19	7	750
W4WNH	24	8	850	W9PAL	19	6	800
K4ETB	24	6	765	W9ALU	18	7	800
W4JJC	23	6	725	W9SMJ	29	9	1075
W4VVE	21	6	720	W9IHD	27	7	890
W4TLV	20	7	1000	W9HFB	27	8	1060
W4HLC	20	6	720	W9GDH	24	9	1300
W4OLA	20	6	720	W9MFE	23	7	900
W4AIB	19	7	840	W9INL	21	6	830
W4ARMU	18	7	1080	W9UOP	21	7	900
W4CPZ	18	6	650	W9TGC	21	7	875
W4RFE	18	7	820	W9HYG	20	8	925
W4MD	17	6	750	W9IC	16	7	1240
K4YUX	16	8	830	W9FLS	16	6	110
W4LNG	15	6	1080	VE3DIR	30	8	1330
				VE3AIB	27	8	1340
W5RCL	34	9	1215	VE3BQN	19	7	790
W5DFU	25	9	1300	VE3DDE	17	8	1340
W5AIG	25	8	1360	VE3ACQ	17	7	1300
W5LPG	25	7	1000	VE3HW	15	7	1350
W5PZ	24	8	1300	VE2AOK	13	5	550
W5KTD	23	8	1200	VE3BPB	14	6	715
W5JWL	21	7	1150	VE7FJ	2	1	365
W5VKH	15	5	720				
W5M	12	5	700	KH6UK	1	2	2540
W5FSC	12	5	1390				
W5HEZ	12	5	1250				
W5FYZ	12	3	735				
W5CVW	11	5	1180				
W5NDE	11	5	625				
W5VY	10	3	1200				

W5VWU W0MOX K5TQP and W0AZT, all with only a few pings to show for their trouble. W0KMY reports many strong bursts on 50 Mc. the week end of Jan. 2-3. Jack was not able to work any DX by random calling, but he heard bursts of perfect copy up to 40 seconds long.

Think you've got TVI? K4KTC, Chattanooga, Tenn., received a note from a set owner in East Haddam, Conn., following the terrific E session June 10. He reported hearing "hundreds of signals" and just happened across K4KTC when he was giving his mail address to a W1. Contest operators were using frequencies well up in the band during the opening, and thus their normal TVI range was considerably extended. Many 6-meter men may not realize that the worst TVI frequency in the band may be around 50.7 Mc., at which spot you may ride through on some receivers, regardless of the channel in use. When the viewer is on Channel 2, that spot is just about guaranteed to cause trouble, unless the TV set is properly filtered. Your conductor was using various frequencies around 50.7 Mc. that Sunday night, and got TVI reports from as far away as Litchfield, Conn., some 20 miles, and behind several ranges of hills. Below 50.4 Mc. we encounter no TVI at all, and even 51 Mc. and higher may not be as troublesome as that critical spot around 50.7.

"What's happened to the technically minded v.h.f. men?", a correspondent in South Africa asks. A v.h.f. enthusiast who would like to talk receivers, antennas and propagation with American hams of like interests, he has had little luck so far. He has a good signal on 14, 21 and 28 Mc., and has called CQ toward this country, requesting calls from v.h.f. operators, but his answers have been mainly from fellows who want a Z86 QSL. Now and then he has raised someone who is on 6 or 2, but invariably the fellow has a commercial package station, and little interest in the technical aspects of the game. If you roll your own v.h.f. gear, and would like to talk about it with someone on the other side of the world, drop a note to H. E. Lubbe (call not given), Box 33, Brakpan, Transvaal, Union of South Africa. He can be on 10, 15 or 20 daily after 1600 GMT.

S.s.b. is proving its worth on a 210-mile 144-Mc. circuit between W5DDJ, Houston, and W5AJG, Dallas. W5FEK says that this path had worked during the more favorable season on a.m., but the Houston boys gave up on W5AJG in winter, until he went on s.s.b.

Add to 6-meter nets: Rockland County Ragchewers, Mondays at 1900, 50.19 Mc. Info from W2IEA, Congers, N. Y.

220 in Tucson: W7AMH writes that he and K7IHD and K7HJD are working on 220 Mc. They will be glad to hear from anyone interested in the band in that area. Across the country diagonally, Vermont now boasts a permanent 220-Mc. home station, K1BKK, Manchester. K2CBA says that Warren has a 4X150A, a 13-element Yagi and a 417A converter.

Opening of the 144-Mc. band to Technicians resulted in a drop in 220-Mc. activity, as some fellows jumped in to try the new territory, but this doesn't represent a permanent loss. Several 220-Mc. operators have assured us that they can be counted on to continue the good work they have started, and that moving to 145 Mc. is only in the nature of expansion.

The same is true of 432 Mc. Here is the stamping ground of the true experimenter-ham, and some fine work is being done in many quarters.

Global DX Via Satellite Reflectors?

Experience with the two successful firings of aluminum-coated balloons from Wallops Island (Dec. QST, p. 83) has shown that they are capable of reflecting 144-Mc. signals with usable strength. The first firings were preliminary to an attempt to put three such 100-foot spheres into orbit, the first probably some time in March. What can we expect to do as amateurs with these reflectors in space?

Project Echo proposes launching of spheres from Cape Canaveral into a 50-degree orbit, with a 1000-mile perigee and a period of about 120 minutes. When sunlight the balloon should be as bright as a first-magnitude star, and it may be visible in Europe and this country simultaneously, and in about any two points in this country at other times. Primary purpose is to test the feasibility of global communication with passive satellite reflectors. Estimates by W4LTU and others indicate signals of usable strength on 144 Mc. out to about 1800 miles, taking into account the practical limits of

Morning Radiators," who congregate from 0700 to 0930 each Sunday, on 50.31 Mc. Everyone within working distance is welcome to join in.

The January Quadrantids shower was not productive for W1AZK, Chichester, N. H. Don kept skeds with W5JWL and W0BFB, with no results except one strong burst from the latter at 0713 Jan. 2. W1JDF, Methuen, Mass., 40 miles to the south, at a much lower elevation, but with a similar antenna, heard more pings and short bursts than did W1AZK. W5JWL, on the other hand, heard a few strong bursts from W1AZK and nothing from W1JDF. The disparity between the results on many meteor skeds in which they have compared notes is something W1AZK and W1JDF cannot explain, especially since the advantage shifts from one to the other at various times.

W4WNH and W4HJQ had 144-Mc. skeds with W7QDJ

power and beamwidth for amateur antennas. Thus we might have a means of working distances never yet covered on 144 Mc. and higher bands, except by W6NLZ and KH6UK.

Possibilities for 220 Mc. and higher are better, if sufficiently refined techniques are employed, due mainly to the sharper beam patterns possible at the higher frequencies. The NASA Laboratory's Goldstone tracking station in California will run tests on 2390 Mc., which might be within the capabilities of advanced amateur microwave enthusiasts. Bell Laboratories, Holmdel, N. J., will be on 960 Mc.

Plans are being made at Haverford College to conduct tests on 1250 Mc., and the cooperation of amateurs is requested. Anyone interested should write Prof. Thomas A. Benham, W3DD, Department of Physics, Haverford College, Haverford, Pa.

Useful life of a satellite may not be more than a week, but three shots are planned. If more precise information on firing times and dates becomes available, it will be put on W1AW at once. NASA news releases indicate that amateur cooperation is welcomed.

Aurora and E_s Picking Up?

Except for winter sporadic- E skip and frequent auroras, 50-Mc. DX has at a low level as we moved into 1960. December PRP reports showed the lowest DX quotient since the project began in 1957. Even LU3EX, one of the most consistent 50-Mc. DX men in South America, could muster only 4 countries worked via E_s or TE : Brazil, Puerto Rico, Chile, and his own Argentina. O3AAEE was heard a few times, and FT8AP, Dakar, once.

The West Coast caught a few openings to Hawaii. K6HGR/KH6 worked K6GIC and K6PRE, Placenta, Cal., in a brief opening beginning at 0955 HST Dec. 15. W6FZA and K6ZEH, Porterville, Cal., report one to Hawaii during the V.H.F. SS, and better Hawaiian signals on Jan. 13 and 14. The latter brought in S9 signals from mobile KH6s, and lasted 4½ hours after 1100 PST. The path was open again for a short time on the 15th.

Sporadic- E skip ran rampant through January, however, and aurora was common for the parts of the country most favored by this medium. Never in the 14-year history of the V.H.F. Sweepstakes has there been anything like the E_s session of Sunday afternoon and evening. It rivaled the best that summer can produce, in geographical distribution and strength and stability of signals. It ran from 1700 to after 2300 in the East, linking all northeastern states with the southern tier. We don't have full details as yet, but there is evidence of skip contacts from just about everywhere. There was good E_s on Saturday night of the contest as well — the first time that sporadic- E skip has been worked on both days of a winter contest, that we can recall.

The following Monday also brought widespread E_s . This was relatively weak in the East, but K6ZEH and W6FZA say that it was terrific for the 6s. Arizona and New Mexico began to come in weakly about 1730 PST, and around 1800 things really popped. When they finally quit at 2330, Arizona, New Mexico, Colorado, Nebraska, South Dakota, Idaho, Montana, Nevada and Wyoming had been worked, and the band was still open.

Arizona and Oregon signals were heard on the 12th. This makes E_s skip on 4 consecutive days, with at least two of them excellent openings — a record never approached in other winter sessions.

A keen observer in Northeastern U. S. A. could find traces of aurora many evenings in January, usually a month relatively low in auroral activity. Some auroras covered a lot of territory, as witness W4FNR's OES report of aurora work. W5FEK mentions that aurora was visible in Houston, Nov. 27, the first in a series of big auroras of the 1959-1960 season. January 14 produced a lively session on both 50 and 144 Mc. There was a quick one early Sunday night of the V.H.F. SS, and minor openings Jan. 13 and 15 and 20, that we know of. Such auroral activity this early in the year lends credence to the idea that auroral effects lag the solar activity peak by a year or more and suggests that we may be in for one of the hottest aurora seasons on record.

Before readers in the more southerly parts of the country shrug this off as something out of their territory, we point out that high incidence of aurora portends wide geographical distribution as well. If February, March and April develop as anticipated, it is quite possible that there will be no corner of the country that is completely out of range of at least some aurora DX.

K1AII, Plymouth, Mass. — Marked increase in c.w. activity noted recently on 50 Mc. Worked 20 different stations by this mode in latter part of December, with several heard nightly.

K1CXX, Auburn, Maine — Running checks on 220 Mc. with W1EXZ, Danville, Vt. No results yet over this 100-mile obstacle path.

W1FOM, Southington, Conn. — Local activity seems higher on 2 than on 6.

W1HDQ, Canton, Conn. — Sporadic- E opening in V.H.F. SS Jan. 10 was one of the longest and most widespread ever experienced in winter. Worked Florida, Alabama, Georgia, Tennessee, Arkansas, Mississippi and Texas, and heard North Carolina. Band loaded to 52 Mc. with S9-plus signals. Saturday night opening also good, though more limited geographically.

W1LWZ, Concord, Mass. — Very widespread E_s opening 1700 to 2000 Dec. 4. Working on 144 Mc. daily, 0700 to 0745. Would like to see more early-morning activity.

W1NKA, W. Concord, Mass. — Heard KZ5PZ on 50 Mc. Dec. 31.

K4EUS, Chester, Va. — Geminids skeds with W0QDII unsuccessful. Identified on best day, Dec. 12, but no QSO.

W4FNR, Ft. Lauderdale, Fla. — Worked W4IKK and W4ZXI Dec. 6 via aurora. Only second time aurora has been experienced here on 50 Mc.

W4FWH, Doraville, Ga. — Rare winter double-hop E_s Dec. 6, with Nevada, New Mexico and California stations heard, along with many nearer. Worked K2GQI on 144 Mc. during Geminids; first successful meteor sked here.

W4RMU, Jacksonville, Fla. — Added product detector to BC-453 for improved weak-signal reception. Use diode detector with 453 for phone. Have been working W4LIP, Miami, over 300 miles, regularly on 50 Mc. since he put up 32-foot Yagi. Skeds are kept at midnight and 0800 EST week ends, with the mornings showing generally better sigs.

K5TQP, Albuquerque, N. Mex. — V.H.F. net schedule: 146:8 Mc. Tuesdays, 50.2 Mc. Mondays.

K6OKK, Vallejo, Cal. — Double-hop E_s to Florida Dec. 19, around 1730 PST. Building high-power s.s.b. rig for 50 Mc.

W6ORS, Altadena, Cal. — Recently moved to 1000-foot elevation with excellent v.h.f. possibilities. San Diego area, 135 miles, comes in with local strength on 144 Mc., even with simple gear and antennas.

K6UMM, Santa Monica, Cal. — 50-Mc. E_s openings observed Dec. 20, 24 and Jan. 1; mostly Texas and Louisiana. Double hop to Florida Dec. 20.

W7QDJ, Clearfield, Utah — Heard weak sigs on 50 Mc. from Middle West during contest (Jan. 10, 2200 to 2215 MST) but nobody was listening for c.w. apparently. Bursts heard on 144 Mc. from W5AJG during Quadrantids skeds, but no QSO.

W8BFF, Kalamazoo, Mich. — Working K9KLV, Dolton, Ill., at 2300 nightly for 50-Mc. propagation information on this 125-mile path. High power and large antennas pay off markedly under the generally adverse conditions of the winter months.

K8RTF, Decorah, Iowa — Caught 50-Mc. openings Dec. 1, 6, 15 and 24. Groundwave conditions seem good for winter, though this may only be the result of more activity. SPARC 50-Mc. transceiver (July '59 QST) being adapted for local club project.

North Atlantic Path Reopens for 50 Mc.

Just as we had the black crepe carefully draped around the bier, the corpse suddenly came to life. Rites for 50-Mc. F_2 DX will have to be delayed a bit, for on several mornings at the end of January the band was open across the North Atlantic. G3EHY, Bristol, England, had been checking the m.u.f. almost daily since last October, but January 26 produced the first evidence of the m.u.f. going high enough to permit crossband work with U. S. 50-Mc. stations.

His first 1960 contacts came the next day, when W1GKE, W1ELP and W1LUN, all of Eastern Massachusetts were worked crossband, with G3EHY on 23.16 Mc. Best day was Jan. 29, many stations from New England to the Philadelphia area were worked. The extra activity of the weekend period kept G3EHY busy Jan. 30, and there was a brief flurry on Jan. 31. Conditions were good again Feb. 1. Best signals were around 0930 EST most days. QST



Correspondence From Members -

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

GENEVA 1959

RFD 3
Hillsburg, Pa.

Editor, *QST*:

A gift that affects each and every amateur in these United States has recently been given us. Much of the credit has to go to our own American Radio Relay League. Official Bulletin #731 states:

"As the culmination of three years domestic preparatory work and four months intensive participation in the proceedings of the Geneva Radio Conference, the ARRL is now able to report to amateurs that the 1959 international radio regulations continue *every* frequency band now available to amateurs in Canada and the United States."

To me, this is a gift of enduring pleasure, a gift that will enable me to become acquainted with so many more fine amateurs all over the world, a gift that will enable me to keep in close contact with the friends already made over my years of operating, a gift that may enable me to aid my community in case of emergency or disaster — this I am thankful for, and pledge my allegiance and membership to ARRL as long as this privilege is granted me. Certainly these must be the sentiments of each and every member of the Harrisburg Radio Amateur Club.

— Charles T. Vogelsong, W3BQA

NR 3 K9GEE GREENWOOD IND DEC 22

EDITOR, *QST*:

I WISH TO THANK THE LEAGUE FOR THE SPLENDID REPRESENTATION GIVEN ALL AMATEURS AT THE GENEVA CONFERENCE.

— CHARLES E. SEBREE, K9GEE

Plainfield, New Jersey

Editor, *QST*:

During the January 11th meeting of the Tri-County Radio Association, Inc., the following motion was made from the floor by W2HIA, duly seconded and unanimously approved by the members.

"The secretary is hereby instructed to write a letter to the ARRL Headquarters to convey the thanks of the TRA for the splendid job that was done in behalf of amateur radio by the ARRL representatives during the Geneva frequency allocation conference."

It is with much pleasure that I write this letter. Keep up your fine work in furthering our fine hobby.

— James B. Hall, Secretary

606 Carty Drive,
Oxnard, California

Editor, *QST*:

January *QST* arrived today and I noted with pleasure the excellent results of the Geneva conference concerning communications. Much of this is due to the outstanding job performed by the League in representing the amateurs. I hope all hams will take note of the convention and realize that by offering a united front and encouraging the growth of amateur radio we can better withstand future onslaughts of this type that are inevitable as the radio spectrum becomes more crowded.

— V. L. McCallon, K6ARK

RFD 2, North,
Pocatello, Idaho

Editor, *QST*:

A million thanks to the League and people responsible for the excellent job done at Geneva.

The League means life for the hobby of amateur radio. It is our only hope of survival in the future.

Congratulations!

— X. F. Scrovel, W7UKH

NR 9 W4AKC ROCK HILL, S.C. DEC 14

EDITOR, *QST*:

THE MEMBERS OF THE ROCK HILL RADIO CLUB WISH TO THANK YOU FOR YOUR MAGNIFICENT WORK AT THE GENEVA CONFERENCE.

— WEBB WHITE, W4WEP, PRES.

593 Ledgeview Boulevard,
Fond Du Lac, Wisconsin

Editor, *QST*:

Our heartiest congratulations and sincerest thanks on your recent victory for amateur radio in Geneva. Amateur radio in the United States, but for the American Radio Relay League, is nothing. It is in times like these that we are grateful to, and glad to be members of, the ARRL.

— Stephen L. Smith, Secretary,
Fond Du Lac A.R.C., Inc.

2705 North 11th Street,
Terre Haute, Indiana

Editor, *QST*:

We of the Wabash Valley Amateur Radio Association would like to extend our thanks to you and your staff for your efforts in our behalf at the recent Geneva conference.

Without the American Radio Relay League, I am sure amateur radio would not be what it is today.

— Dick Hawkins, K9IGS, Secretary

639 Russell Ave.,
Johnstown, Penna.

Editor, *QST*:

Probably page 64A of January *QST*, is the best New Year's gift any amateur could have.

All of the amateur radio population owe profound and deep thanks to you and to the United States delegation for the very tremendous amount of work and planning that you have done in order to be so successful.

Believe me, we are most grateful for the time and effort that you spent in order that we all can continue to enjoy our very wonderful hobby.

— Louise Ramsey Moreau, W3WRE

NR 8 K5LGT ABILENE, TEXAS DEC 20

EDITOR, *QST*:

RE OB 731 CONGRATS TO ARRL REPRESENTATIVES AT GENEVA RADIO CONFERENCE. A FB JOB. TNX FROM THE HAMS.

— RAYMOND SOLOSKI, K5LGT
PRESIDENT, ABILENE ARC

4422 Seakurst Avenue,
Everett, Washington

Editor, *QST*:

. . . Thanks to the gang for the splendid work done at Geneva . . .

— Kirby H. Baldrey, W7PRY

Post Office Box 269,
Fredericksburg, Va.

Editor, *QST*:

. . . It did my heart good to be able to QNC the fine results at Geneva. After the wild rumors and unfounded anti-ARRL propaganda being bandied around the bands, I was tickled to be able to help pass around the word that sent the propagandists slinking back under their wet rocks. Congratulations to the Geneva crew!

— John Carl Morgan, W4KX

40 Highgate Gardens,
St. Michael, Barbados, W. I.

Editor, *QST*:

I would like, as an old timer, to thank the ARRL for the

wonderful work they did at Geneva recently. The thanks of all amateurs, wherever they are, should also be accorded.

— G. MacLean Wilford, VP6W/D

1614 Davison Street,
Richland, Washington

Editor, QST:

... Congratulations on the results of your efforts at Geneva. . . .

— Fred J. McKinnon, W7NMF

521 Pine Street
Halsted, Kansas

Editor, QST:

... Please accept my personal "well done" for your excellent work at the Geneva conference. It worked out just as you indicated at Galveston last summer. . . .

— Paul N. Wilkinson, K0EMF, Secretary,
Hutchinson Amateur Radio Club

66 Hamilton Place,
Oakland, Calif.

Editor, QST:

... Congratulations on the fine job at the conference — and the preparation for it that made the results possible.

— J. L. McCaughran, W6EY

5430 N. Wayne,
Chicago 40, Ill.

Editor, QST:

Congratulations on the fine work accomplished at the Geneva conference! As always, the League continues to do a fine job in representing the amateur. . . .

— John Stokely, K9APQ

348 Celina Road
Columbus 4, Ohio

Editor, QST:

... Would like to express my thanks and appreciation for the fine business job the ARRL and participating officials did at the Geneva conference. It certainly is welcome news to know our frequencies will stay put. The \$5.00 a year membership is good insurance for protection of our bands. The way the DX boys are getting their bands chopped up, we are plenty fortunate to have a strong organization backing us up. . . .

— Robert Leasure, K8AGX

GOOD NEIGHBOR RELATIONS

Army Rocket & Guided Missile Agency
Redstone Arsenal, Alabama

Editor, QST:

Recently, I was visiting Ascension Island and had a problem brought to my attention. Under regulations governing the island, the American Atlantic Missile Range personnel are not permitted to carry on amateur radio activities. The British subjects on the island are all employees of Cable and Wireless, Ltd., and staff the C&W communications station on the island. At present, none of these C&W people are active hams.

American amateurs are swamping Cable and Wireless with requests for schedules and QSL cards to such an extent the clerical staff cannot handle the mail.

It would aid materially the international relations on Ascension if American hams would ease up on writing Ascension, Cable and Wireless is not unfriendly to the amateur, for they encourage amateur work when British amateurs are stationed on the island.

Ham cooperation with this request would aid both our relations with the British in an important part of our missile program and the reputation of American amateurs.

— A. Y. Harper, Jr.
2nd Lt., Ord Corps

CONTEST QRM

1 Trinity Court
Bergenfield, New Jersey

Editor, QST:

The letter by W2SF in the January issue inspired me to write one of my own.

During the first days with my new rig, I flicked the transmitter to stand-by so it might warm up while I tuned the bands to listen for some activity. I naively anticipated an

enjoyable QSO on that fine Saturday afternoon. What I heard coming out of the receiver, however, was enough to make me shudder and wonder if perhaps photography would be a better hobby. Our ARRL was holding a contest, and all the available space in the ham spectrum was filled with shouts and squeals of call letters and contest numbers and QRM; I couldn't understand how any sane person could find pleasure in that melee. So I flicked the switch off and would not look that rig in the face for a week. I was sure that I had forsaken a good camera for the cause of ham radio.

Happily, I have enjoyed our hobby as I have no other (and I've tried them all). My few months on the air have been a source of rewarding pleasure for me, except on contest days.

Since the ARRL is a democratic organization, majority rule must be the law. If the majority want contests, let there be contests. But the basis of democracy is majority rule — with minority rights! So let us not deprive the non-contest minority (if, in fact, we are the minority) of their fundamental rights and privileges to use the amateur frequencies. Let us assign contest frequencies and hold many fine competitions for those who enjoy the sport, but we must not forget the rights of the non-participants; let's keep some unmolested band space for them. That, to me, is democracy!

— Irwin Rappaport, WA2EVE

QTC . . . AT 45 WPM

Subport Rotterdam

APO 292, New York, N. Y.

Editor, QST:

I read with interest the letter from VE3CEA concerning c.w. code speeds. Evidently he is a phone man. I graduated from the Navy Radio School at San Diego in 1928, and before the end of the year, was handling traffic at 45 w.p.m. This means solid copy, message after message, not just a short burst of speed.

On the old War Department radio nets, and on the Air Corps AACSS nets in 1940-41, we were handling traffic at no less than that speed. One civilian op at Ft. Sam Houston was an XYL.

In 1953, at the amateur radio convention of the Hawaiian Islands, held at Honolulu, I participated in a high speed code copying contest with numerous operators. When I fell out at about 55 w.p.m., Katashi Nose (KH6IJ) was still going strong — the winner!

— MSgt. Richard L. Hoyt, K4SCW

THE EDITOR TALKS BACK

38 LaSalle Road

West Hartford 7, Conn.

Readers, QST:

"Correspondence From Members" is read more avidly by ARRL members than perhaps any other part of QST. The writers of these letters are apparently very pleased when their thoughts appear in the magazine, and quite annoyed when the letters they send are not used. Perhaps it is in order to let you all have a glimpse inside the Correspondence Editor's mind to see how it works, why some letters make it, others don't.

First, each month the editor must read through ten times the number of letters he can use. Obviously, he must use his own judgment on which subjects to choose, and again on which letters to choose within the subject. The editor must also reserve the right to edit: to shorten a letter or to make small changes to improve the clarity of a letter. He tries not to distort the writer's meaning, of course.

Being just a bit lazy, he is more apt to select a letter that is double-spaced, neatly typed or written in a clear hand on one side of the paper only, because these letters are easy to edit.

Unless the editor got up on the wrong side of the bed on Correspondence Day, he is not likely to select a letter which merely gripes, although he does choose letters containing constructive criticism, and tries to pick suitable letters on both sides of controversial issues.

And there is one absolute rule the boss has hung over the Correspondence Editor's desk: "Never, never use a letter that isn't signed." Some mighty good letters have died in a file envelope because the author didn't identify himself!

— The Correspondence Editor

(Please turn the page)

PACIFIC ISLAND TICKETS

Trust Territory Of The Pacific Islands
P.O. Box 542
Agana, Guam, M. I.

Editor, *QST*:

In the interests of amateur radio, especially for those FCC-licensed amateurs who may be entering the Trust Territory on assignment with the various branches of the military and civilian agencies, this Government wishes to give wide distribution to information on its licensing requirements.

Contrary to popular belief, FCC rules and regulations do not carry force in the Trust Territory of the Pacific Islands. In short, an FCC amateur radio license is not valid for the installation and/or the operation of an amateur station. We do, however, recognize a valid FCC license as evidence that the holder has passed an examination equivalent to that issued by the Trust Territory for the particular class of license held. In such cases, a photostatic copy of the license must accompany the application.

Military and civilian amateurs assigned to military posts are required to file their applications through the Commanding Officer of the post. Civilian amateurs assigned by government agencies to other islands may file their applications direct with the Office of the High Commissioner, Trust Territory of the Pacific Islands, P.O. Box 542, Agana, Guam. Prompt attention is given to applications.

Because of the far-flung network of islands, scattered throughout an area larger than the United States, examining officers for Trust Territory amateur license are available at practically every military post. At isolated Coast Guard Loran Stations, the examining officer may be the commanding officer and the code-speed examiner may be the radio operator assigned to the station. New amateurs are encouraged, but they are reminded that a Trust Territory license automatically expires with their departure from the Territory. Further, only U. S. nationals and Trust Territory citizens are eligible for license.

Portable and mobile operations are strictly limited to within the geographical limits — within three miles from any land mass — of the Territory. Maritime mobile operation for Trust Territory licensees is not permitted beyond the three-mile limit. By the same token, maritime mobile stations licensed by another nation could not operate within the three-mile limit without a valid Trust Territory license. Aeronautical mobile operation is not authorized.

The Trust Territory Government issues calls within the following blocks of call letters:

KC6AA through KC6WZ; KC6YA through KC6ZZ — Eastern and Western Caroline Islands.

KG6RA through KG6RZ — Rota Island (Mariana Islands).

KX6AA through KX6MZ — Kwajalein and Eniwetok Areas, Marshall Islands.

KX6NA through KX6WZ; KX6YA through KX6ZZ — Marshall Islands, less Kwajalein and Eniwetok Areas.

The Trust Territory Government will appreciate publication of the above information. Since amateur radio has contributed much toward the improved morale at U. S. military installations, we are anxious that the amateurs be properly informed prior to their departure for posts in the Territory.

— J. C. Putnam
Deputy High Commissioner

[Editor's note: Licenses for Guam itself are issued by FCC, with the prefixes KG6AA-KG6HZ.]

NOVICE LAMENT

2846 Lucas Drive
Dallas 19, Texas

Editor, *QST*:

I would just like to register my complete concurrence with WA2BMB's ideas as expressed starting on page 79 of the January issue.

The simple truth is that the terrible amount of QRM we hear on the bands at night is due to only one thing — that being the soaring influx of Novices and Novices turned-General since the inception of the Novice license.

We all know it is almost ridiculously easy for anyone with absolutely no real knowledge of radio or electronics whatsoever to get a Novice license. I know of at least one ham who got his Novice license after studying the code for a few days and the theory for about half an hour. Now I have no

objection to this in itself — it would be wonderful if everyone in the world could be a ham — but the unfortunate truth is that there is an unalterable limit to the number of stations it is practical and desirable for all concerned to have in existence.

It seems pretty obvious to me and it should to anyone who thinks about it that since the rate of the rate of increase is increasing and at present one person out of every 900 is a ham in this country, if nothing is done about it the ultimate result will be utter chaos. Obviously something should be done, and soon, to cut down drastically the oncoming numbers of new hams. I can think of no better method than, as WA2BMB suggested, taking away the Novice license . . .

— John A. Bartoli, jr., *K5JMY*

75 Hillside Avenue
Verona, New Jersey

Editor, *QST*:

I think we should all give Mr. Guidi (WA2BMB) a hearty cheer for his suggestion to rid the bands of Novices. While this class does give the beginners a chance to operate, it does cut down on the amount of space that amateurs who have really worked for their licenses have. If the Novice Class is going to remain as it is, I think that the code speed should be raised and the theoretical questions made a whole lot tougher.

— Pete Hanson, *K8MPG*

3545 Biddle Street
Cincinnati 20, Ohio

Editor, *QST*:

Having looked over the January issue of *QST*, I noticed an anti-Novice letter from WA2BMB. Being a Novice myself, I disagree wholeheartedly with his desire to get rid of us altogether. He said it would discourage 95% of the prospective amateurs and thus make the bands less crowded. Getting rid of the Novice, he states, would make the bands larger.

First we have very little space on the amateur bands in which to make QRM. If a General or Advanced class operator wishes, he may use the Novice bands.

Secondly, the majority of amateurs do not wish to destroy amateur radio, but build it. May I quote from the Amateurs' Code (4):

"The Amateur is Friendly . . . Slow and patient sending when requested, friendly advice and counsel to the beginner, kindly assistance and cooperation for the broadcast listener; these are the marks of the amateur spirit. . ."

— David F. Ransohoff, *KN8RMT*

98 Kent Street
Hartford 12, Connecticut

Editor, *QST*:

Some people have written saying some things that were, in my opinion, pretty far from the truth, but Mr. WA2BMB really hit the jackpot.

He may have thought that he got to the bottom of the ham-band QRM but he sure didn't. It is not the incoming Novices that are crowding our bands. Most of these newcomers have very modest rigs that certainly do not create any great amount of QRM. Our old-timers who run a kw. on the over-crowded 75- and 40-meter bands are the real culprits. It is their powerful signals that create QRM. To the best of my knowledge I have never QRM'd anyone with my 65 watts of controlled carrier, but many's the time a kw. has plowed me under but good.

Now for a possible solution: Generals should be forced to cut down to about 500 watts or so of power. It would not cut down our chances for DX or anything else, but it would help out the QRM problem. This might even lend itself to some privileges for Extra Class licensees, who perhaps could maintain their present power.

— Ben H. Gorsky, *K1IVR*

393 1/2 Hudson Street
Seattle 18, Washington

Editor, *QST*:

Just who the heck does WA2BMB think he is? Today I passed my General examination and owe it all to my on-the-air experience. Not only do I think WA2BMB's remark about Novices messing up the air waves is ridiculous, but I know that Novices have helped in nets, emergencies, and in community affairs . . .

— Mike Perrett, *K7HIL*



Operating News



F. E. HANDY, WIBDI, Communications Mgr.
GEORGE HART, WINJM, Natl. Emerg. Coordinator
JOHN F. LINDHOLM, WIDGL, Ass't. Comm. Mgr., C. W.

ROBERT L. WHITE, WIWPO, DXCC Awards
LILLIAN M. SALTER, WIZJE, Administrative Aide
ELLEN WHITE, WIYYM, Ass't. Comm. Mgr., Phone

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FCC Suspends License for Failure to Keep Mobile Log; also for Permitting Operating without Control by Duly Licensed Amateur Operator. All amateurs who presently engage in mobile operations, or contemplate doing so in the coming season should take note that the FCC insists on compliance with its Amateur Rules, Section 12.136 and Section 12.28. The operator engaging in mobile or portable work should likewise carefully study applicable sections of Sections 12.90 and 12.81. Mobile work requires as high obligations in the exercise of control and responsibility as other types of amateur operation.

FCC took under consideration the suspension of the Advanced Class Amateur Radio Operator license of Frederick William Peters jr. (W5BAG) Los Alamos, New Mexico, *it appearing* that at various specified times in May and June 1959 (twelve dates designated) the named licensee wilfully failed to maintain a log of operation of W5BAG (mobile) in violation of Sec. 12.136 of FCC rules, and *it further appearing* that (on designated dates) the licensee wilfully permitted W5BAG to be operated without actual control over the emissions by a duly licensed amateur radio operator (as required Sec. 12.28).

The Federal Communications Commission ORDERED (Nov. 25, 1959) that the Advanced Class operator license of Frederick William Peters jr., Los Alamos, N. M., BE SUSPENDED for a period of two months. This action was effective from December 22, 1959.

Citizen's Band License Revoked for Unlicensed Operation in an Amateur Band. FCC has announced that in Docket 12988 its initial decision of October 7 became effective November 26th, revoking the license for Citizen's Radio Station 3A0896 of Harry E. Altland, York, Pa. He was cited for *unlicensed operation in the amateur band*, and also for falsely identifying himself.

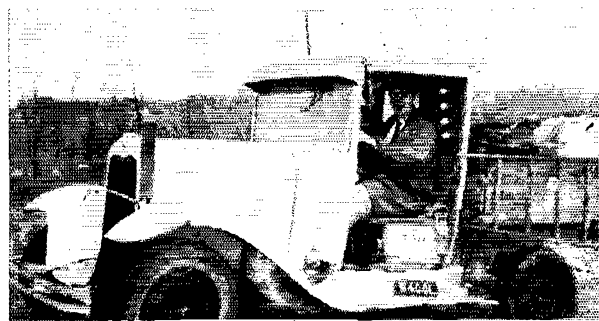
Net Directory Use at Local Levels. Some

SCMs, RMs, and PAMs may wish to follow the policy of Eastern Massachusetts SCM Baker, W1ALP, in mailing with correspondence, slips or cards that identify the different nets of the section. *The frequency, days of operation, and net starting time are shown for each net.*

Amateurs also can readily make a good Net Reference List for the operating position by consulting the new ARRL Net Directory, and extracting the pertinent items for whatever part of the country desired. Full net information can be found in Nov. *QST* (p. 79), Jan. *QST* (p. 86), and this issue (p. 99). A list of local nets handy at the operating position will help you determine outlets for radio traffic. The W1ALP sample included c.w., phone, and v.h.f. nets 3.5 to 148 Mc! The complete annual ARRL Net Directory is available upon request.

K6USA and Amateur Operators at the Olympic Games. All radio amateurs visiting the VIII Olympic Winter Games at Squaw Valley, California, February 18-28 are invited to visit the communication center, located in Squaw Valley Lodge Annex and sign the K6USA visitor's log. ARRL is indebted to L. B. LaDue, W6JEQ, and John Holmes, W6MSI, for the account of some of the arrangements at Squaw Valley. Personnel from our amateur ranks will handle the emergency nets. The plans go back to meetings of ARRL members (at Sacramento Jan. '59) with Dr. W. W. Stiles, Medical Director and M. V. Long, ex-W6GDE, in charge of the whole emergency communications set-up. The olympic grounds and K6USA are located in the high Sierras, 40 miles west of Reno, seven from Lake Tahoe; 800 entries from 31 nations are expected in these Winter Games. The radio nets that

Although some traffic men have undoubtedly already seen this picture (it was part of a Christmas card), we want to share it with the rest of the traffic fraternity, because we definitely think that W4OOL's mobile rig is a thing of beauty.



control dispatch of medical vehicles, location of ski patrols, requests for assistance etc. will be in the hands of the gang that will operate K6USA when off duty. A communications center at Squaw Valley controls remote equipment on top of KT-22; another main control is at McKinnary Creek 19 miles distant, with a further fixed station at the fire house at Tahoe City. V.h.f. and other equipment has been supplied by the military, and 6th Army military frequencies assigned. The official arrangements are to assist a possible 35,000 spectators a day.

The ham radio station, K6USA, has been authorized and set up for amateur use on off-duty hours. The equipment is furnished by Elmar Electronics and QSLs by W6GGC. For the gang of amateur operators present this is a once in a lifetime chance not only to get in on some exciting radio operating, but to see world famous athletes in action. The staff participation is best noted by the amateur calls: W6YRK, W6GGC, W6DXI, W6LOE, W6BDE, K6QCL, W6MSI (supervisor of mobiles), W6YWQ, W6JEQ (supervisor base station and KT-22), W6OPL, W6WWW, K6RHD (supervisor at McKinnary Creek), W6MAP, K6SBI, and K6SEA.

More About High Speed Code Runs. Last March in this column we mentioned the high speed code practice and certificate qualifying runs sponsored by the Connecticut Wireless Assn., Inc., and implemented by WINJM and other member stations. This program is *not* sponsored by ARRL nor transmitted over W1AW, but picks up (at 40 w.p.m.) where the ARRL program leaves off (at 35 w.p.m.) and gives those who want to continue to increase their proficiency an opportunity to do so. Two CWA Certifying Runs have been completed.

Certificate winners:

- At 60 w.p.m.: W8RMH, VE7CQ.
- At 55 w.p.m.: W1KYYK, W1ZDP, W4LYV, W5JPC, W9BRD, K8ILM.
- At 50 w.p.m.: W3GJY, W4ORB, KN4VUR, W4ZKU.
- At 45 w.p.m.: K2KIR, W4KFC, W6OZ, W8ZCW, W9DJM, W9DJN, W9YZO.
- At 40 w.p.m.: W1WPR, K2ACP, K2QBW, W2LYH, W2ZVW, W3GAU, K4CAX, W4YE, W7LVU, W8APL, W8BYD, W8DQC.

The next CWA test run is scheduled for March 13, 1960. WINJM will be on 3637 and 7120 kc., and W1TX hopes to repeat the signals on 14,095 kc. A west coast station may assist. The *primary* frequency is 7120 kc. (approx.) so try there first. Then find out if 3637, 14095 kc. etc. can be received. The "call up" starts at 2000 EST (0100 GMT) and continues until 2030. Detailed instructions are then transmitted at 25 w.p.m. Then the test begins. 40 w.p.m. will be followed by 45, 50, 55, and 60 w.p.m., five minutes of plain English text at each speed. There *may* be a 65-w.p.m. transmission. If you copy one minute solid of the five minute transmission at any speed, send it in to WINJM for checking and possible certificate issuance.

On other Sunday nights, WINJM transmits high speed code *practice* starting at 2030 EST (0130 GMT Monday) on 7120 kc. and the other

frequencies, call-up starting at 2015 EST. Practice runs are at 15, 25, 35, 45, and 55 w.p.m.

On GMT for Voluntary Use by Amateurs. Among recent reports from Washington we note that K8ANV petitioned FCC, asking that all radio services in the U. S. A. be required to use GMT for records. FCC December 29th denied this petition, recording that GMT is standard in International Communications, and suited to amateur work, *but best left on a voluntary basis.* Most U. S. services according to FCC have occasion to refer to one or two time zones only, from which FCC reasons that compulsory GMT would be an unnecessary burden. Keeping all our FCC station logs in 24-hour time (0000 to 2400) has steadily gained in popularity. Commonly, however, amateurs usually make the entries with reference to their own local-time meridian starting from midnight. In DXing of course everybody who gets any place uses Greenwich: to be understood internationally, reference to a single time meridian is the ultimate in good sense.

— F. E. H.

A.R.R.L. ACTIVITIES CALENDAR

- Mar. 3: CP Qualifying Run — W6OWP
- Mar. 4-6: DX Competition (phone)
- Mar. 15: CP Qualifying Run — W1AW
- Mar. 18-20: DX Competition (c.w.)
- Apr. 6: CP Qualifying Run — W6OWP
- Apr. 9-10: CD Party (c.w.)
- Apr. 16-17: CD Party (phone)
- Apr. 20: CP Qualifying Run — W1AW
- May 5: CP Qualifying Run — W6OWP
- May 19: CP Qualifying Run — W1AW
- June 1: CP Qualifying Run — W6OWP
- June 11-12: V.H.F. QSO Party
- June 17: CP Qualifying Run — W1AW
- June 25-26: Field Day

OTHER ACTIVITIES

The following lists date, name, sponsor, and page of this QST in which more details appear.

- Feb. 27-28: The French Contest (c.w.), REF (p. 76, last month).
- Feb. 27-28: YL-OM Phone Contest, YLRL (p. 68, last month).
- Mar. 12-13: YL-OM C.W. Contest, YLRL (p. 68, last month).
- Mar. 12-13: Minnesota QSO Party (c.w.), St. Paul RC (p. 121, this issue).
- Mar. 13: WINJM High Speed Code Test, Connecticut Wireless Assn. (p. 91, this issue).
- Mar. 26-27: State of Maine QSO Party, Portland Wireless Assn. (p. 138, this issue).
- Mar. 26-27: Minnesota QSO Party (phone), St. Paul RC (p. 121, this issue).
- April 2-3: Helvetia-22 Contest, USKA (p. 83, this issue).
- Apr. 9-10: The French Contest (phone), REF (p. 76, last month).
- Apr. 23-24: New Hampshire QSO Party (next month).
- Apr. 30-May 1: PACC Contest (c.w.), VERON (next month).
- May 2-4: Operation Alert, OCDM (next month).
- May 7-8: PACC Contest (phone), VERON (next month).
- May 7-8: International Telegraphic Contest, USSR Central Radio Club (next month).



This is about the time of the year that we go into a statistical frenzy around headquarters, preparing report summaries for the annual reports to the ARRL Board of Directors prior to their annual meeting in May. The more data you extract, the more you see that would be most interesting. You have to draw the line somewhere, or you'll turn into a walking calculator.

Generally speaking, statistics can be pretty dull. We try to make them interesting. Last year we introduced a "gimmick" into the presentation by stacking the various call areas, divisions and sections against each other — a group statistical competition, as it were. Each ARRL Director, SCM and SEC was informed where his particular bailiwick stood in comparison with the rest.

The result was rather astonishing. Even some of the directors, who are policy-making officials rather than administrators of operating activities, expressed concern at their divisions' showings and a desire to do something about it. SCMs and SECs bombarded us with questions, excuses, reasons and criticisms concerning the presentation. It was easy to see that most of them were shaken and were resolved to improve their standings. Nobody likes to be last. We all want to "place high" in the standings. But heretofore there have been no standings. Hereafter, the results of the statistical comparisons being what they were, your group is going to be in competition with other groups in the same category.

Traditionally, competitions in amateur radio have been individual rather than collective. Except for Field Day, it's mostly a matter of who (sing.) makes the most contacts, who works the most countries, who runs up the highest traffic total. But we think that group efforts, especially when coupled with public service, are ever so much more progressive and worthwhile. If competition and comparison can enhance them, then let us have more competition, by all means.

One thing more needs to be said, and that is that even group rivalries can be run into the ground, as some Field Day scoring practices have shown. Statistics are the only way in which we can show the degree of service rendered, but these are for the most part paper data, and paper data can be juggled. Indeed, many of them are prepared on the basis of a desired result rather than to show what results. Or, to put it another way, it is often customary to decide first what result you want, then select the data to prove it, rather than to use the data available to show what the results actually are. This is as dishonest intellectually as is robbing a bank legally. If we organize our AREC with a view to placing high statistically rather than to rendering the maximum possible public service, we are doing ourselves a great disservice. Statistics are a means to an end, not an end in themselves. Let's keep them that way.

South Carolina SCM W4GQV adds the following list of calls to those who participated in the Hurricane "Gracie" operation reported in January QST: K4* AKC DAW QCC CHD PED ITU GIF PMZ HMG FFH TUN TTH HBY. Each has been presented with one of the new 50-star flags by the SCM.

Amateurs were called upon to furnish communications for the Oklahoma City Weather Bureau on Sept. 25, 1959. Rain storms had put all teletype and telephones out of order and the Bureau had no means of obtaining information from outside, or to get their data on the teletype lines. W5AZO was called, who in turn called W5HHG who immediately went to the Weather Bureau and contacted W5AZO by mobile. This contact continued until a portable rig was set up in the Weather Bureau office. Weather information continued to be passed via W5VAX and W5KBZ to Tulsa, Wichita Falls, and Fort Worth until the teletype was restored at 1400, and communications continued until telephone service was restored at 2000. Outstanding in traffic handling was K5BWM at Wichita Falls. Others taking active part in the operation included K5s JHN KHA

BYS, W5s IZN CZB. Many others stood by to render assistance as needed. — W5UYQ, SEC Okla.

On Oct. 3, 1959, the Sangamon County sheriff in Springfield, Ill., received a tip that a local club was to be robbed. The sheriff asked the c.d. director for radio assistance and W9s KQL GOJ and PRN manned portables at two law enforcement offices while the deputy sheriffs used unmarked cars with portable transmitters. Nothing happened, but constant vigil was maintained for over four hours. — W9PRN, SCM Ill.

On Sept. 6 the Six Meter Club of Chicago aided the Pan American Games in Winnetka, Ill., by providing 5½ hours of continuous communications for the bicycle races. The amateurs gave information on the progress and action of the races, provided transportation for officials, kept unauthorized persons off the course, and on one occasion summoned an ambulance for an injured cyclist. Fourteen amateurs participated. — K9MLI.

NATIONAL RTTY CALLING AND WORKING FREQUENCIES

3620 kc. 7140 kc.

An oil refinery at Augusta, Kans., was assisted in a fire drill by units of the local AREC on Sept. 17. The control unit was operated from the City Manager's office in the Augusta City Building. One mobile unit was stationed on U. S. Highway 54 at the west edge of the refinery and another at the Santa Fe Railroad control tower at the east city limits. These two units were to stop or reroute traffic in case of spreading of burning oil and chemicals. The test was very successful and impressive to plant officials and the local citizenry. Five amateurs took part. — K0IZM, EC Zone 11, Kans.

The DeLoe Radio Club on Sept 19 coordinated a hike of a scout troop and an explorer post from Woodlyn, Pa. using three two-meter mobiles. This was the fourth year the DRC has participated in this activity, so the details were pretty well ironed out. The hilly terrain was used to good advantage, and communications between the several groups into which the hikers were divided was never lost. At one time eight boys were lost but were quickly found, thanks to the radio check point system being used. The hike terminated at base camp where a turkey dinner was served to all concerned, including the amateurs taking part. — W3AKEQ.



These five amateurs, all members of the Garden State Amateur Radio Assn., provided communication for the National AAU Olympic Walkathon at Asbury Park, N. J., on Oct. 18. They are, left to right: K2MGL, K2UBW, K2ZMZ, W2CQB, W2N8P.

From 1600 Oct. 20 to 2400 Oct. 21, Saskatchewan amateurs took part in a c.d. drill involving all forms of communication and most of the c.d. directors of the province. The exercise went very smoothly and the amateurs handled most of the radio communications. Nineteen amateurs took part in the province-wide exercise. — *VE5IG, SEC Sask.*

For the protection of small fry embarked on "trick or treat" expeditions and the suppression of juveniles who have matured in body but not in mind, the Cuyahoga County (Ohio) AREC was requested by the police chief of Olmstead Falls (W8QBF) to supplement regular police communications on "Cabbage Night" and "Hallowe'en Night." Six mobiles, each carrying a regular policeman, were assigned patrol areas and a portable was set up beside the police dispatcher. Dangerous assignments went to regular police cruisers while others, especially those connected with goblin activities, were assigned the amateur mobiles. It didn't take long for word to get out that "the heat was on" and known gangs and characters became conspicuous by their absence. The project greatly improved mutual respect of police and amateurs for each other. The "Goblin Patrol" is highly recommended as an AREC public service activity for large or small communities. Twenty-one amateurs took part. — *W8AEU, EC Cuyahoga County, Ohio.*

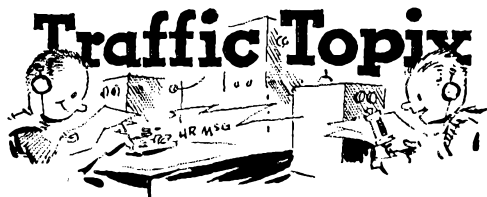
Twenty-seven SECs reported November activities, representing 9970 AREC members. This is one more report and considerably more membership than November of 1958. Eastern Mass. made its first SEC report in many moons. One thing this monthly squib is doing is making SECs report-conscious. Sections reporting for November: So. Texas, N. N. J., NYC-LI, Kans., Mich., Ind., Minn., Tenn., Me., Wash., Wyo., Ala., N. Mex., E. Fla., Colo., N. Texas, S. Dak., Okla., San Joaquin Valley, Nevada, Wis., E. Bay, E. Pa., Maritime, Santa Clara Valley, Ore., E. Mass.

RACES News

Realizing that schools are usually selected as the meeting place for all emergency gatherings, whether simulated or real, Kentucky C.D. Radio Officer W4BAZ has embarked on a program of installing radio equipment in as many schools as possible. DeSales High School in Louisville was the first. The installation was made by members of the DeSales High School Radio Club and consisted of a 67-foot rooftop tower and both transmitting and receiving gear, plus code practice equipment. W4BAZ says that not only does this provide operating equipment at the place it is needed but also provides on-the-spot training for the boys and girls in proper emergency operating. The station, and those planned for other schools, will take part in official RACES tests and drills and participants will practice code three times a week. It is felt that through this training they will be able to hold up their end when faced with a real emergency.



For the second straight year the RACES group of Delaware Township, N. J., assisted local police authorities in maintaining surveillance during the Hallowe'en period. Under the direction of RO W2L BX, four mobiles operated on Oct. 29 with reserve police assigned to patrol, with eight mobiles doing a similar job the following night. The township, 27 square miles in area, was divided into sections for coverage by each mobile in operation. Telephone reports to the regular police were relayed to the mobile units for investigation, and in many cases a unit was on the scene almost before the telephone had been replaced on the hook. Patrolling units also investigated all roaming groups of youngsters. A total of 9½ hours operation was covered during both nights. Eleven amateurs took part. All operation was on two meters. — *W2YRW, SEC S. N. J., Asst. RO, Delaware Twp.*



Increasingly coming to our attention these days is a practice, getting more widespread all the time, of boosting traffic totals by dreaming up originations and performing unnecessary relays. One amateur in a fairly large city tells of two messages he received by telephone from another local amateur, originated by a third amateur also in the same city. One of the messages wished him a Merry Christmas, the other a Happy New Year. When he expressed surprise that he should receive a greeting by amateur radio from someone in his own telephone calling range the delivering operator laughingly told him that the same messages had been relayed all over town before being delivered so everybody could get traffic points.

Fellows, we don't see how we can put a stop to such practices if you are determined to use them, but *this ain't traffic handling* — not in our book, anyway. Traffic handling is supposed to be a public service, but this sort of thing is a service only to the individual, with a selfish end in view. The above example is a little extreme, but the practice exists in more moderate forms which, taken altogether, add up to what The Old Man would have called "Rotten Traffic."

Where does one draw the line between "good" and "bad" traffic? It is so much a matter of opinion that the terms mean different things to different people. We think the intent of the traffic has a lot to do with it. Is the traffic you originate primarily for the purpose of running up your traffic total? If so, there still isn't anything particularly wrong with this, but what *kind* of traffic is it? Does it say anything? Will the recipient's heart be gladdened by its receipt? Will those upon whom falls the responsibility for relaying it grimace with disgust? Will it, and stacks of traffic like it, dilute to insignificance our total traffic effort?

True, our traffic is not and cannot be really important, generally speaking, but this is no reason to generate trash. Use the old noodle, OM. The section winners in the SS contest are not going to be impressed by your congratulations, particularly if they don't know you. Dozens of the DXCC Honor Roll are not interested in your felicitations. In fact, isn't it true that you yourself are not interested in them or their accomplishments, but only your own traffic total?

Mind you, we're not trying to tell you not to originate traffic. All we're doing is asking you, pleading with you, to *please* originate only messages that have something in them, that have some reason for being relayed and delivered, that give us traffic relayers some sense of accomplishment, pride and satisfaction in what we are doing — because this is the only reason we are doing it. Never mind the outraged innocence and the crocodile tears, *you* know what we're talking about. Let's originate and handle good traffic and let the totals, and the BPL listings, certificates and medallions fall where they may.

Net Reports. Eastern States Net reports 31 sessions, traffic total of 661 with 470 check-ins. Mike Farad Emergency and Traffic Net had 23 sessions, 413 check-ins and handled 716 messages. Transcontinental Phone Net, First Call Area, handled 2980 messages in 31 sessions. Early Bird Transcon Net reports 31 sessions, 1317 message handlings. North Texas-Oklahoma Net reports 31 sessions, 933 check-ins, 772 messages. Thanks to W1SMU, K2UBG, W1MDB, W8BVL and W5B00 respectively for these reports.

National Traffic System. The December traffic peak has passed and we're all still in business. There was a lot of griping and tempers frayed slightly at times when the going got tough just before Christmas, but we think we in NTS handled our share of the traffic and quite a bit more. After New Year's, most of us expected to relax a while.

Maybe some of us did, but most of us were kept busy handling ARRL traffic. The net directory came out but there was no automatic mailing this year, so that was the cause of one flood. With the DX contest coming up, many messages were received asking for contest logs — also for Novice Roundup and VHF Contest forms and CD Party

logs. It really got tough for a while, and the headquarters received some criticism for not having staff members on the air to handle this traffic.

The question seems to be, what to do with ARRL traffic if you can't raise W1AW and you can't find any other HQ staffer on the air. Yes, this *seems* to be the question, but we're not quite sure *why*. ARRL traffic is traffic for Connecticut and can be handled by regular NTS routes, through EAN-1RN-CN/CPN channels. On EAN it is listed as 1RN, on 1RN it is listed as Conn., and not until it reaches CN or CPN does it get its specific ARRL designation. Then the local net members have to beat their brains out trying to find an outlet, but that's another problem.

On the other hand, when ARRL traffic gets heavy as it did in January, it may often be helpful to be able to short-circuit it directly to its destination. Besides W1AW, there are three ARRL staff members who participate regularly in NTS nets: W1BDI, W1DGL, and W1NJM. If you find one of them on a net in which you are QNI, or hear them on the air at other times, they'll always be glad to QSP. W1YBH, our Conn. PAM and manager of CPN, handles great quantities of ARRL traffic; he is located right here in West Hartford. W1EFW, a regular on UTL as well as NTS nets, is located not far away and can usually make delivery conveniently.

Except in such special circumstances, however, let's try to keep traffic, whether for ARRL or elsewhere, flowing properly through NTS routes. At area level, traffic is reported to the NCS by regions *within that area* or by area if for other areas. At region level, it is reported by sections *within that region*, or by the designation "thru" if for any point outside the region. At section level, traffic is reported by its city or town of destination, or by the designation "thru" if for any point outside the section. Our procedure in some nets has been very loose in this respect. CD-24 is very specific and the net directory contains an NTS routing guide. No use having NTS procedure if we don't use it. December reports:

Net	Ses- sions	Traffic	Rate	Aver- age	Repre- sentation (%)
1RN.....	60	1472	.610	24.5	76.9
2RN.....	62	763	.480	12.3	97.1
3RN.....	62	1299	.459	20.9	97.8
4RN.....	60	1502	.573	25.0	85.4
RN5.....	62	1604	.869	25.7	96.8
RN6.....	57	1715	.609	30.1	93.0
RN7.....	62	1340	.384	21.6	46.6
SRN.....	58	754	.351	13.0	93.1
9RN.....	49	2700	1.188	55.1	80.1
TEN.....	62	2128	.883	34.3	81.9
ECN.....	22	163	.348	7.4	86.4 ¹
TWN.....	47	992	.493	23.3	66.4
EAN.....	31	2385	1.286	76.9	98.4
CAN.....	31	2250	1.150	72.5	100.0
PAN.....	31	2785	1.070	89.7	100.0
Sections ²	1279	14967		11.7	
TCC Eastern..	60 ³	346			
TCC Central..	62 ³	2353			
TCC Pacific..	103 ³	2591			
Summary.....	2045	44109	EAN	17.5	CAN/PAN
Record.....	1690	39151	1.380	23.5	100.0
Late Reports:					
PAN (Nov.)...	30	1478	.740	49.3	100.0

¹ Region net representation based on one session per day. Others are based on two sessions per day.

² Section nets reporting: NJN (N. J.); MDD & MDDS (Md.-Del.-D. C.); WSSN & WIN (Wis.); QKS (Kans.); Iowa 75 Phone; NEB (Nebr.); Beehive (Utah); SCN (Calif.); VN & VFN (Va.); EPA (Pa.); Tenn. CW, Tenn. Phone & E. Tenn.; AENP (2 nets), AENO & AENB (Ala.); TLCN (Iowa); GSSN, FMTN, FPTN & TPTN (Fla.); WSN (Wash.); WVN (W. Va.); SCN (S. C.); MJN, MPN Noon, MPN Evening, MSN, Minn. 160 (Minn.); KYN, KPN, MIKPN (Ky.); QMN (2 Mich. Nets); CPN (Conn.); GSN (Ga.); EMN (Mass.); QIN (Ind.).

³ TCC functions, not counted as net sessions.

It doesn't seem possible that we can keep on piling up bigger totals, but this December once again outstripped all previous Decembers in number of sessions and amount of traffic handled on NTS — and since December is always our biggest traffic month, this means that the current summary above represents an all time monthly record for NTS. Not

NATIONAL CALLING AND EMERGENCY FREQUENCIES (Kc.)

3550	3875	7100	7250
14,050	14,225	21,050	21,400
28,100	29,640	50,550	145,350

During periods of communications emergency these channels will be monitored for emergency traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be vacated immediately to accommodate other callers.

The following are the National Calling and Emergency Frequencies for Canada: *c. n.* — 3535, 7050, 14,060; *phone* — 3765, 14,160, 28,250 kc.

only that, but we have exceeded the 40-grand mark and topped our previous high traffic total by over 4000. In sessions, we have reached the 2000 mark and there is no sign of a let up.

All we can think of to say (besides WOW!) is that we must be careful to maintain our quality while we continue to increase our quantity. NTS growth has not been over-rapid, but steady, progressive. Its growth has been healthy. With increased popularity of NTS among the newer traffic men, we have to watch out for a growth explosion, lest the system suddenly become too big for its shoes and the demand consequently gets too great for changes in the setup — changes that will revert us to the old hodge podge of former years. Yes, there is room for everybody, but each participant has to be absorbed gradually, each has to grow accustomed to the system, and none should expect his greatness to be recognized until or unless he is thoroughly familiar with what NTS purports to do and trying his level best to do his part in it.

It looks as though 1RN might have a second session for keeps, this time. W2PHX has issued 2RN certificates to W2OPB, K2ZHK and W2APY; the latter is the first W2 to receive this honor. W3UE speaks highly of the improved representation on 3RN. K6HLLR is resigning as RN6 manager. K7AXF earns his RN7 certificate for Oregon representation; ITV on 3575 is causing concern and possibly a change in frequency. W8BWK, a stalwart for West Virginia on 8RN, recently became a silent key. The high volume of traffic on 9RN was handled without trouble, thanks to adequate representation of the sections. K0KBD congratulates all TEN representatives on the fine way they handled the December load. ECN is changing frequency to 3540 kc. to get away from commercial and other-net QRM. TWN made a fine showing in its first month of two sessions per night; Manager K0EDH puts out a monthly summary sheet. CAN Manager W9DO was presented a deskpin plaque and a pair of fur-lined earphones by the CAN NCSs.

Transcontinental Corps. Inter-area traffic handling is pretty tough, and gets even worse during a busy month like December. The Central Area boys take a beating when conditions get bad and traffic between Pacific and Eastern areas has to be relayed. We think the TCC deserves a big hand for the job it did in December under conditions that were far from ideal. December reports:

Area	Func- tions	% Successful	Traffic	Out-of-Net Traffic
Eastern.....	60	90.0	2554	346
Central.....	62	93.5	4706	2353
Pacific.....	103	88.3	2615	2591
Summary.....	225	90.2	9875	5290

The TCC roster: Eastern Area (W3WG, Dir.) — W1s AW NJM SMU, K1MMA, K2SSX, W3WG, W8PGW, K9DAC, W9s DO DYG. Central Area (W0BDR, Dir.): W0s LCX LGG SCA BDR. Pacific Area (W6EOT, Dir.) — K6s LVR OHV HLR GID, W6s EOT WPF ELQ IZG HC, K7CWV, W7s GMC ZB BDU, K0s EDK EDH DTK CLS, W0s ANA KQD.



An aftermath of Field Day finds Mort Kahn, W2KR, Hudson Division ARRL Director, congratulating Al Mason, K2JQB, President of the Communications Club of New Rochelle (N. Y.); Jerry Hacker, K2ZDJ, Field Day Committee Chairman; and George Bartels, C.D. Director of New Rochelle. CCNR placed first in its class, operating 14 rigs during the event. (Photo by Allan Beeman.)

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for December traffic:

Call	Ortg.	Recd.	Rel.	Rel.	Total	Call	Ortg.	Recd.	Rel.	Rel.	Total
W3CUL	415	4723	4201	176	9515	K7EWZ	52	292	229	45	618
K2UTV	380	2988	2777	220	6363	W9JOZ	12	305	283	3	603
W2KLB	566	1723	1486	595	4370	W0GGP	110	417	56	12	595
W8DDR	158	2048	1910	68	4134	K4DUR	35	343	246	35	597
W0LGG	731	1131	1046	69	2977	K9BLT	10	304	257	18	589
W8UPH	35	1365	1225	138	2763	W7UHT	50	268	201	67	588
W0LXC	27	1235	1114	121	2497	W6ZJB	189	225	150	20	584
W8SCA	55	1141	1125	1	2322	K4FMA	58	273	171	79	581
W7SA	11	1051	1013	36	2111	W8BTL	5	292	279	1	577
W9DYG	40	1016	946	59	2061	K9BTCG	55	260	200	53	568
W6EOT	9	1028	962	54	2053	W0NYU	23	284	187	66	560
W6GYH	37	926	909	36	1908	W1FFW	34	267	212	46	559
K5W8P	150	764	764	150	1828	W7ZB	37	263	209	47	556
W8GQY	684	232	762	116	1774	K8RCF	36	259	249	10	554
K1FDP	306	561	707	70	1724	W3FHK	7	272	265	4	548
W4IVB	32	782	738	44	1566	W7AVN/5	126	198	198	28	548
W9NZZ	317	635	0	631	1583	W5UTW	2	273	262	7	544
K4QLG	1103	218	81	137	1539	W7QLH	16	272	217	33	538
W9D0	17	752	665	104	1538	K6ZYZ	13	260	256	4	534
W1AWA	49	742	701	31	1523	W1DXS	23	256	208	44	531
W4PL	15	932	545	25	1517	K4BXS	16	254	196	61	527
K1HCS	170	676	605	152	1503	W0VXY	31	248	220	28	527
K6BPI	93	645	600	45	1383	K1DIO	41	242	144	58	525
W00HJ	10	686	673	13	1382	K0EDH	58	295	161	11	525
K4QES	239	548	543	8	1328	W1EMG	12	255	210	46	523
K1GRP	74	597	556	41	1268	K4EJL	111	209	174	24	518
W8MDU	81	594	559	58	1245	K8BMD	56	226	143	112	507
W7DXZ	3	609	559	37	1213	K1IKP	135	201	155	4	505
W8RSY	38	596	437	102	1173	W5GY	151	186	165	2	504
W9TT	32	608	272	255	1167	Late Report:					
W7BDU	4	583	557	9	1153	W8ZJB (Nov.)	270	233	16	163	682
K4SGQ	39	550	543	0	1132						
W3VR	15	541	512	5	1056	More-Than-One-Operator Stations					
W9MAM	8	542	536	6	1102	Call	Ortg.	Recd.	Rel.	Rel.	Total
K2YZI	152	490	441	12	1095	W8YDK	1932	1062	961	101	4056
K9AIR	436	106	523	19	1084	K0VAH	154	439	349	90	1032
W9KOD	43	510	470	27	1050	K1616	154	405	403	42	1004
W9ZYK	63	496	350	119	1028	W0TUS	85	459	374	36	934
K481J	177	749	343	52	1221	W6IAB	322	190	120	70	702
K1LSM	27	487	452	34	1000	Late Report:					
W4SHJ	2793	117	35	24	969	K6MCA (Nov.)	204	805	1004	7	2020
K8ONK	125	380	402	15	922						
W9BLI	5	460	451	5	921	BPL for 100 or more originated-plus-delivered:					
K8DTK	18	450	444	5	917	K4GFR	294	W2YRW	129	VE2DR	111
W9DA	15	454	434	6	909	K4MIH	289	W3WRG	129	VE7AAF	111
W10BR	83	412	358	24	877	K7BKB	224	W1MHS	126	K2MBU	110
W5CJZ	113	466	377	21	877	K3WBJ	206	K9BLJ	125	K0TMM	110
K1MAM	97	398	363	17	875	K0SGJ	205	W0QDL	125	K8HKU	108
W4ZKU	28	406	334	93	861	K2IMK	195	W3UHN	121	K4PHG	107
W4ZCTG	86	347	401	24	858	W3TN	188	K1BYV	120	W1HJG	106
W3KUN	19	418	276	142	855	K0LTP	184	K0LTP	120	K2SFL	106
K1CIP	257	310	265	12	844	K9TYM	184	K3BYB	119	K8GWK	106
VE2WT	332	253	222	10	817	K9PDE	164	W9TZN	119	K9IBP	106
W1UIR	13	437	269	86	805	K8PDX/3	159	W9MAK	118	W1KJZ	106
K80ZJ	2	400	385	15	801	K2DEI	158	W4ZBQK	117	K1JAW	104
W9DGA	584	163	43	11	801	K3CXX	157	W4BEO	117	W4BKE	104
K288X	105	349	315	23	792	K8EA	157	K6PXX	117	W4QDY	103
W8DAE	38	382	210	161	791	W0YQ	153	K9PHP	117	K7GHC	103
W9USR	3	390	212	174	779	W4ZCNS/		W9CCO	116	K4RAEM	103
W1PEX	12	383	364	7	766	VE8	152	W0KIK	116	K2EVL	102
W6BHG	126	335	315	5	766	W4ZKE	152	W7APS	115	K6EPL	102
K7CLL	99	333	315	5	752	K4VHC	145	W9SAA	115	K5LGH	102
K4LCD	16	397	295	71	749	K4ODS	141	K0SNG	114	K9RSU	102
W7PGY	35	347	312	36	724	W46BLM	140	K2UCY	113	W1NJK	101
W9CXY	7	364	347	5	723	W46CDD	140	K9BLE	113	K1BRK	100
K7BYC	85	321	266	36	708	K4CNY	139	K0JGC	112	W1RWH	100
W80CC	9	350	343	4	706	K4VY	134	K8MNO	111	K8RMO	100
W6WPF	2	344	335	9	690	K3GHH	131	K8SXX	111	K0RPW	100
K61VR	13	338	332	2	685						
K8JLF	11	338	326	5	680						
K2ZHK	85	322	265	6	678						
W9VAY	29	341	296	2	668						
K0LTI	238	201	203	21	663						
W3UPE	22	313	303	24	662						
W5ZRN	51	326	104	175	655						
K0RBD	29	333	284	8	654						
W0ANA	45	290	239	71	645						
W2RUF	40	350	154	95	639						
W5BKH	4	314	207	111	636						
K4QIX	39	333	333	20	633						
K6ISD	51	322	281	9	633						
W9UQF	50	256	227	99	632						
K9PEF	22	306	86	213	627						

W1AW OPERATING SCHEDULE

(All times given are Eastern Standard Time)

General operation covers all amateur bands on which W1AW has equipment. Novice periods include operation on 3.5, 7 and 21 Mc. (see footnote 2 in box on p. 76, November QST). Master schedules showing complete W1AW operation in EST, CST or PST will be sent to anyone on request.

Operating-Visiting Hours:

Monday through Friday: 1500-0300 (following day).
Saturday: 1900-0230 (Sunday).
Sunday: 1500-2230.

Exceptions: W1AW will be closed from 0300 April 14 to 1900 April 16 in observance of Good Friday.

General Operation: Use the chart (p. 76, November QST) for determining times during which W1AW engages in general operation on various frequencies, phone and c.w. Note that since the schedule is organized in EST, certain morning operating periods may fall on the evening of the previous days in western time zones. W1AW will participate in all official ARRL operating activities, using scheduled general operating periods for this purpose if necessary.

Official ARRL Bulletin Schedule: Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules:

Frequencies (kc.):

C.w.: 1820, 3555, 7080, 14,100, 21,075, 28,080, 50,900, 145,800.

Phone: 1820, 3945, 7255, 14,280, 21,330, 29,000, 50,900, 145,800.

Frequencies may vary slightly from round figures given: they are to assist in finding the W1AW signal, not for exact calibration purposes.

Times:

Sunday through Friday: 2000 by c.w., 2100 by phone.

Monday through Saturday: 2330 by phone, 2400 by c.w.

Code Proficiency Program: Practice transmissions are made on the above listed c.w. frequencies (except 1820 kc.) starting at 2130 daily. Speeds are 15, 20, 25, 30 and 35 w.p.m. on Monday, Wednesday and Friday, and 5, 7½, 10 and 13 w.p.m. on Sunday, Tuesday, Thursday and Saturday. Approximately ten minutes of practice is given at each speed. Exceptions: Mar. 15 and Apr. 20 W1AW will transmit ARRL Code Proficiency Qualifying Runs instead of the regular code practice.

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 Mar. 15 at 2130 Eastern Standard Time. Identical texts will be sent simultaneously by automatic transmitters on 3555, 7080, 14,100, 21,075, 28,080, 50,900 and 145,800 kc. The next qualifying run from W6OWP only will be transmitted Mar. 3 at 2100 PST on 3590 and 7129 kc.

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.

Code-practice transmissions are made from W1AW each evening at 2130 EST. Approximately 10 minutes' practice is given at each speed. Reference to texts used on several of the transmissions are given below. These make it possible to check your copy. For practice purposes, the order of words in each line of QST text sometimes is reversed. To improve your list, hook up your own key and audio oscillator and attempt to send in step with W1AW.

Date Subject of Practice Text from January QST

Mar. 1: How to . . . Key Clicks, p. 44
Mar. 7: Hams on Ice, p. 11
Mar. 10: 3 Bands on a 1½-Foot Boom, p. 41
Mar. 16: So You Want to Win a Contest, p. 56
Mar. 22: It Seems to Us, p. 9
Mar. 25: A Table-Top Half Kilowatt, p. 24
Mar. 29: Two-Band Coverage with the BC-454, p. 36
Mar. 31: Operating News, p. 80

NEW NET DIRECTORY AVAILABLE

Official Bulletin Number 733, announcing the availability of the new cross-indexed Net Directory, prompted a flood of requests of avalanche proportions. Five hundred were shipped the first week with requests still coming in strong. But you're not too late to get yours. A request to ARRL will bring your copy. You may drop a radiogram or drop a post card. When doing so however, please remember to give your full name, call, and complete address. There is no automatic mailing list this year. You will receive the Net Directory only upon request.

The directory is in three sections: (1) Nets are listed alphabetically by name, giving coverage, frequency, days, time (in both local standard and Greenwich), call of net manager, purpose (traffic or emergency) and approximate maximum time in session; (2) Alphabetically by state; (3) By frequency, from low to high. Thus, a net can be located by its name, the state within which its coverage area falls, or its operating frequency. Nets that do not serve a traffic or emergency purpose have been omitted.

Over 500 nets were registered up to the directory deadline date, Dec. 9. Subsequent lists appear in this issue of QST and forthcoming May QST.

SUPPLEMENT TO NET DIRECTORY

The following list of nets will supplement and correct the listings on page 79, Nov. QST and page 86, Jan. QST. Footnotes indicate correction to previous QST listings, corrections or additions to the printed Net Directory (CD-50) or National Traffic System affiliation. Please inform us of any corrections or additions so that they can be included in the final May QST installment.

Registrations that do not show a public service purpose are not included. Only nets which have been registered or re-registered since Aug. 1, 1959, are included in this list. This list does not include nets listed in Nov. or Jan. QSTs unless a change is shown.

Important note: QST net listings are for information only. Listing in QST or the annual ARRL Net Directory (CD-50) does not signify necessarily that nets listed have any official status, does not entitle them to exclusive or prior right to the frequency or frequencies on which they are registered, and is in no sense a form of copyright.

Certain common abbreviations are used to conserve space in listing net names. Under column headed "Days" the following abbreviations are used: Sn, Sunday; M, Monday; T, Tuesday; W, Wednesday; Th, Thursday; F, Friday; S, Saturday; Dy, Daily including Sunday; 1/M, first Monday of month (& similar); 1/3M, first and third Mondays of month (& similar); a hyphen (-) between days indicates that all days between are included.

Name of Net	Freq.	Time	Days
Adams County AREC Net (Pa.)	3865	1300	EST Ah/Sn
Addison County Emerg. Net (ACEN) (Vt.)	145,800	1830	EST Dy
AENT (Ala. Teenage Net) (AENT) ²	3905	1630	CST Dy
		0830	CST S
Allen County C.D. Net	50,580	1900	CST M-F
American Red Cross Emergency Net	3885	1000	PST Sn
Antietam Radio Assn., Inc. Net (Md.) ²	29,540	1900	EST 1/2T
AREC Net (N. Mex.)	3838	2000	MST T-S
AREC-Queens Net (N. Y.)	145,800	2030	EDT M
Arkansas Emerg. Phone Net	3885	0900	CST M-S
Beehive (Utah) Net (BUN) ²	3920	2000	MST Th
	7272	1230	MST Dy
Blackstone Valley Amateur Radio Net	29,000	1900	EST M
Bloomfield Communications Group Net (BCG) (N. J.)	145,320	1900	EST TF
Blue Ridge 160 Meter Net (BRN) (Idaho)	1815	0830	CST Sn
B.C. Amateur Radio Emergency Corps Net (B.C.A.R.E.C.)	3755	1800	PST M-S
Butler Co. VHF Net (Ohio) ²	50,550	1930	EST Th
Camden County Civil Defense Net (N. J.)	28,620	2000	EST F
	50,480		
	145,380		
Carbon County (Pa.) RACES Net	145,380	2000	EST TTh
Central Iowa 6 Meter Net	50,748	2000	CST T
		2200	CST F
Central Virginia Six Meter Net ²	50,100	1900	EST Dy



Pacing the field in the October 30 and 31 RTTY Sweepstakes was W3CZE, as reported in January QST. Frank White, W3PYW, was the operator in this all-out effort, which netted 108 contacts in 40 sections—a mighty fine score. (Photo by W3CZE.)

Champaign County (Ill.) Civil Defense Net	28,600	1900	CST	F	MDD, Maryland Delaware and Dist of Col Net ^{1,2}	3650	1915	EST	M-S
	50,400				Medina County (Ohio) 160 Meter Net	1805	1300	EST	Su
	147,500				Michiana Six Meter Phone Net ²	50,500	1700	CST	T
Champlain Valley VHF AREC Net ²	50,250	2000	EST	W-M	Middle Tenn. 6 Meter Net ²	50,600	1930	CST	M
Chicago Area 2 Mtr. RACES Net ¹	145,200	2000	CST	Th	Middletown Intercom Net (Ohio) ²	146,250	2100	EST	M
Chicago FMN-1 AREC Net ¹	147,500	2100	CST	Th	Military Civilian Affiliated Net-7	7215	1330	PST	M-F
Colo. Emerg. Phone Net (CEFN)	3890	0800	MST	Su	Minnesota Junior Net (MJN) ^{2,3}	3595	1900	CST	Dy
Confederate Signal Corps Two Meter Net	145,350	2000	EST	M	Missouri Emerg. Phone Net (MEN) ^{1,2}	3885	1800	CST	MWF
Coosa Valley Emerg. Net (CVEN) (Ga.) ²	3950	1330	EST	Su	Monterey Bay RC Emerg. Net (Calif.)	147,160	2000	PST	M
Danvers Emerg. Net (DEN) (Mass.)	29,455	1845	EST	M	Montgomery County A.R.E.C. Net (MRC) (Ill.)	145,500	2030	CST	T
Del. Valley Two Meter Traffic Net ²	146,000	1930	EST	S-Th	Montgomery County C.D. Net (MCCD) (Ill.)	50,500	1930	CST	F
Delta-75 Net	3905	0730	CST	Su	Montgomery County Operational Net (Pa.)	29,520	2030	EST	Th
Du Page Co. (Ill.) RACES Nets	29,600	2000	CST	M	Morning Calif. Net (MCN) ²	7125	1000	PST	Dy
	145,380				N. Mex. Brass Pounders Net (NMBP)	3570	2000	MST	MWF
	146,940				N. Mex. Breakfast Club Net	3838	0700	MST	M-S
Dutchess County RACES 6 Meter Net (N. Y.)	50,380	2130	EST	M	N. Mex. Emerg. Phone Net (NMEPN)	3838	0730	MST	Su
Dutchess County RACES 10 Meter Net (N. Y.)	28,610	2000	EST	M		1800	MST	TTh	
Dutchess County RACES 2 Meter Net	145,350	2100	EST	M	New Orleans 3825 Net	3825	0930	CST	Su
Eastern N. Y. AREC 10 Meter Net	29,490	2100	EST	Th	New York City Long Island Net ³ (NLI)	3630	1930	EST	M-F
E. N. Y. AREC 2 Meter Net	145,350	2100	EST	F		1915	EST	SSu	
Echo (Charley Net (N. M.)) (EC)	3838	1900	MST	Su	N. Y. Phone & Emerg. 6 Meter Net ²	50,100	0900	EST	Su
Erie County Emerg. Net (N. Y.)	3915	1230	EST	Su	N. Y. State C.D. Command Net (CW) (YCD) ²	3510.5	0900	EST	Su
FARM Net (Friendly Amateur Radio Missions)	3935	1900	MST	M-F	N. Central Phone Net (NCPN) ²	3915	0645	CST	M-S
Fond du Lac 6 Meter Emerg. Net (Wis.)	50,100	2100	CST	M	N. Dak. CW Net ³	3670	1830	CST	MWF
Galveston County RACES Net (Texas)	3993	1800	CST	Alt/T	N. Texas Traffic Net (NTTN) ^{2,3}	3960	1730	CST	Dy
The Golden Empire Amateur Radio Society's Civil Emerg. Net (Calif.) ²	50,560	0800	CST	Alt/Su	Northeast Area Barnyard Net	3960	0800	EST	M-S
Goose River Net ²	1820	0900	CST	Su	Northern Calif. Net (NCN) ^{2,3}	3635	1900	PST	M-S
	1980				Nutley Amateur Radio Net (N. J.)	29,400	1330	EST	Su
Hampton Roads Emerg. Net (Va.)	29,000	2000	EST	M	OCDM Region Six RACES Net (OCDR6) ²	3500.7	1930	MST	T
	145,800					7098.5			
Harford County C.D. Radio Net (Md.)	29,590	1930	EST	T	The Orange County Six Meter Emerg. Net (Texas)	50,800	1900	CST	Dy
Hiawatha Weather Net	3920	0700	EST	M-S	Oregon Emergency Net (OEN)	3810	1800	PST	Dy
Houston Amateur Radio Club Emergency Net (Texas)	3995	0800	CST	Su		1900	PST	Dy	
Inter-County Net (Miami, Fla.)	29,600	2000	EST	3/M	Oregon YL Net	3890	1500	PST	M
Interstate Single Sideband Net	3985	2000	EST	Dy	Oswego County C.D. Net (N. Y.)	147,150	1900	EST	S
	14,285	0900	CST	M-F	Pa. Central Area Net	3997	0800	EST	Su
Jackalope Net	7255	1215	MST	M-F	Pa. Eastern Area Net	3997	0830	EST	Su
Jefferson County Emerg. Net X (AEN"X") (Ala.)	50,700	1915	CST	T	Pa. State Radio Officers Command Net	3997	0740	EST	Su
Jefferson Emerg. Net (JEN) (La.)	7190	2100	CST	M-F	Pa. Western Area Net	3997	0900	EST	Su
Ky Korn Krakers Net (KKK)	3932	0600	CST	M-S	Penowva Phone Net	50,520	2000	EST	T
	3945	0800	CST	Su	Pulaski County CD Net (Mo.) ²	146,000	2000	CST	F
Lehigh County AREC Net ²	50,850	2230	EST	Su	Putnam County A.R.E.C. Net (N. Y.)	3890	1330	EST	Su
	145,720	2130	EST	Th	Queen City Emerg. Net (QCEN)	29,600	2000	EST	M
Lorain County (Ohio) 160 Meter Net	1820	1300	EST	Su		50,700	2000	EST	W
Los Angeles Amateur Radio Emerg. Council Net ²	29,500	1215	PST	M	Queens Co C.D.-AREC 10 Meter Net (N. Y.)	29,500	2000	EST	M
Louisiana Net (LAN) ²	3615	1900	CST	M-F	RACES Net-Sector 1B ¹	50,745	2000	EST	1/T
Manitoba Phone Net ¹	3760	1900	CST	Dy	River Forecast Net (RFN)	3656	0700	CST	Su
Marion County AREC Net (Ind.)	50,700	2000	EST	T	RN-5 Net ²	3645	1945	CST	Dy
McKean County Emerg. Net (Pa.)	3525	0800	EST	Su		2130	CST		

Rockbridge Amateur Emerg. Net ("RAEN")	50,400	1830	EST	TF	Turlock ARC Alternate Tuesday Night Net (Calif.) ²	145,350	2000	PST	Ait/T	
Rutland City CD Net (Vt.)	145,350	1930	EST	W	2-4-6 Net (Calif.)	50,150	1900	PST	M-F	
Sacramento 6 Meter CD Net (Calif.)	51,300	2000	PST	T		50,190	1830	PST	M-F	
The Saint Clair County Joint RACES-AREC Net (Ill.)	29,520	1930	CST	2/4Th		145,080	1900	PST	Dy	
San Bernardino Area Net (AREC) ²	50,580	2000	CST	2/4Th			1930	PST	Dy	
SCRFS Net (Calif.) ¹	29,200	1900	PST	M	Ulster-Kingston CD RACES Net (N. Y.)	29,510	2000	EST	M	
Six Meter Nomad Club Net (Ohio) ²	147,850	2000	PST	T		50,520				
S. C. Single-Side Band Net	50,400	2000	EST	M	Upper Peninsula Emerg. Net (UPEN) (Mich.)	145,440	3920	0900	EST	Sa
S. Texas Emerg. Net	3915	2000	EST	M-F						
S. Texas Emerg. Net (CW)	3860	1300	CST	Tn	Warren County RACES Net (Ill.)	50,550	1830	CST	W	
St. Clair County Emerg. Net (Mich.)	3780	1930	CST	M	Waukesha County C.D. Net (Wis.)	145,290	2000	CST	M	
Steel City Amateur Radio Club Net (Colo.) ²	29,400	2100	MST	W	West Fla. Phone Net ²	3836	1800	EST	Dy	
Ten Meter Wheat Belt Net	28,400	2000	MST	T	Western Pa. Mobilers Net	29,360	2000	EST	W	
Tennessee Phone Net ^{2,3}	3980	0845	CST	M-S	Whittier CD and Emerg. Comm Net (Calif.)	3885	2015	PST	Th	
		1800	CST	TTh	Winston-Salem C.D. Two-Meter Network (N. C.)	147,150	2000	EST	TTh	
		0800	CST	Sa						
Tenn. Single Side Band Net ²	3980	1900	EST	MWF	Wis. Slow Speed Net (WSSN) ²	3617	1630	CST	M-F	
Topeka Kansas Ten Meter Emerg. Phone Net ¹	29,600	0900	CST	Sa	Wood-Ridge, N. J. C.D. Net	145,680	2000	EST	W	
Transcontinental Phone Net, First Call Area (TCPN) ²	3970	1700	EST	Dy	Zone-5 of The South Texas Emergency Net ²	3815	1900	CST	T	
Trumbull County Emerg. Net (Ohio)	29,604	1845	EST	T						
Tularosa Basin Two Meter Phone Net ¹	146,802	1800	MST	M						

¹ Correction to previous QST listing.

² Addition or correction to previous QST listing and to Net Directory (CD-50).

³ Part of ARRL National Traffic System.

DX CENTURY CLUB AWARDS

HONOR ROLL

W6AM	296	W6CUQ	291	W8BKP	288
Z12GX	296	Z1LHY	291	W8DMD	288
W1FH	295	W1ME	291	W4DQH	288
W8GJW	295	W3JNN	291	C4EJC	288
W3GHD	295	G2PL	291	W6TTC	288
PY2CK	293	W7AMX	291	W4TAM	287
W2HUQ	293	W3KT	291	W1CLX	287
W6ENV	293	W6EBG	291	W8UAM	287
W6SYG	293	W5ANL	290	W6NNV	287
KV4AA	292	W9YFV	290	W8KIA	287
W8JIN	292	W6ADP	290	W9KOK	287
W4BPD	292	W7GUV	289	W6MX	286
W8BA	292	W7GBW	289	W5ADZ	286
W2AGW	292	W9RBI	289	G4CF	286
G3AAM	292	W3BBN	289	W6TSS	286
W6DZZ	292	W2BXA	289	W1GKK	286
W9NDA	291			ZS6BW	286

Radiotelephone

VY2CK	293	W8HGW	284	Z1LHY	280
VQ4ER	288	W9RHL	284	W6AM	280
W8GZ	286	W3JNN	283	W8PQK	279
ZS6BW	286	W6YY	282	4X4DK	277
W8FB	285	W8KML	280	CX2CO	277
W1FH	284			Z12GX	273

From December 1, 1959 to January 1, 1960 DXCC certificates and endorsements based on post-war contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

NEW MEMBERS

W6TOT	212	K2GUN	104	W1FJJ	100
W8MVL	134	W4UBM	104	W1PCO	100
VE3FN	126	W8FHZ	104	W2ASY	100
OZ7CF	124	W0ECS	104	W2FXN	100
SM5CFC	124	SM5AWP	104	W3GID	100
ZS2HX	116	VP3YG	104	W3FEJ	100
F9TV	115	ZS6AJX	104	K4CFE	100
W8SDP	112	W4HYH	103	W4GSM	100
K8LSG	110	K9PDI	103	W4RWV	100
DM2AIG	109	W4MCM	101	K4TEA	100
LA5IC	108	K4RPK	101	K5GOE	100
W4FUI	106	K4YCG	101	W5HTG	100
OZ5X	106	W5BTH	101	W9FFZ	100
W9DYN	105	K6BEX	101	K6AIK	100
W0HNA	105	W7AUP	101	DJ4JJ	100
SP8HR	105	SP9RF	101	HA5BW	100

Radiotelephone

W6TOT	150	F9TV	111	W2GRY	101
4X4GB	150	ZS2HX	107	W6NXP	101
VK2OQ	132	ZB1USA	104	K5CTR	100
W1TYG	116	K2JMY	102	W91FJ	100
W4TDV	114	W6YJW	102	VE1QC	100
KR6HT	113	ZS1OE	102	J41BF	100

Endorsements

W8LDD	281	W68IA	245	W7GHB	240
W1ZW	270	W6ZVQ	242	W0YCR	239
W1HX	260	W2ESO	240	W0SYK	238
K6UYC	260	W3KT	240	K4PJD	235
W5URU	251	W4TFB	240	W3WU	230
W2YTH	250	K6CQM	240	W7AUS	230
W4BYU	250	W6LTX	240	IT1AT	229

W40PM	226	W1JSS	175	K9CAZ	150
G6XK	226	W9LQF	175	K91YW	150
W5PM	226	VE5HB	172	F3CIB	148
DL3RK	220	W1HGT	171	W6HYG	147
W4IFN	210	K2MGR	171	F8PM	145
W4GD	205	K48XR	171	W8VOV	141
W6KG	204	SP7HX	171	W9WNB	141
VQ3CW	204	VE2WA	170	K2UKQ	140
Z1LPI	204	K4HRB	166	K4QLE	140
DL6AIK	201	G4JZ	166	W3SW	137
KV4BQ	201	K2KXL	163	J41BF	136
Z12AFZ	201	W5RHV	163	K8CVQ	133
W2ITD	200	W6FLT	163	K2DBN	132
W4UKA	200	DL9TJ	163	W7CWF	132
KA4CR	200	W1HWH	161	W7UW	132
W2QKJ	198	G3LEW	161	W8VZ	132
W6AGO	198	W4YWX	160	K9BGL	131
W0LJW	193	W6NZ	160	W0PL	131
W8JSU	191	K8IKB	160	W4NPT	130
W0CDP	190	E4JAP	159	K4RJN	130
W1CDX	187	K9HCK	155	W3DWP	130
E1JR	186	W9UNG	153	W9YLD	130
K4JVE	185	VE2AYY	153	W6KNAI	126
K4KOY	185	W6HJ	152	K1BEZ	121
W5VGR	185	OA4FM	152	W9KXZ	121
W8ZCQ	184	G2AVN	151	W9RIB	121
W9IHN	183	SM5AQB	151	K4HJN	120
K9GXR	182	K7ZQ	150	K8KJZ	120
W5RX	181	W2RQH	150	SP6EY	120
W4TP	180	K4TCK	150	W5CYE	113
W7ATV	180	W5CK	150	W1DGL	111
W8RVU	180	W8BYG	150	W1YCF	110
W0YPQ	180	W7ABO	150	K6VFF	110
VE2YA	180	W8MQR	150	W9GWO	110
SM5KV	180				

Radiotelephone

W2ZX	243	W5RHV	162	SP7HX	133
W4TFB	216	Z1LPI	162	W3SW	132
OZ7FG	215	E1JR	157	K4HRG	131
W9YRQ	202	W2RTX	152	W9UMJ	131
CX3AA	202	W1GH	151	OZ7TH	131
W0YVZ	200	W4BYU	151	W1ZW	130
F9HF	200	W8RVU	151	K2LGS	130
W0SYK	194	W2SNI	150	K4JQR	130
W6YMD	190	W2TP	150	G4JZ	126
SM5WJ	182	W9HPS	146	W68IA	123
W7AUS	176	F8UY	140	W91FJ	122
W5BRU	171	W5DFZ	137	F8CP	120
W1JSS	170	W1CUX	134	CT1JG	112
W2QKJ	162	CT1HF	133	VE3DYB	112

U.S.-Canada Area and Continental Leaders

KH6IJ	259	VE2WW	262	VF7ZM	280
K1L	251	VE3DIP	250	VE8AW	195
W0ELA	283	VE4XO	260	VO1DW	220
VE1PQ	240	VE5JV	190	4X4DK	284
		VE6NX	256		

Radiotelephone

W2BXA	267	K17AFR	190	VE8RU	178
W4DQH	264	VE1DR	137	VE6NX	152
W5BGP	251	VE2WW	202	VE6TF	152
KH6OR	254	VE3KF	224	VF7ZM	253
W7PHO	268	VE3QA	224	G2PL	266
		VE4RP	102		

• 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

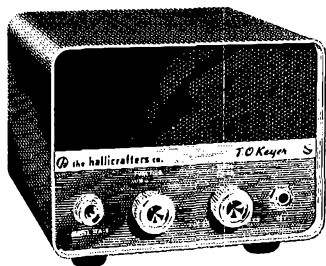
EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: DUL, PAM; TEJ, RM; AXA. The Pennsylvania Phone Net meets Mon. through Fri. at 1800 EST on 3850 kc. The EPA C.W. Net meets every night at 1830 EST on 3610 kc. The new EC for Monroe County is K3BKL. ZVX resigned as EC for Montgomery County after a job well done. His successor as EC is AWL. Other appointments are K3GAA as OES, MAV as OPS, YXP and OY as ORS. New club officers are as follows: The Carbon ARC—K3BGF, pres.; K3EXW, vice-pres.; AIW, secy.; GZI, act. mgr. The Southern Chester County ARC—K3ATL, pres.; HWD, vice-pres.; K3ATX, treas.; K3BAT, secy. The York Road RC—AWG, pres.; ZYO, vice-pres.; EOS, secy.; ULC, treas. Albright College ARA—K2GYY, pres.; DSL, vice-pres.; K3BXD, secy.; K2SUJ, treas.; Temple University ARC—K2EYW, pres.; K3HXC, trustee. The following Schuylkill County Novices have formed the Mahanoy Valley Brass Founders Club: KN3s KNK, KNL, KNM, KNN and KNQ. Elected officers are KN3KNR, pres.; KN3KND, vice-pres.; KN3NP, treas.; KN3KNO, secy. "New Sky-Wire Department": To MAV, a 40-meter dipole; to K3BEX, an 80-meter long wire; to VXP, a 5-band trap dipole; to HNK, a Mosley Tribander; to EAN, a new paint job for his 60-ft. tower. FKE and HNK made BPL for the first time. New Santa Claus additions may be noted, too: K3ALD, an electronic key; CR5AR to CMN for No. 71; FB8XX to MFW after trying 7 years; to K2KBC/3, a new jr. operator; to K3ELR, the FCC; to GYX, a new Apache; to CUL an HT-32A and an SX-101A. BYF has a half-gallon on 144 and 220 Mc. DJJ is the most active ham in the Lehigh Valley Area and is known as "Mr. 2 Meters." BPZ has a kw. on 75 through 10 meters. FEY holds regular skeds with K2CBA on 220.14 Mc. Now that the Geneva Conference is at an end OY, assured of holding the bands, has settled down to some 160-meter DX. The Mobile Sixers RC publish a very fine bulletin called *Six Only*. Editor is TXO. The Bucks County ARC has started code and theory classes for the Novice. Field Day is not far off. June 25-26 to be exact. Have you and/or your club checked the rigs? Traffic: W3CUL 9515, IVS 1598, VR 1126, HNK 548, FKE 253, KMD 211, VXP 196, AXA 178, K3DCB 161, W3MFV 125, K3ALD 59, BHU 56, W3BUR 56, ZLP 48, ZRQ 48, K3ANS 38, W3NF 38, BFF 37, BPZ 38, OY 28, ELI 19, EEN 16, NQB 16, TEJ 15, ADE 12, JSX 11, AMC 10, ZVX 10, BNR 8, PDJ 7, DUI 4, FEY 4, EAN 3 K3AKN 2, BHX 1, W3HZZ 1, JNQ 1.

MARYLAND, DELAWARE, DISTRICT OF COLUMBIA—SCM, Thomas B. Hedges, W3BKE—Asst. SCM Delaware: P. R. DeCourcelle, 3DQZ, SEC: PKC. The MDD Section C.W. Net meets on 3650 kc. Mon. through Sat. at 1915 EST. The M1EPN (phone) Net meets on 3820 kc. Mon., Wed. and Fri. at 1800 and Sat. and Sun. at 1300 EST. Slow speed nets: MDDS, 3650 kc. Mon. and Thurs. 2030 EST and MSN 3870 kc. Mon. through Fri. at 1845 EST. New appointments: CPM, RNY and FYS as OO's; GRF and RNY as ORSs; K5SPD/3, as OPS; YOB as EC for Kent and Queen Anne Counties; ZNW as EC for Calvert County, Md. TN, UE, K3BYB, K3CXX, K3WBJ and K5SPD/3 are congratulated on making HPL. *Maryland Report*: BUD is pushing a good traffic total on the MDDS Slow Net. JWN enjoyed helping with the flood of holiday traffic while home from school. KA pauses in his DX struggle to make a good start for his first month as OO. K3CXX passed his 1st-class radiotele-

phone exam and made BPL, which kept him busy during the holiday season. K3GZK turns in a nice traffic report from Bel Air. EQK is ready to put his new rig on 20-meter phone and is mobilizing in the meantime. MCG is real busy managing the MDD Net and invites more QNIs. His *Net Bulletin* is appreciated. K3GJD is slowed down by school activities but still finds time for traffic. WV continues actively chasing DX. K3GBV likes OES activity and is working on a 2-meter antenna. K3JTE found time during his vacation to QSP lots of traffic from Bethesda-Chevy Chase H.S. station K3KFM. The Md. V.H.F. Society meets alternate Mon. at the Red Cross Bldg., St. Paul and 23rd Sts. Contact 3MAD for details. Congratulations to PKC on his handling of the SEC post and rejuvenation of AREC activities. John still needs ECs in Frederick, Garrett, Howard and a few other counties. OSF and ZAQ continue their OO work in Baltimore. JWN divides his time between studies and operating EAX at the U. of Md. K3KMA is a new reporter after an absence of 20 years from ham radio! K5OEA/3 and his XYL, K5SPD/3, keep their HT-32 going all day at the Bainbridge Naval Station. Marv made BPL and is now OPS. IJW continues his 2-meter c.w. activity. ZNW keeps up his traffic count along with his other duties. TN's BPL standing improves each month and Dave excels as MDD net control. UE keeps 3RN activity high and prods the boys when their procedure slips. 4EXM/3 has new S/Line equipment. AHQ led the section in OO activity again even though he had a spell in the hospital. EFZ is back on and has applied for ORS appointment. JZY keeps Western Md. 75-meter phone activity up at a high level. GRF now has a 10-kw. emergency power unit. What a set-up! K3DCP displayed unusual accuracy in the Nov. FMT. *District of Columbia Report*: CDQ enjoys ragchewing with her new Apache. CN maintained daily contact with D.C. with his mobile rig while on 3-weeks vacation in Texas. AKB and BWT entertained the WAYLARCS for their Annual Christmas Party. PQ checks in the MDD regularly and maintains a steady traffic flow. K4DLZ keeps K3WBJ going at Walter Reed Hospital and handles traffic for patients there. Attendance remains high at the Washington RC's code class at Gordon School. *Delaware Report*: K3GEF now has a DXCC standing of 153/114 and is going strong. EKO continues as an excellent outlet for MDD in Delaware. HKS checks in MDD and the Delaware Emergency Net. Traffic: W3UE 662, K5SPD/3 454, OEA/3 416, K3CXX 317, W3TN 262, K3WBJ 248, W3MCG 224, K3BYB 210, JTE 181, W3JTN 140, AHQ 102, PQ 87, K3GJD 86, W3BUD 62, EKO 62, HKE 51, ZNW 45, K3GZK 44, W3FAX 28, IJW 23, CN 13, K3DCP 6, W3WV 4, AKB 3, HKS 2, JZY 2.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—SEC: W2YRW, RMs: W2BZJ, W2HDW and W2ZI. The NJP&T Net reports 31 sessions, attendance 593 and traffic 175. K2DEI and W2YRW earned the BPL award this month. W2ZI and K2BG again have been appointed Asst. Directors of the Atlantic Division. K2JJC has had transmitter trouble but is back in business. W2BZJ is planning to go on 14 Mc. soon. K2JGU, Glassboro, is building for 50-Mc. operation. W2ZK, Oceanport, has left for KC4USG. Look for Bud on 14,260 kc. The NJN traffic report for December was 667. The roster now consists of 52 members. Gloucester Co. Amateur RC elected W2AQL, pres.; K2JJC, secy.; W2JUZ, treas.; and W2AFZ, corr. secy. The SJRA's new officers are W2REB, pres.; K2KCI, vice-pres.; K2BG, treas.; K2GSJ, rec. secy.; and W2EZY, corr. secy. The Burlington Co. Radio Club elected K2MOV as its new president. The Levittown (N. J.) Radio Club has started a new training class. In the recent Sweepstakes, SJRA member W2EXB had the top club c.w. score and K2UQD was phone leader. W2ZX was the top SJRA scorer in the 25th ARRL DX Competition. We regret the passing of W2BLE, Auburn. K2ARY, Salem County EC, continues to do a net job in that area. *Cross Talk*, the Gloucester Co. ARC paper, edited by K2JKA, is filled with the club's '59 accomplishments and plans for '60. The EASN handled 165 during December. K2ZHK, Cranford, is the net's manager. The N. J. license plate bill has failed again despite the efforts of W2JAV and K2HOB, the bill's

(Continued on page 114)



ANTONIO STRADIVARI

(1644-1737)

"Italian violin maker . . . who brought the craft of violin making to its highest pitch of perfection." (Encyclopedia Britannica)

THOSE of you who've been listening to the rebirth of good CW operating this past year know of the Jim Ricks (W9TO) Keyer. You've heard it called the "Stradivarius" of all keyers . . . a name given to it, I believe, by W6UF.

AFTER several years of intensive research, Jim came forth with a circuit that is indeed the "highest pitch of perfection" in keyers. It uses digital technique in a simple circuit to form self-completing dots and dashes which always are in correct ratio.

MANY hams have built their "TO Keyers" from circuit information in various issues of *QST*. Jim has built a number of them for friends around the country. He built one for W9AC, which stimulated my present enthusiasm.

SOMEHOW I see a parallel between the SSB pioneering some years back of Wes Schum, W9DYV, and this new CW interest. It's the nature of amateur radio to strive always for improvement . . . And giant steps are being made all the time.

WHILE we all have fun with amateur radio as a hobby, it is the technical and operating achievements that distinguish the ham fraternity and make it a constantly growing resource for electronic leadership.

Now back to the commercial. You will very soon be seeing "TO Keyers" made by Hallicrafters at your local ham distributor. Visit him and enjoy playing "The Stradivarius."

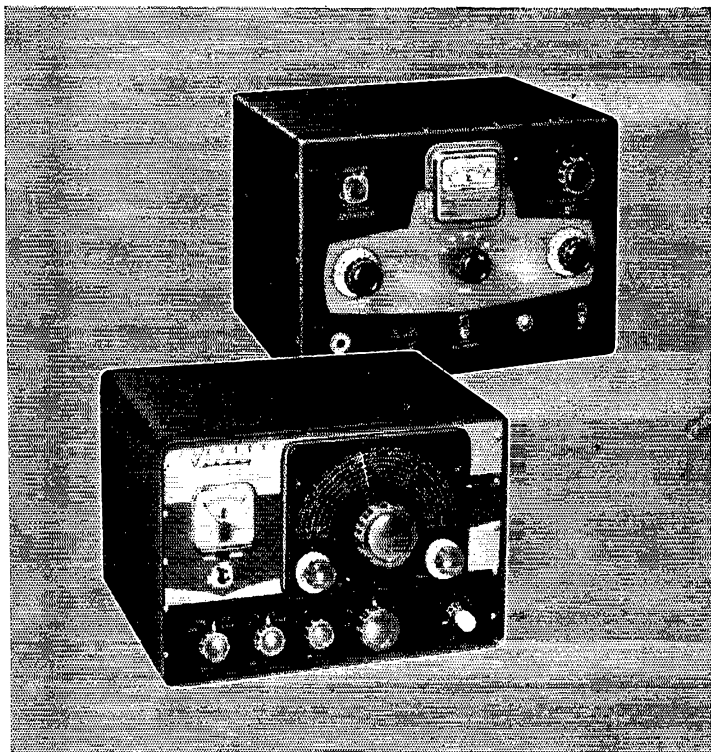
W9AC

We will see you at the New York
Single Sideband Dinner, March 22,
at the Statler Hilton Hotel

Buel Ballou Jr. W. J. Hallegan W9AC for hallicrafters

Whatever you expect from a transmitter ...you'll get more with a VIKING!

Excellent dollar value . . . high trade-in value . . . solid communication power . . . dozens of operating and convenience features — just a few of the many good reasons why you get much more with a Viking! From the popular, low-priced "Adventurer," which was used to earn the first novice WAC—to the brilliantly engineered "Kilowatt"—Viking transmitters are "first choice" among the nation's amateurs. Yes, dollar-for-dollar, Viking transmitters are your best buy. See them today at your authorized Johnson distributor.



"ADVENTURER" TRANSMITTER

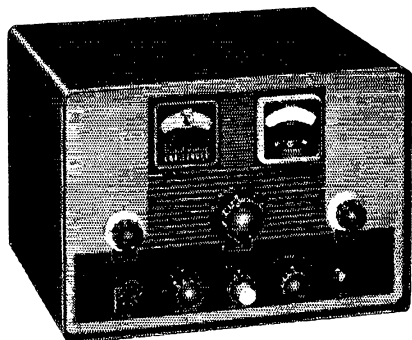
More than just a novice transmitter, this power-packed, completely self-contained unit was used to earn the first novice WAC. Instant band-switching 80 through 10. Crystal or external VFO control—wide range pi-network output. 50 watts CW input. Effectively TVI suppressed. With tubes, less crystals.

Cat. No. Amateur Net
240-181-1 .. Kit \$54.95

"NAVIGATOR" TRANSMITTER/EXCITER

Perfect for novice or experienced amateur—serves as a flexible VFO Exciter with enough RF power to excite most high-powered amplifiers on CW and AM. 40 watts CW input—bandswitching 160 through 10. Built-in VFO or crystal control—wide range pi-network output. Timed sequence keying. TVI suppressed. With tubes, less crystals.

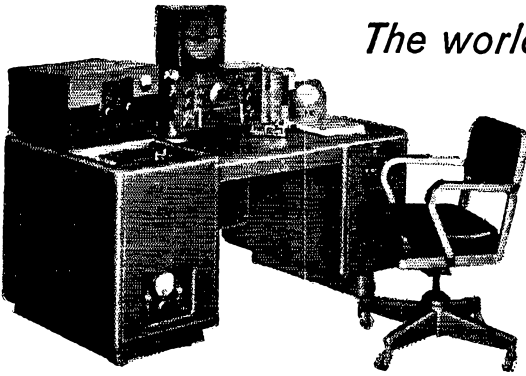
Cat. No. Amateur Net
240-126-1 .. Kit \$149.50
240-126-2 .. Wired \$199.50



"CHALLENGER" TRANSMITTER

Ideal for fixed station or portable use! Fast, easy tuning and plenty of reserve drive. 70 watts phone input 80 through 6 meters; 120 watts CW input 80 through 10—85 watts CW input on 6 meters. Wide range pi-network output—effectively TVI suppressed—special "LC" keying circuit provides true "shaped" CW waveform. Crystal or external VFO control. With tubes.

Cat. No. Amateur Net
240-182-1 .. Kit \$114.75
240-182-2 .. Wired \$154.75

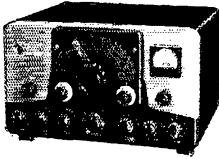


The world at your finger tips!

VIKING "KILOWATT" AMPLIFIER—The only power amplifier available which will deliver full 2000 watts SSB* input, and 1000 watts CW and plate modulated AM. Continuous coverage 3.5 to 30 mcs. Excitation requirements: 30 watts RF and 10 watts audio for AM; 10 watts peak for SSB.

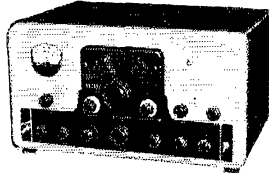
Cat. No. Amateur Net
 240-1000 ..Wired and Tested.....\$1595.00
 251-101-1..Matching desk top, back and 3 drawer pedestal, FOB Corry, Pa.\$132.00

*The FCC permits a maximum of one kilowatt average power input for the amateur service. In SSB operation under normal conditions, this results in peak envelope power inputs of 2000 watts or more, depending upon individual voice characteristics.



"RANGER" — 75 watts CW and 65 watts phone input. Bandswitching 160 through 10 meters. Built-in VFO or crystal control. With tubes.

Cat. No. Amateur Net
 240-161-1..Kit\$229.50
 240-161-2..Wired\$329.50



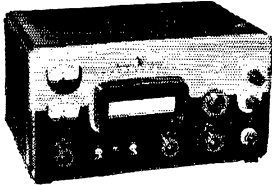
"VALIANT"—Instant bandswitching 160 through 10. 275 watts input CW and SSB (P.E.P. with aux. exciter) 200 watts phone. With tubes.

Cat. No. Amateur Net
 240-104-1..Kit\$349.50
 240-104-2..Wired\$439.50



"FIVE HUNDRED" — 600 watts CW input; 500 watts phone and SSB (P.E.P. with aux. SSB exciter). Bandswitching 80 through 10. With tubes.

Cat. No. Amateur Net
 240-500-1..Kit\$749.50
 240-500-2..Wired\$949.50



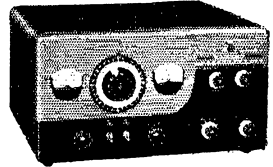
"THUNDERBOLT" AMPLIFIER—2000 watts P.E.P.* input SSB; 1000 watts CW; 800 watts AM linear. Continuous coverage 3.5 to 30 mcs. With tubes.

Cat. No. Amateur Net
 240-353-1..Kit\$524.50
 240-353-2..Wired\$589.50



"6N2"—Instant bandswitching coverage of both 6 and 2 meters. Power input rated at 150 watts CW, and 100 watts AM phone. With tubes.

Cat. No. Amateur Net
 240-201-1..Kit\$129.50
 240-201-2..Wired\$169.50



"6N2" THUNDERBOLT AMPLIFIER—Input rated 1200 watts P.E.P.* SSB and DSB, Class AB; 1000 watts CW, Class C; 700 watts AM linear, Class AB. Continuous coverage 6 and 2. With tubes.

Cat. No. Amateur Net
 240-362-1..Kit\$524.50
 240-362-2..Wired\$589.50

"COURIER" AMPLIFIER — Class B linear rated 500 watts P.E.P. input with auxiliary SSB exciter; 500 watts CW; 200 watts AM. Continuous coverage 3.5 to 30 mcs. With tubes.

Cat. No. Amateur Net
 240-352-1..Kit\$244.50
 240-352-2..Wired\$289.50



New Catalog

Your complete guide to amateur radio's most exciting equipment. Write today for your free copy.



FIRST CHOICE AMONG
 THE NATION'S
 AMATEURS



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E. F. JOHNSON COMPANY • WASECA, MINNESOTA

BUILD YOUR OWN



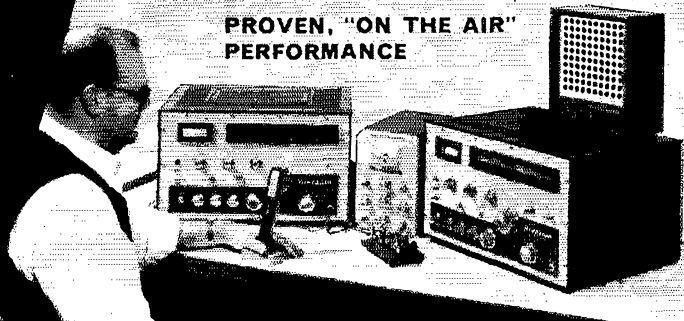
HEATHKIT

HAM GEAR



**HEATHKIT HAM EQUIPMENT
IS DESIGNED BY HAMS
WHO KNOW YOUR
PROBLEMS AND
NEEDS.**

**PROVEN, "ON THE AIR"
PERFORMANCE**

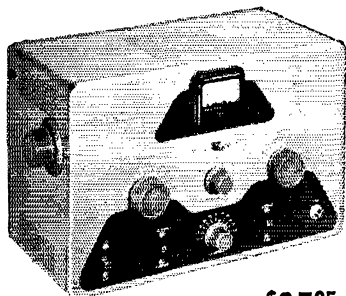


"SENECA" VHF HAM TRANSMITTER KIT

Beautifully styled and a top performer of highest quality throughout. The "Seneca" is a completely self-contained 6 and 2 meter transmitter featuring a built-in VFO for both 6 and 2 meters, and 4 switch-selected crystal positions, 2 power supplies, 5 radio frequency stages, and 2 dual-triode audio stages. Panel controls allow VFO or crystal control, phone or CW operation on both amateur bands. An auxiliary socket provides for receiver muting, remote operation of antenna relay and remote control of the transmitter such as with the Heathkit VX-1 Voice Control. Features up to 120 watts input on phone and 140 watts on CW in the 6 meter band. Ratings slightly reduced in the 2 meter band. Ideal for ham operators wishing to extend transmission into the VHF region. Shpg. Wt. 56 lbs.



HEATHKIT VHF-1 **\$159⁹⁵**




HEATHKIT DX-20 **\$35⁹⁵**

DX-20 CW TRANSMITTER KIT

Designed exclusively for CW work, the DX-20 provides the novice as well as the advanced-class CW operator with a low cost transmitter featuring high operating efficiency. Single-knob bandswitching covers 80, 40, 20, 15 and 10 meters using crystals or an external VFO. Pi network output circuit matches antenna impedances between 50 and 1,000 ohms. Employs a single 6DQ6A tube in the final amplifier stage for plate power input of 50 watts. A 6CL6 serves as the crystal oscillator. The husky power supply uses a heavy duty 5U4GB rectifier and top-quality "potted" transformer for long service life. Easy-to-read panel meter indicates final grid or plate current selected by the panel switch. Complete RF shielding to minimize TVI interference. Easy-to-build with complete instructions provided. Shpg. Wt. 19 lbs.

HEATH COMPANY Benton Harbor, Michigan

 a subsidiary of Daystrom, Inc.

Mobile Gear...for the Ham on the Go!

"CHEYENNE" MOBILE HAM TRANSMITTER KIT

All the fun and excitement . . . plus the convenience of mobile operation are yours in the all-new Heathkit "Cheyenne" transmitter. The neat, compact, and efficient circuitry provides you with high power capability in mobile operation, with low battery drain using carrier controlled modulation. All necessary power is supplied by the model MP-1 described below. Covers 80, 40, 20, 15 and 10 meters with up to 90 watts input on phone. Features built-in VFO, modulator, 4 RF stages, with a 6146 final amplifier and pi network (coaxial) output coupling. High quality components are used for long service life and reliable operation, along with rugged chassis construction to withstand mobile vibrations and shock. Thoughtful circuit layout provides for ease of assembly with complete instructions and detailed pictorial diagrams to insure success. A spotting switch is also provided. A specially designed ceramic microphone is included to insure effective modulation with plenty of "punch". Plan now to enjoy the fun of mobile operation by building this superb transmitter. Shpg. Wt. 19 lbs.



HEATHKIT MT-1

\$99⁹⁵



"COMANCHE" MOBILE HAM RECEIVER KIT

Everything you could ask for in modern design mobile gear is provided in the "Comanche" . . . handsome styling, rugged construction, top quality components . . . and, best of all, a price you can afford. The "Comanche" is an 8-tube superheterodyne ham band receiver operating AM, CW and SSB on the 80, 40, 20, 15 and 10 meter amateur bands. A 3 mc crystal lattice-type IF filter permits the receiver to use single conversion without image interference, and at the same time creates a steep sided 3 kc flat top IF bandpass characteristic comparable to mechanical type filters. The neat, compact and easy-to-assemble circuitry features outstanding sensitivity, stability and selectivity on all bands. Circuit includes an RF stage, converter, 2 IF stages, 2 detectors, noise limiter, 2 audio stages and a voltage regulator. Sensitivity is better than 1 microvolt on all bands and signal-to-noise ratio is better than 10 db down at 1 microvolt input. One of the finest investments you can make in mobile gear. Shpg. Wt. 19 lbs.

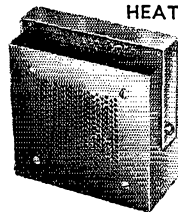


HEATHKIT MR-1

\$119⁹⁵

MOBILE SPEAKER KIT

A matching companion speaker for the "Comanche" mobile receiver. Housed in a rugged steel case with brackets provided for easy installation on fire wall or under dashboard, etc. Uses 5 PM speaker with 8 ohm voice coil. Measures 5" H. x 5" W. x 2 1/2" D. Shpg. Wt. 4 lbs.



HEATHKIT AK-7

\$5⁹⁵

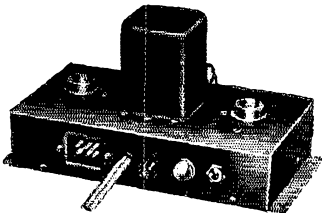


HEATHKIT AK-6

\$4⁹⁵

HEATHKIT MP-1

\$44⁹⁵



MOBILE POWER SUPPLY KIT

This heavy duty transistor power supply furnishes all the power required to operate both the MT-1 Transmitter and MR-1 Receiver. It features two 2N442 transistors in a 400 cycle switching circuit, supplying a full 120 watts of DC power. Under intermittent operation it will deliver up to 150 watts. Kit contains everything required for complete installation, including 12' of heavy battery cable, tap-in studs for battery posts, power plug and 15' of connecting cable. Chassis size is 9 1/8" L. x 4 3/4" W. x 2" H. Operates from 12-14 volt battery source. Circuit convenience provided by self-contained relay which allows push-to-talk mobile operation. Shpg. Wt. 8 lbs.

MOBILE BASE MOUNT KIT

The AK-6 Base Mount is designed to hold both transmitter and receiver conveniently at driver's side. Universal mounting bracket has adjustable legs to fit most automobiles. Shpg. Wt. 5 lbs.

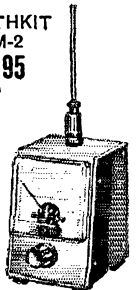
POWER METER KIT

This handy unit picks up energy from your mobile antenna and indicates when your transmitter is tuned for maximum output. A variable sensitivity control is provided. Features a strong magnet on a swivel-mount for holding it on a car dashboard or other suitable spot. Has its own antenna or may be connected to existing antenna. Sensitive 200 ua meter. Shpg. Wt. 2 lbs.

HEATHKIT

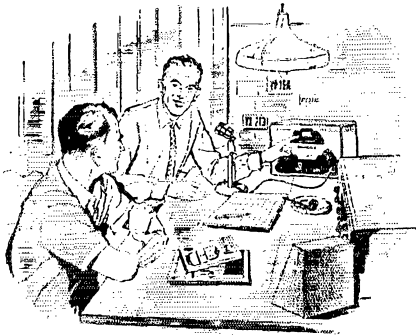
PM-2

\$12⁹⁵





COMPANION UNITS



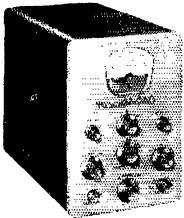
HEATHKIT TX-1 \$234⁹⁵

"APACHE" HAM TRANSMITTER KIT

The many features and modern styling of the "Apache" will provide you with just about everything you could ask for in transmitting facilities. Emphasizing high quality the "Apache" operates with a 150 watt phone input and 180 watt CW input. In addition to CW and phone operation, built-in switch selected circuitry provides for single-sideband transmission using the SB-10 External adapter. The newly designed, compact and stable VFO provides low drift frequency control necessary for SSB transmission. A slide rule type illuminated rotating VFO dial with full gear drive vernier tuning provides ample bandspread and precise frequency settings. The bandswitch allows quick selection of the amateur bands on 80, 40, 20, 15 and 10 meters. This unit also has adjustable low-level speech clipping and a low distortion modulator stage employing two of the new 6CA7/EL34 tubes in push-pull class AB operation. Time sequence keying is provided for "chirpless" break-in CW operation. The final amplifier is completely shielded for TVI protection and neutralized for greater stability. A cooling fan is also provided. The formed one-piece cabinet with convenient access hatch provides accessibility to tubes and crystal sockets. Die-cast aluminum knobs and control panel escutcheons add to the attractive styling of the transmitter. Pi network output coupling matches antenna impedances between 50 and 72 ohms. A "spotting" push button enables the operator to "zero beat" an incoming frequency without putting the transmitter on the air. Equip your ham shack now for top transmitting enjoyment with this outstanding unit. Shpg. Wt. 110 lbs. Shipped motor freight unless otherwise specified.

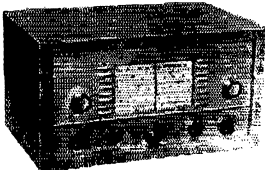
HEATHKIT SB-10 SINGLE SIDEBAND ADAPTER KIT

\$89⁹⁵



Designed as a compatible plug-in adapter unit for the TX-1 "Apache" transmitter, this unit lets you operate on SSB at a minimum of cost, yet does not affect the normal AM and CW functions of the transmitter. By making a few simple circuit modifications, the DX-100 and DX-100-B transmitters can be used, utilizing all existing RF circuitry. Extremely easy to operate and tune, the adapter employs the phasing method for generating a single-sideband signal, thus allowing operation entirely on fundamental frequencies. The critical audio phase shift network is supplied completely preassembled and wired in a sealed plug-in unit. Produces either a USB, LSB or DSB signal, with or without carrier insertion. Covers 80, 40, 20, 15 and 10 meter bands. An easy-to-read panel meter indicates power output to aid in tuning. A built-in electronic voice control with anti-trip circuit is also provided. 10 watts PEP output. Unwanted sideband suppression is in excess of 30 db and carrier suppression is in excess of 40 db. An EL84/6BQ5 tube is used for linear RF output. Shpg. Wt. 12 lbs.

MODIFICATION KIT: Modifies DX-100 and DX-100-B for use with the SB-10 Adapter. Model MK-1. Shpg. Wt. 1 lb. \$8.95.



HEATHKIT AR-3

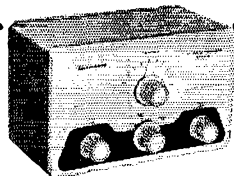
\$299⁹⁵

(less cabinet)

ALL-BAND RECEIVER KIT

A fine receiver for the beginning ham or short wave listener, designed for high circuit efficiency and easy construction. Covers 550 kc to 30 mc in four bands clearly marked on a slide-rule dial. Transformer operated power supply. Features include: bandswitch, bandspread tuning, phone-standby-CW switch, phone jack, antenna trimmer, noise eliminator, RF gain control and AF control. Shpg. Wt. 12 lbs.

CABINET: Opt. extra. No. 91-15A. Shpg. Wt. 5 lbs. \$4.95.



HEATHKIT QF-1

\$99⁹⁵

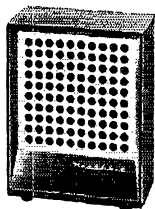
"Q" MULTIPLIER KIT

Useful on crowded phone and CW bands, this kit adds selectivity and signal rejection to your receiver. Use it with any AM receiver having an 1F frequency between 450 and 460 kc that is not AC-DC type. Provides an effective "Q" of approximately 4,000 for extremely sharp "peak" or "null". The QF-1 is powered from the receiver with which it is used. Shpg. Wt. 3 lbs.

OF DISTINCTIVE QUALITY

ACCESSORY SPEAKER KIT

Handsomely designed and color styled to match the "Mohawk" receiver this heavy duty 8" speaker with 4.7 ounce magnet provides excellent tone quality. Housed in attractive 3/4" plywood cabinet with perforated metal grille. Speaker impedance is 8 ohms. Shpg. Wt. 7 lbs.



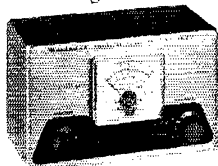
HEATHKIT AK-5
\$9⁹⁵



HEATHKIT RX-1 \$274⁹⁵

"MOHAWK" HAM RECEIVER KIT

Styled to match the "Apache" transmitter the "Mohawk" ham band receiver provides all the functions required for clear, rock-steady reception. Designed especially for ham band operation this 15-tube receiver features double conversion with IF's at 1682 kc and 50 kc and covers all the amateur frequencies from 160 through 10 meters on 7 bands with an extra band calibrated to cover 6 and 2 meters using a converter. Specially designed for single sideband reception with crystal controlled oscillators for upper and lower sideband selection. A completely preassembled wired and aligned front end coil bandswitch assembly assures ease of construction and top performance of the finished unit. Other features include 5 selectivity positions from 5 kc to 500 CPS, bridge T-notch filter for excellent heterodyne rejection, and a built-in 100 kc crystal calibrator. The set provides a 10 db signal-to-noise ratio at less than 1 microvolt input. Each ham band is separately calibrated on a rotating slide rule dial to provide clear frequency settings with more than ample bandsread. Front panel features S-meter, separate RF, IF and AF gain controls, T-notch tuning, T-notch depth, ANL, AVC, BFO, Bandswitch tuning, antenna trimmer, calibrate set, calibrate on, CW-SSB-AM, receive-standby, upper-lower sideband, selectivity, phone jack and illuminated gear driven vernier slide rule tuning dial. Attractively styled with die-cast aluminum control knobs and escutcheons. No external alignment equipment is required for precise calibration of the "Mohawk". All adjustments are easily accomplished using the unique method described in the manual. An outstanding buy in a communications receiver. Shpg. Wt. 66 lbs. Shipped motor freight unless otherwise specified.



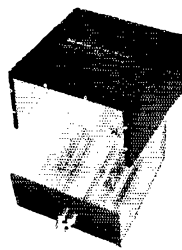
HEATHKIT AM-2
\$15⁹⁵

REFLECTED POWER METER KIT

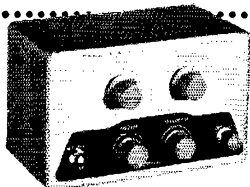
The AM-2 measures forward and reflected power or standing wave ratio. Handles a peak power of well over 1 kilowatt of energy and covers 160 through 6 meters. Input and output impedance provided for 50 or 75 ohm lines. No external power required for operation. Use it also to match impedances between exciters or RF sources and grounded grid amplifiers. Shpg. Wt. 3 lbs.

BALUN COIL KIT

Match unbalanced coaxial lines, found on most modern transmitters, to balanced lines of either 75 or 300 ohms impedance with this handy transmitter accessory. Capable of handling power input up to 200 watts, the B-1 may be used with transmitters and receivers covering 80 through 10 meters. No adjustment required. Shpg. Wt. 4 lbs.



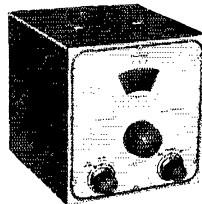
HEATHKIT B-1
\$8⁹⁵



HEATHKIT VX-1
\$23⁹⁵

ELECTRONIC VOICE CONTROL KIT

Eliminate hand switching with this convenient kit. Switch from receiver to transmitter by merely talking into your microphone. Sensitivity controls allow adjustment to all conditions. Power supply is built in and terminal strip on the rear of the chassis accommodates receiver and speaker connections and also a 117 volt antenna relay. Shpg. Wt. 5 lbs.

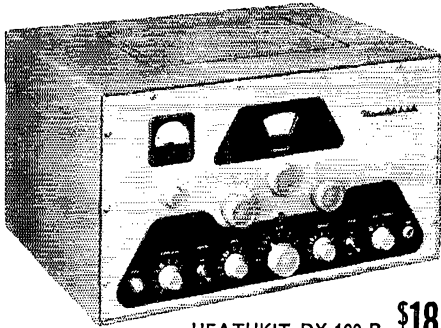


HEATHKIT VF-1
\$19⁵⁰

VFO KIT

Far below the cost of crystals to obtain the same frequency coverage this variable frequency oscillator covers 160, 80, 40, 20, 15 and 10 meters with three basic oscillator frequencies. Providing better than 10 volt average RF output on fundamentals, the VF-1 is capable of driving the most modern transmitters. Requires only 250 volts DC at 15 to 20 ma. and 6.3 VAC at 0.45 a. Illuminated dial reads direct. Shpg. Wt. 7 lbs.

Save 1/2 or more...with Heathkits



HEATHKIT DX-100-B \$189⁵⁰



HEATHKIT DX-40 \$64⁹⁵

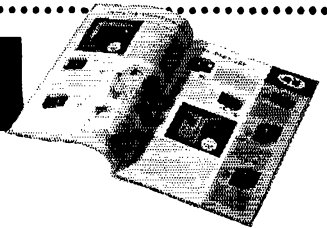
DX-100-B PHONE AND CW TRANSMITTER KIT

A long standing favorite in the Heathkit line, the DX-100-B combines modern styling and circuit ingenuity to bring you an exceptionally fine transmitter at an economical price. Panel controls allow VFO or crystal control, phone or CW operation on all amateur bands up to 30 mc. The rugged one-piece formed cabinet features a convenient top-access hatch for changing crystals and making other adjustments. The chassis is punched to accept sideband adapter modifications. Featured are a built-in VFO, modulator, and power supply, complete shielding to minimize TVI, and a pi network output coupling to match impedances from 50 to 72 ohms. RF output is in excess of 100 watts on phone and 120 watts on CW. Band coverage is from 160 through 10 meters. For operating convenience single-knob bandswitching and illuminated VFO dial on meter face are provided. A pair of 6146 tubes in parallel are employed in the output stage modulated by a pair of 1625's. Shpg. Wt. 107 lbs. Shipped motor freight unless otherwise specified.

DX-40 PHONE AND CW TRANSMITTER KIT

An outstanding buy in its power class the DX-40 provides both phone and CW operation on 80, 40, 20, 15 and 10 meters. A single 6146 tube is used in the final amplifier stage to provide full 75 watt plate power input on CW or controlled carrier modulation peaks up to 60 watts for phone operation. Modulator and power supplies are built in and single-knob bandswitching is combined with the pi network output circuit for complete operating convenience. Features a D'Arsonval movement panel meter. A line filter and liberal shielding provides for high stability and minimum TVI. Provision is made for three crystals easily accessible through a "trap door" in the back of the cabinet. A 4-position switch selects any of the three crystals or jack for external VFO. Power for the VFO is available on the rear apron of the chassis. Easy-to-follow step-by-step instructions let assembly proceed smoothly from start to finish even for an individual who has never built electronic equipment before. Shpg. Wt. 25 lbs.


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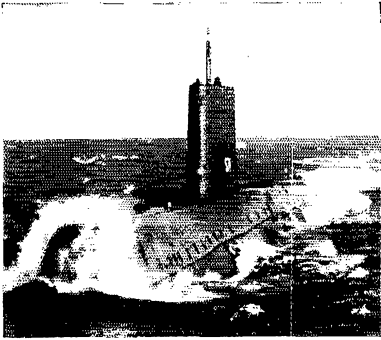
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QUANTITY	KIT NAME	MODEL NO.	PRICE



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In addition to the sonar program, there are Raytheon field engineering opportunities in missiles, fire control, ground and bombing radar, radar countermeasures. To qualify, you should have field experience in one or more of these fields—and preferably an EE degree.

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IS K6INI THE WORLD'S CHAMPION DX OPERATOR?

Judge for yourself! Read his letter and count the DX he has worked—with only 65 watts and a \$16.95 Gotham V-80 Vertical Antenna.

2405 Bowditch, Berkeley 4, California
January 31, 1959

GOTHAM
1805 Purdy Avenue
Miami Beach 39, Florida

Gentlemen:

I just thought I would drop you a line and let you know how pleased I am with your V-80 vertical antenna. I have been using it for almost two years now, and am positively amazed at its performance with my QRP 65 watts input! Let me show you what I mean:

I have worked over 100 countries and have received very fine reports from many DX stations, including 599 reports from every continent except Europe (589)! I have also worked enough stations for my WAC, WAS, WAJAD and ADXC awards, and I am in the process of working for several other awards. And all this with your GOTHAM V-80 vertical antenna!

Frankly, I fail to see how anyone could ask for better performance with such low power, limited space and a limited budget. In my opinion, the V-80 beats them all in its class.

I am enclosing a list of DX countries I have worked to give you an idea of what I have been talking about.

Wishing you the best for 1959, I am

Sincerely yours,
Thomas G. Gabbert, K6INI (Ex-TI2TG)

List of 105 countries/stations worked with 65 watts and a V-80 vertical

BV1US	KG4AI	VK3YL
CE3DZ	KG6FAE	VK9XK
ZL5AA	KH6IJ	VK9AT
CO2WD	KL7BUZ	VK8CJ
CN2BK	KM6AX	VP2KFA
CN8FB	KP4ACF	VP2AY
CR9AH	KP6AL	VP2DW
CT1CB	KR6BF	VP2MX
CX2FD	KS4AZ	VP2LU
DL1FF	KV4AA	VP2SW
DU7SV	KW6CA	VP5CP
EA1FD	KX6AF	VP5BH
EI4N	KZ5CS	VP6TR
F8VQ	LA3SG	VP7NM
F8BZZ	LU2DFC	LU1ZS
FG7XE	LZ1KSP	VP9BK
FK8AL	OA4AU	VR2DA
FM7WT	OE9EJ	VR3B
FO8AD	OH2TM	VS1HC
G3DOG	OK1FF	VS2DW
GC8DO	ON4AY	VS6LN
GI3WUI	KG1AX	XE1PJ
GM3GJB	OZ2KK	XW8AI
GW3LJN	PA0FAB	YN1JW
HA5KBP	PJ5AA	YU3FS
HC4IM	PJ2ME	YV5HL
HC8LUX	PY2EW	ZC5AL
HE9LAC	PY0NE	ZE1JV
HP1LO	SM5AQB	ZK1BS
I1MY	SP6BY	KH6MG/ZK1
JA1ANG	TI2LA	ZK2AD
JZ0HA	UA1AU	ZL1ABZ
W1AW	UA0KKB	ZL3JA
KB6BJ	UQ2AB	ZM6AS
KC4AF	VE8OJ	ZS1OU



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- If K6INI can do it, so can you.
- Absolutely no guying needed.
- Radials not required.
- Only a few square inches of space needed.
- Four metal mounting straps furnished.
- Special B & W loading coil furnished.
- Every vertical is complete, ready for use.
- Mount it at any convenient height.
- No relays, traps, or gadgets used.
- Accepted design—in use for many years.
- Many thousands in use the world over.
- Simple assembly, quick installation.
- Withstands 75 mph wind-storms.
- Non-corrosive aluminum used exclusively.
- Omnidirectional radiation.
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.
- Ideal for novices, but will handle a Kw.
- Will work with any receiver and xmitter.
- Overall height 23 feet.
- An effective modern antenna, with amazing performance. Your best bet for a lifetime antenna at an economical price. ONLY \$16.95.

73,
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1805 PURDY AVE., MIAMI BEACH, FLA.

Enclosed find check or money-order for:

TWO BANDER BEAMS

A full half-wave element is used on each band. No coils, traps, baluns, or stubs are used. No calculations or machining required. Everything comes ready for easy assembly and use. *Proven Gotham Value!*

6-10 TWO BANDER.....	<input type="checkbox"/>	\$29.95
10-15 TWO BANDER.....	<input type="checkbox"/>	34.95
10-20 TWO BANDER.....	<input type="checkbox"/>	36.95
15-20 TWO BANDER.....	<input type="checkbox"/>	38.95

TRIBANDER

Do not confuse these full-size Tribander beams with so-called midgets. The Tribander has individually fed (52 or 72 ohm coax) elements and is not frequency sensitive, nor does it have baluns, coils, traps, or other devices intended to take the place of aluminum tubing. The way to work multi-band and get gain is to use a Gotham Tribander Beam.

<input type="checkbox"/> 6-10-15	\$39.95	<input type="checkbox"/> 10-15-20	\$49.95
----------------------------------	---------	-----------------------------------	---------

2 METER BEAMS

Gotham makes only two different two meter beams, a six-element job and a twelve-element job. They are both Yagi beams, with all the elements in line on a twelve foot boom.

<input type="checkbox"/> Deluxe 6-Element	9.95	<input type="checkbox"/> 12-El	16.95
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6 METER BEAMS

New records are being made every day with Gotham six-meter beams. Give your rig a chance to show what it can do, with a Gotham six-meter beam.

<input type="checkbox"/> Std. 3-El Gamma match	12.95	<input type="checkbox"/> T match	14.95
<input type="checkbox"/> Deluxe 3-El Gamma match	21.95	<input type="checkbox"/> T match	24.95
<input type="checkbox"/> Std. 4-El Gamma match	16.95	<input type="checkbox"/> T match	19.95
<input type="checkbox"/> Deluxe 4-El Gamma match	25.95	<input type="checkbox"/> T match	28.95

10 METER BEAMS

Ten meter addicts claim that ten meters can't be beaten for all-around performance. Plenty of DX and skip contacts when the band is open, and 30-50 miles consistent ground wave when the band is shut down. Thousands of Gotham ten meter beams have been perking for years, working wonders for their owners, and attesting to the superior design and value of a Gotham beam.

<input type="checkbox"/> Std. 2-El Gamma match	11.95	<input type="checkbox"/> T match	14.95
<input type="checkbox"/> Deluxe 2-El Gamma match	18.95	<input type="checkbox"/> T match	21.95
<input type="checkbox"/> Std. 3-El Gamma match	16.95	<input type="checkbox"/> T match	18.95
<input type="checkbox"/> Deluxe 3-El Gamma match	22.95	<input type="checkbox"/> T match	25.95
<input type="checkbox"/> Std. 4-El Gamma match	21.95	<input type="checkbox"/> T match	24.95
<input type="checkbox"/> Deluxe 4-El Gamma match	27.95	<input type="checkbox"/> T match	30.95

FREE! FREE! FREE!

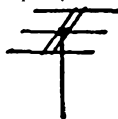
Valuable catalog of 50 different antennas, with specifications and characteristics. Gives bands and frequencies covered, element information, size of elements, boom lengths, power and decibel gain figures, weight, feed line used, polarization, and other valuable information. Send card today!

CITIZENS BAND ANTENNAS • Any of our ten meter beams or the V40 vertical is perfect for the CB operator.

New! Ruggedized Hi-Gain 6, 10, 15 METER BEAMS

Each has a TWIN boom, extra heavy beam mount castings, extra hardware and everything needed. Guaranteed high gain, simple installation and all-weather resistant. For 52, 72 or 300 ohm transmission line. Specify which transmission line you will use.

- Beam #R6 (6 Meters, 4-El)... \$38.95
- Beam #R10 (10 Meters, 4-El).. 40.95
- Beam #R15 (15 Meters, 3-El).. 49.95



15 METER BEAMS

Fifteen meters is the "sleeper" band. Don't be surprised if you put out a quick, quiet CQ and get a contact half-way around the world. Working the world with low power is a common occurrence on fifteen meters when you have a Gotham beam.

- | | | | |
|--|-------|----------------------------------|-------|
| <input type="checkbox"/> Std. 2-El Gamma match | 19.95 | <input type="checkbox"/> T match | 22.95 |
| <input type="checkbox"/> Deluxe 2-El Gamma match | 29.95 | <input type="checkbox"/> T match | 32.95 |
| <input type="checkbox"/> Std. 3-El Gamma match | 26.95 | <input type="checkbox"/> T match | 29.95 |
| <input type="checkbox"/> Deluxe 3-El Gamma match | 36.95 | <input type="checkbox"/> T match | 39.95 |

20 METER BEAMS

A beam is a necessity on twenty meters, to battle the QRM and to give your signal the added punch it needs to over-ride the high power boys. Hundreds and hundreds of twenty meter beams, working year after year, prove that there is no better value than a Gotham twenty meter beam.

- | | | | |
|--|-------|----------------------------------|-------|
| <input type="checkbox"/> Std. 2-El Gamma match | 21.95 | <input type="checkbox"/> T match | 24.95 |
| <input type="checkbox"/> Deluxe 2-El Gamma match | 31.95 | <input type="checkbox"/> T match | 34.95 |
| <input type="checkbox"/> Std. 3-El Gamma match | 34.95 | <input type="checkbox"/> T match | 37.95 |
| <input type="checkbox"/> Deluxe 3-El Gamma match | 46.95 | <input type="checkbox"/> T match | 49.95 |

(Note: Gamma-match beams use 52 or 72 ohm coax. T-match beams use 300 ohm line.)

ALL-BAND VERTICAL ANTENNAS

- V40 VERTICAL ANTENNA FOR 40, 20, 15, 10 AND 6 METER BANDS. ESPECIALLY SUITED FOR THE NOVICE WHO OPERATES 40 AND 15..... \$14.95**

- V80 VERTICAL ANTENNA FOR 80, 40, 20, 15, 10 AND 6 METER BANDS. MOST POPULAR OF THE VERTICALS. USED BY THOUSANDS OF NOVICES, TECHNICIANS, AND GENERAL LICENSE HAMS... \$16.95**

- V160 VERTICAL ANTENNA FOR 160, 80, 40, 20, 15, 10 AND 6 METER BANDS. SAME AS THE OTHER VERTICAL ANTENNAS, EXCEPT THAT A LARGER LOADING COIL PERMITS OPERATION ON THE 160 METER BAND ALSO..... \$18.95**

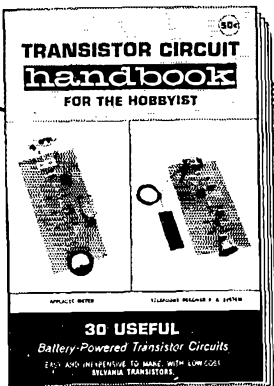
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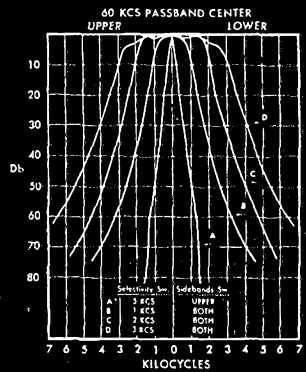
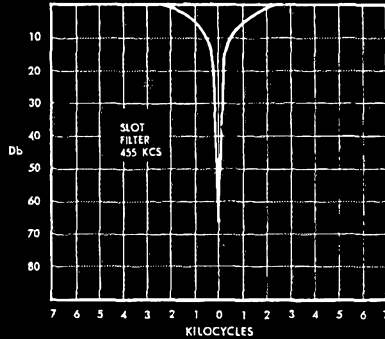
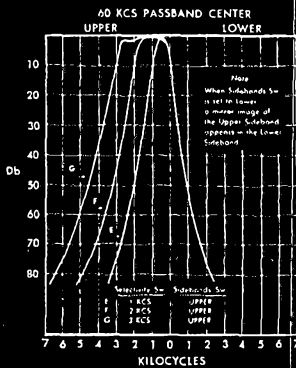
(Continued from page 102)

sponsors. K2SHJ reports YL and NYL news in SJRA's *Harmonics*. Many fine reports and club papers are being received. Traffic: W2YRW 386, K2DEI 284, W2RG 222, K2JGU 136, W2ZI 89, W2SKV 69, W2H7J 46, W2BEI 18, K2OWM 16, W2TLO 16, K2SOX 9, K2SNK 7, K2ZVW 5, K2JJC 4, K2CPR 2.

WESTERN NEW YORK—SCM, Charles T. Hansen K2HUK—RMs: W2RUF and W2ZRC, PAMs: W2PVI and W2LXE (v.h.f.) NYS C.W. meets on 3615 kes. at 1900, ESS on 3500 kc. at 1800, NYSPTEN on 3025 kc. at 1800, NYS C.D. on 3500.5 and 3903 kc. at 0900 Sun., TCPN 2nd call area on 3070 kc. at 1900, LPN on 3980 kc. at 1600. Appointments: Lakeshore ARC, State U. of N. Y. at Oswego, as OOs, Endorsements: W2RUT, K2KIR, K2RYH and K2GWN as ORSs; W2IDL and K2KQC as OPSs. W2RUF reports that State Net had 365 sessions in 1959 with an average of 48 min. per session, 7286 messages were handled. W2ATA was voted most active member and K2UTV the most valuable. "Grandma" K2IYP got a nice write-up in her local paper, along with her daughter K2TDG. The BRATS (Buffalo Radio Association for Teen-agers) has been organized with 40 members. Officers are K2YKB, pres.; W2ACQB, vice-pres.; W2DFY, secy.; W2DZE, treas. W2PVN and W2ATC are adult advisors. The ARATS elected W2HNN, pres.; W2DSE, vice-pres. and treas.; W2QUP, secy. W2BEU reports success with his beam on 10 meters, 32 countries. The Amateur Emergency Radio Communications Assn. at Utica was organized with W2QLW, pres.; and W2BKC, secy., treas. and trustee. The club is tied in with the Red Cross and has 13 charter members. W2ILP hopes to be back on the air with a 2-meter rig. W2UMW is operating video now. K2ILL has a fine half-gallon. We are sorry to report that K2QNM, active in many nets, is now a Silent Key. K2MLK credits his BPL to a new v.l.o. W2BFO made WAS in two months with a new Apache. Glad to see W2HKA back in the NYS Net after a heart attack. New club has been formed in Tioga County, the Tioga County Amateur Radio Assn., and it is headed by W2MEF. K2GVN died of a sudden heart attack in November. The Vestal Central H.S. Club has the call W2BCCZ. Equipment includes a DX-100, an HQ-140X, a triband beam, etc. K2RFC reports that K2CWD sponsored a social with 58 people in attendance. Don't forget the RARA hamfest to be held May 14. Monroe County now has a new call. W2HUW reports W2CTA, radio officer. W2ICE is editing a monthly "old-timer" bulletin with items of interest to amateur historians, old-timers and collectors all over the country. Contact Kelley for details. BPLers this month are W2ACIG, K2SSX, W2RUF and K2IATK. Traffic (1-er): W2ACIG 858, K2SSX 792, W2RUF 639, K2MLK 405, W2TFV 364, K2UZP 328, W2E7B 283, K2RTN 275, W2FGA 268, K2IYP 218, W2E 172, K2ACQ 146, W2MTA 144, K2JPK 128, K2RTN 111, K2GWN 93, W2BEU 83, K2KQC 72, K2RYH 70, W2FPB 62, W2BYH 48, K2OFU 48, K2GQU 43, W2HQF 34, K2BBI 33, K2KLR 22, W2COB 20, K2MQA 19, K2RWV 17, W2CQY 14, K2YMH 12, W2EMW 6, K2MLY 5, W2BLO 4, K2KTK 3, K2DOZ 1, W2ZHU 1. (Nov.) K2GWN 54, K2KQC 17. (Oct.) W2ACIG 302.

WESTERN PENNSYLVANIA—SCM, Anthony J. Mroczka—SEC, OMA, RMs: GEG, KUN and NUG. The WPA Traffic Net meets Mon. through Fri. at 1900 EST on 3585 kc. The PEN meets Mon. through Fri. at 1900 EST on 3850 kc. Congratulations to the following on making BPL in December: KUN, K3GHI, WRE and UHN. KUN made his the real hard way; while K3GHI, WRE and UHN made it on organizations plus deliveries. The response of the ORSs over the holidays on WPA was terrific. The Route Managers wish to thank them for the fine support they gave. SJJ now has competition—the local hospital added an addition next to his backyard; he now tunes in all their x-ray equipment. The Conemaugh Valley ARC recently celebrated its 5th birthday. The Horseshoe ARC reports via *Hamateur News*: TXQ is going on s.s.b.; is doing a swell job as EC; ROA has 133 confirmed on phone; KQD has 126 confirmed on c.w.; TXQ has 107 confirmed on c.w.; the new officers of the Huntingdon ARC are MER, pres.; K3CTG, vice-pres.; K3BPF, secy.; K3CQU, treas. UOF reports that K8DSM/M, in Clarion, played havoc with the court stenographer's tape recorder. ZIIQ has received the French DUF 1 and 2 and Russian P5K certificates. FBX is in Butler County Memorial Hospital. K3HPS is studying medicine at Temple U.

(Continued on page 120)



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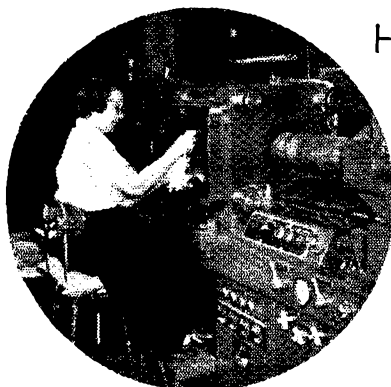
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The tremendous acceptance of MOSLEY Antennas by tens of thousands of Amateurs around the world is amazing . . . but not to us! We know the reason!

We know, for example, the type of engineering skill that conceives each MOSLEY Antenna; engineering that is oriented not only to quality but to the needs of Amateur Radio as well.

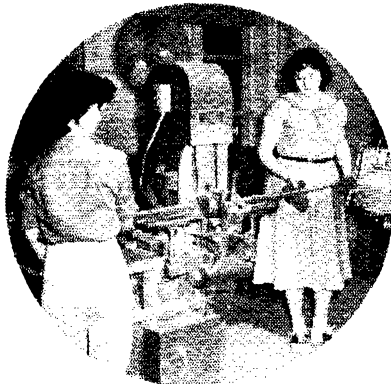
We know, too, of the many extras that go into the making of MOSLEY Antennas: The diligent search for ever-better materials; the constant striving to improve without creating obsolescence; the little extra production steps taken to assure that your MOSLEY Antenna will be a source of pride for you as well as satisfaction and enjoyment.

Here are some of the Extra Steps to Quality



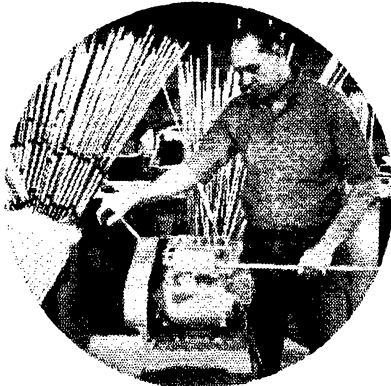
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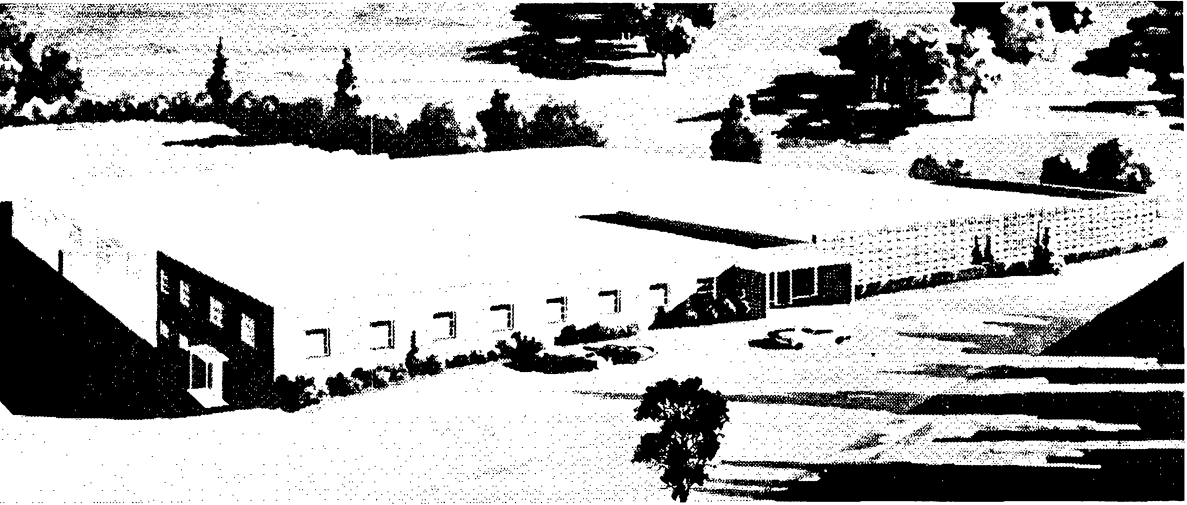
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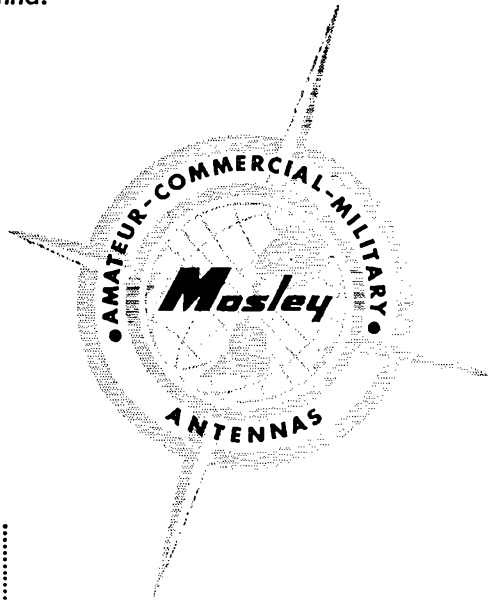


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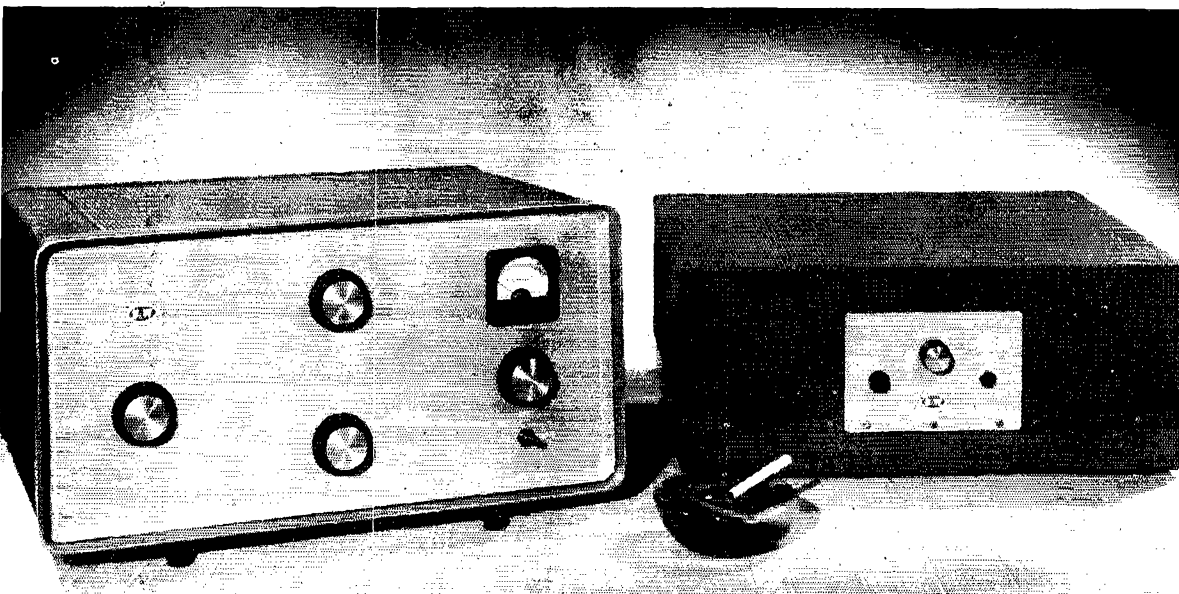
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Station Activities

(Continued from page 114)

K3CLX will be operating at his own QTH soon. The Butler High School ARC has been issued the call **K3KJG**. **KN3RHN** has a new **SX-110**. **K3DKD** did a swell job on TV Channel 2 for the Children's Hospital in his real role as chief anesthetist. The *Eric Times-News* Christmas Fund received a contribution from an anonymous donor to the Silent Keys around Erie: **MXM**, **SER**, **ROP**, **NCJ**, **KQB**, **GV**, **MOM** and **MS**. The Pothills Radio Club soon will move to its new location, the Pleasant Valley Schoolhouse. The Steel City ARC reports via *Kilowatt Harmonics* that its big annual Christmas Party was a huge success. The Etna RC reports via *Oscillator*: **OVZ** bagged his deer only a few minutes after the season opened; **KZF** has a new Triband beam; new Novices are **K3DCZ** and **K3HWK**. For the coming year our Atlantic Division Director, **YA**, has appointed the following from the Western Pennsylvania section to serve with him as Assistant Directors: **JW**, **RSB** and **UHN**. Wanted: C.w. operators from Pittsburgh willing to handle traffic. Inquire WPA Traffic Net on 3585 kc. Traffic: (Dec.) **W3KUN 855**, **K3GHH 383**, **W3UHN 256**, **WRE 161**, **NUG 64**, **LSS 55**, **YA 32**, **KNQ 21**, **SIJ 22**, **K3CLX 14**, **COT 3**.

CENTRAL DIVISION

ILLINOIS—**SCM**, Edmond A. Metzger, **W9PRN**—Asst. **SCM**: Grace V. Ryden, **9GME**, **SEC**: **PSP**, **RM**: **PCQ**, **PAM**: **KYU**. **EC** of Cook County: **HPG**. Section net: **ULN**, 3515 kc. Mon. through Sat. at 1900 CST. Officers of the Joliet Amateur Radio Club for the new season are: **KPC**, **UAX**, **K9HUY** and **K9PRB**. **DO** has a new 813 final working 500 watts. After many years of mobile work, **REA** finally has settled down to a fixed position. **K9MKA** and **K9MDM** are on the frequencies with a new **DX-40** and an **NC-300**. **K9DCF** reports that his new 829B amplifier will be used on 50 and 144 Mc. **LGH** has made **WAS**. **K9BQW** and **K9AMC** have gone to 2-meter activity. **K9OCU** received a new **HQ-110** from Santa. **SXL**, **EC** of McLean County, writes to tell that his County C.D. **RACES** group has received 6 Communicators "3" and a Hy-Gain antenna. According to **IDA**, the **S.S.B.** Net handled 3015 pieces of traffic and **K9QYW** reports that the North Central Phone Net handled 256 messages during the month. **WPZ** found a new use for an antenna tower by stringing Christmas lights on it. **K9IVG** is the new net manager of the "No Name Net." The new officers of the **SARA** are **BJE**, **K9IZE**, **JJE**, **K9HXH**, **RKV** and **PLT**. From St. Clair County comes news that **KFZ** has a new **HQ-170**. **NXY** has a new Pacemaker and Heath Mohawk receiver, **RQR** also has received a new transmitter, a Globe Champ, and **TWT** has joined the ranks of the married operators. **K9MLI** made the front pages of the *Chicago Daily News* with the pleading of his own case in regard to an overtime parking citation. The judge dismissed the case. **LL** has transferred his QTH to Dover, N. Y., where he is employed. **K9CIL** is now s.s.b. with his newly acquired 20-A. From the Starved Rock Radio Club comes reports that the new final amplifier is in operation and that **PNY**, **ZEN**, **QLZ** and **RHY** are the club's new officers. The Ottawa Radio Club is making plans for its new club station with an **SX-101** and a Viking II already purchased. **EU** has received his 230 country sticker for the **DXCC** Award, and he, along with **TV**, **OUK**, **PBY**, **JLD**, **SEV**, **K9ISK**, **K9JAW**, **K9IMU** and **K9AFE**, are on 2 meters. **K9BIV** is organizing **RACES** for McDonough County. **K9HWC** is now working his new rig on 220 Mc. and wishes to contact other 220-Mc. enthusiasts. **EBY** is the proud father of a YL harmonic. **K9RAG** and **K9RAY** are now graduates of the Novice Class. **JUV**, **JJN**, **HPG**, **FDL**, **CIL**, **ADN**, **REC**, **QGL**, **NN** and **PBI** were high scorers in the recent Frequency Measuring Tests. New **OOs**: **K9QPJ** and **ZIV**. The Chicago **YLRL** Club announces a new certificate. To be eligible to win this Dark-Eyed Queen Award one must work at least five members of the club. I would like to take this opportunity to thank the many amateurs of this section who sent holiday greetings to this column. To acknowledge all individually would be a Herculean task. Again many thanks and the best of greetings to all. Traffic: (Dec.) **W9DO 1538**, **K9AIR 1084**, **W9IDA 909**, **USR 779**, **K9PLF 627**, **W9MAK 472**, **TZN 218**, **K9ISP 209**, **W9SXL 125**, **JXV 108**, **K9IVG 100**, **GDQ 84**, **W9EU 82**, **FAW 64**, **K9CIL 38**, **OAD 37**, **QYW 36**, **IXK 32**, **W9UQT 23**, **K9LXG 21**, **MDK 18**, **QIB 18**, **W9PRN 11**, **K9RAS 11**, **BIV 10**, **CRT 10**, **W9Y 10**, **W9QXO 8**, **K9OCU 7**, **OZM 6**, **TAW 6**, **W9CLH 5**, **SKR 4**, **JJN 3**, **K9AUB 2**, **MDK 2**, **MLI 2**, (Nov.) **K9CIL 37**.

INDIANA—**SCM**, Clifford M. Singer, **W9SWD**—Asst. **SCM**: Arthur G. Evans, **9TQC**, **SEC**: **SNQ**, **PAMs**: **BDG**, **BKJ**, **MEK** and **UKX**. **RMs**: **DGA**, **JOZ**, **TT** and **VAY**. Net skeds: **IFN**, 0800 daily and 1730 M-F on 3910 kc.; **ISN**, 1730 daily on 3920 kc.; **QIN**, 1900 daily and **RFN**, 0700 Sun. on 3656 kc.; **QIN** (training), 1800 M-F on 3745 kc. New appointments: **NZK** as **EC** for Monroe Co. and **OKR** for Porter Co. **K9QDE** (Kokomo ARC) is now **OPS**. **HDG** is **OO** Class 1 and **K9ORZ** is **OPS** and **OBS** on 160 meters. The Northeastern ARC elected **K9KAL**, **AMH**, **QWI** and **K9MAH** as officers. The Seymour ARC's new officers are **K9DZS**, **RXX** and **SIO**. The Delaware ARA elected **K9LBF**, **RMV**, **TNG** and **FYC**. Officers of the Newcastle ARC are **ZVP**, **PPD** and **NVL**. The Hoosier Amateurradio Membership Society (HAMS) elected **SWD** and **K9KKG**. New officers of the Gibson ARC are **FJJ**, **K9LXG** and **TKK**. The Western Electric ARC (WEARC) elected **K9OYK**, **SRT**, **SVA** and **SWD** to serve in 1960. Officers of the Kekionga ARC at Ind. Tech. College are **K9QNJ**, **K4KLY**, **KN9TQP** and **K9JPPQ**. The Indianaapolis RC elected **JJC**, **PSE**, **K9JSF** and **EUQ**. The Calumet Area Emergency Net (CAEN), on 160 meters, is picking up momentum with the help of Asst. Manager **K9ORZ**. The Seymour ARC has set up a library and **K9MAC** has been appointed librarian. Ten-year-old **K9RLW** has hit 6 meters like a veteran. **KN9TKE** pierces the ether with a **DX-100** and the hearing aid is an **S-85** with a **Q** Multiplier. **DKR** is happy with a new **SX-101**. **9EGV** has abandoned **SWLW** since firing up an Apache. **K9CFG** has built a 50-Mc. transistor transceiver. **K9BUU** has constructed a v.f.o. The Walsh Valley ARA is compiling a ham directory for the Terre Haute Area. December Net reports: **ISN 279**, **QIN 1266**, **RFN 344**, **IFN 653** and **QIN** (training) 124. Sixteen stations made **BPL**: **K9BSU**, **DGA**, **K9ELE**, **JOZ**, **MMI**, **NZZ**, **K9PDE**, **PHF**, **RMQ**, **KN9TCQ**, **TT**, **K9TYM**, **QVP**, **VAY** and **ZVK**. *Amateur radio exists as a hobby because of the service it renders.* Traffic: (Dec.) **W9NZZ 1583**, **TT 1167**, **MMI 1102**, **ZYK 1028**, **DGA 801**, **VAY 668**, **IOP 632**, **JOZ 603**, **KN9TCG 568**, **K9BUU 478**, **W9JJS 424**, **K9PDE 409**, **W9BKJ 279**, **K9RMQ 231**, **TYM 201**, **W9SVL 177**, **K9BSU 171**, **ELE 170**, **W9SWD 151**, **K9KRN 149**, **PHF 145**, **MAN 104**, **LBD 100**, **W9BDG 92**, **K9IXD 88**, **W9WID 85**, **ETM 74**, **RTH 72**, **K9GBB 57**, **W9NTI 50**, **VNY 50**, **K9LZJ 48**, **W9MEK 45**, **K9JKK 43**, **ORZ 43**, **W9SNQ 42**, **CC 36**, **ELW 33**, **BDP 31**, **DOK 28**, **QYQ 27**, **RVM 26**, **ZPP 26**, **FWH 25**, **YYX 24**, **K9LTK 22**, **MAF 22**, **W9IMU 20**, **YJI 20**, **K9JGG 16**, **W9FVG 13**, **OC 13**, **K9GSV 12**, **W9BVR 11**, **HUF 9**, **ENU 8**, **PPD 8**, **K9QDE 8**, **KN9TKE 8**, **W9DZC 5**, **TQC 3**, **K9RKY 2**, **KN9UBK 1**, **W9YYS 1**, (Nov.) **W9WVY 18**, **K9AAR 8**, **CJE 7**, **W9AB 3**, **K9AUE 2**.

WISCONSIN—**SCM**, George Wolda, **W9KQB**—**SEC**: **YQH**, **PAMs**: **NRP**, **GFL** and **K9IQO**. **RMs**: **SAA** and **K9ELT**. A **BEN** certificate went to **K9ORR**. **WIN** certificates to **APB**, **K9UKB** and **K9PLJ**, a **WSSN** certificate to **K9OPF**. **Mark** May 21 on your calendar as the big hamfest date at Wausau. **Ex-8CM** and **RM LFK** celebrated his 35th wedding anniversary Jan. 14. **RKP** and **IKY** became Class 1 **OOs**. Add **WJH** to the list of Wisconsin A-1 Operators. **DYG**, Wisconsin's Mr. Traffic, had a total of 11,948 for the year. **ADM** and **LGR** now are at radio station **KECK** in Odessa, Tex. The Lakeshore Halls Radio Club at the U. of Wis. now is operating with a **DX-100** and an **HQ-100** with **GOC** as the call. An interesting bulletin edited by **K9GBK** is issued monthly to the Fond du Lac Club. **FZC** now is with the State Traffic Patrol in Madison operating c.w. eight hours daily. **K9GDF** is nearing **WAS** with letters received in answer to his **OO** notices. **CCO** and **DTK** are looking for other college students for over-the-air discussion sessions. The reported traffic of 5300 for December made the year's total of Wisconsin reported traffic 34,815, compared to 25,600 for 1958. **K9PQT** has a new Ranger and is waiting for **KL** and **KH** cards for **WAS**. **KN9UTO** is new in Eau Claire and **K9RIY** is a new General Class licensee in Junction City. The Neenah-Menasha Club welcomes all to join its 160-meter net, Sun. at 9 p.m. on 1810 kc. **RQM** worked all 73 sections in the recent **SS**. New officers of the Green Bay Mike and Key Club are **IKY**, pres.; **K9CZC** and **W9MAI**, vice-pres.; **K9ORR**, secy.; **AHH**, treas. Wisconsin closed the year with 34 **ECs**, 10 **OPSs**, 29 **ORSS**, 11 **OOs**, 4 **OBSs** and 9 **OESSs**. Traffic: **W9IDY 2061**, **CXY 723**, **K9ELT 589**, **DTK 431**, **W9SAA 355**, **K9GYQ 235**, **W9CCO 207**, **K9GSC 154**, **W9VHP 85**, **KQB 77**, **NRP 54**, **CBE 47**, **IKY 41**, **NLJ 37**, **LFK 33**, **NQW 25**, **VIK 25**, **K9DOL 30**, **W9OTL 22**, **MIW 20**, **K9LWV 15**, (Continued on page 122)



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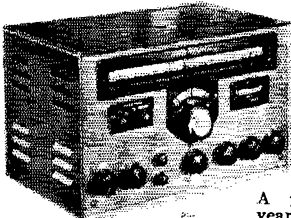


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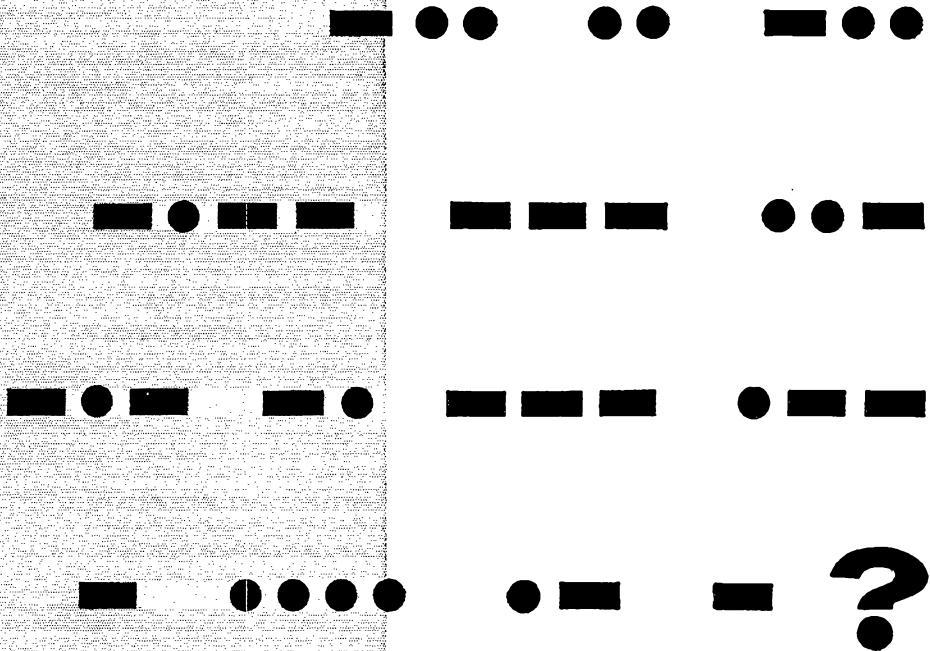
DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold Wengel, W0HYA. SEC: K0JLW, PAM: K0KJR, RM: KTZ, The N.D. Phone Net report for Dec.: 27 sessions, 791 check-ins; low 15, high 40; formal traffic 147, informal 62, relays 38. The C.W. Net Report for Dec.: 15 sessions, 60 check-ins, formal traffic 12. The C.W. Net asks for more activity. Regulars include KTZ, FVG, LHB, SDN, JBM, APK, QKP, AOX and ATK. AJW has a 75-watt Globe Chiet and an SX-100. ZZK has a GSB-100 and an HQ-170 on 15 and 20 meters. CAQ has a Citizens Band call. The Minot Amateur Radio Assn. reports ARRL approval of a North Dakota State Convention in Minot July 30 and 31. K0YAO, at Minot, formerly was K4JWV/0 and ZPX was 7FHV. A new call in Minot is K0YAF. Novices are KN0WIO and VXX. K0MPH, UTO and UTL are doing well on 10 meters. Traffic: K0TYY 156, ADI 122, ITP 95, GRM 48, GGI 35, RAS 28, W0BHT 26, K0TYM 26, MPH 20, W0YCL 20, K0IAB 16, UTO 15, ATK 11, PVH 11, JLU 10, MHD 10, PVG 10, DWX 9, PHC 9, W0THI 8, K0DHB 7, W0KTZ 7, DNJ 6, K0ABC 5, PUJ 5, KBV 4, KJR 4, OSV 3, OSW 3, W0BHF 2, K0CQQ 2, W0IAN 2, K0OMA 2, PEO 2, RLF 2, RRZ 2, W0GQD 1, K0RFP 1.

SOUTH DAKOTA—SCM, J. W. Sikorski, W0RRN—SEC: SCT, SMV has received all QSLs for his WAZ. His total is now 177, with 165 confirmed. K0SZJ is an OPS. SCT and DVB made BPL. This was SCT's highest traffic total since he has been on the air, despite the fact that ice tore down power lines four days in December. He stayed "in town" with K0EJW to operate regular net schedules part of the time. NAE reports there are four members of his family licensed—SDJ, uncle; K0BWB, brother, and KN0YDN, father. PDW has moved from Dupree to Timber Lake. CTZ reports another ham family in Eagle Butte—KN0ULH, ULG (the XYL) and ULZ (a son). K0APZ is DXing with a new TA-3 beam, T2T. Clearfield, is back on the air with a new SX-101A. A new General Class call at Clear Lake is K0TAM. K0QZW, Redfield, has joined the 40-Meter Net. KN0VIC is proudly displaying a 10-w.p.m. CP certificate. YQR has secured the call K7JHO, to operate while working at Sundance, Wyo. He also is on 14 Mc. KN0YBX is secy.-treas. of the Hi-Lo ARC, Sturgis. Ex-BVMM is now K0KID, West Chicago. TKO and TKN have dropped the "N." New calls: KN0YXD and KN0YCD, Huron. 1LL's jr. operator is KN0YBZ. The Huron ARC has purchased an emergency generator and is building a trailer for it. Traffic: K0BMO 374, W0DVB 336, ZVL 319, K0HSW 146, W0UJ 101, K0ACJ 81, AIE 61, EWJ 49, KLR 32, W0CTZ 28, K0LXH 27, VYV 26, W0DIX 22, K0SEJ 20, TKO 17, W0RWM 14, EQJ 13, EUJ 13, K0QPK 12, W0RWM 10, K0DHA 8, W0HJZ 7, VYF 6, FLP 3, K0LKH 3, LJQ 1, W0NNX 1, K0OMP 1, OXU 1, RCA 1, W0T2T 1, WUW 1.

MINNESOTA—SCM, Mrs. Lydia S. Johnson, W0KJZ —Asst. SCM: Rollin O. Hall, BLST, SEC: TUS, RMs: RIQ and K0LZD, PAMs: OPX and K0EPT, ARL 27 to new PAMs OPX and K0EPT; also to MPN NCSs (noon) HEN, OPX, UMX, VYL, WWT and K0MGT; (evening) KYG, OPX, TUS, K0EPT, HKK, QYV; MSN NCSs ISJ, KJZ, KLG, RIQ, ROJ, K0MAH, MGT; MJN NCSs K0KZD, QLM, SNG, W0KJZ, PET, TTY. The 51-Mc Net meets at 2100 CST Sun.; and the Post Office Net on 3820 kc, at 1230 CST, Ex-2JTP, formerly of New York and now in St. Paul, is K0WMR and his XYL is K0WTO. A site near Wold-Chamberlain has been considered for the W0EP memorial station. K0RCF, RPW, SNG, QDL, TUS and KJZ made BPL. QYD is out of the Navy and employed by OOO. K0GME put up a cubical-quad antenna for 15-meter DX. The virus bug hospitalized ARRL President TSN and his XYL K0WKS for a week. TKX is the proud owner of a new HQ-180. He teaches radio code and theory at Lew Bonn, Minneapolis, Wed. from 7 to 9 p.m. OMC and K0EPT visited URQ and his XYL. The MRC's Christmas Banquet was attended by 180 Twin City OMs and XYLs. BCO has a 32V-3 on the air. OGP had BEI's emergency generator overhauled. K0ULX, UMA and UXB called on MNY. K0QMI installed are Johnson tr. switch for full break-in. The newest Novice in Cokato is KN0WYV. K0RPW met K0RZS and JIG while sking in Wisconsin. K0OAV reports that K0ACY, Bethel College station, consists of an Apache SB-10, and HQ-150, a GSB and for Novices a DX-20 and an SX-24 receiver. Newly licensed KN0WWS and KN0WWT are members of the BARC. EC MEQ states that Asst. EC HSK underwent major surgery. RM IZD is using a 150-watt converted BC-457A. K0MVA and TPU have a 105-ft. tower with eight-element 8-meter and ten-element 2-meter

(Continued on page 124)



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A Word From Ward . . .



THE CORPORATE IMAGE

American corporations have one thing in common: they want to enjoy the highest esteem of the American public. Every year they spend millions of dollars on TV, radio, magazine advertising and public relation programs to build up a favorable "corporate image" about their particular companies.

If it spends enough money, for a long enough time, practically any corporation can convince the public that it is a good, sweet, kind, public-spirited corporation, devoted to progress, interested in humanity—and the proud possessor of a genuine, bona fide soul.

Does this mean that only a multi-million dollar company can afford to have a "good" corporate image? Not on your life! Here, at Adirondack Radio Supply, we've got an "image" every bit as favorable as the big boys—but we didn't spend millions to get it.

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Anybody can buy a manufactured corporate image—but an image like ours has to be earned.

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beams up. Certificates were endorsed for K6ORK as ORS, K6BFS, as EC, ALW and K6MAH as OPSS. Luck to newly-appointed ECs OJK, K6SNC and CNB and OO KLG. AHV's call is WA6HKV. FGV accepted a position in a Northfield school. K6DEH put up a vertical antenna, and BLU a tower with a Triband beam and rotator. MJJ is in a Red Wing rest home. ZPV is mobile on 10 and 75 meters. K6KKQ reports that TYW operates a TV store in Sanstone. Traffic: (Dec.) W6TUS 934, K6RCF 554, W6KJZ 354, K6SNC 282, SNC 269, W6RIQ 241, K6QLM 207, W6OMC 200, QDL 198, K6QYY 154, MAH 141, W6KFN 133, HEN 121, OJG 116, K6RPW 110, DYT 100, W6OPX 96, PET 96, TWG 96, OJK 88, K6QBF 88, LWK 84, W6BUO 74, K6GIW 73, EPT 68, W6ISJ 67, KLG 66, LST 63, NNG 61, UMX 56, NYM 51, K6IZD 44, KYK 42, AGT 42, W6QVR 40, K6ACY 35, W6THY 35, K6PML 34, W6DQL 33, K6KUC 32, W6RSD 31, K6RGP 30, JYJ 29, W6ALW 27, K6ICG 27, MNY 27, W6RQJ 27, W6A 18, DYC 17, OFT 16, K6QBI 12, UXT 12, W6YHR 12, K6RHN 11, W6RYM 8, QVQ 7, RGY 4, UYR 4, SJZ 3, VBD 3, KN6VMF 3, K6NEQ 1, W6RA 1, KN6YV 1.

1960 MINNESOTA QSO PARTY

March 12-13 (C.W.)

March 26-27 (Phone)

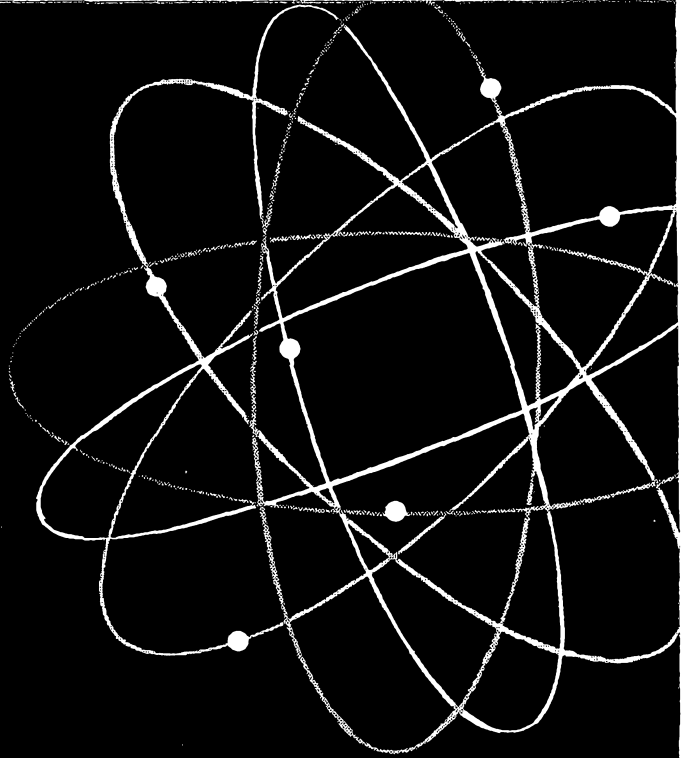
The St. Paul Radio Club Inc., invites all amateurs the world over to participate in the 1960 Minnesota QSO Party.

Rules: 1) Time of contest for each week end: Saturday 0600 CST to Sunday 2359 CST. The week end March 12-13 is for c.w. only; the week end March 26-27 is for phone only. 2) General call is "CQ MINN." C.w. stations identify by signing "DE MINN." Phone stations say "Minnesota calling." 3) Exchange consists of QSO number, RS(T), county and Minnesota city. Outside stations include state, province, or country. Only c.w.-to-c.w. and phone-to-phone contacts are permitted. A station may be worked once per band. Outside stations work Minnesota stations only; Minnesota stations work any amateurs. 4) Suggested frequencies are 3595, 3820, 7050, 7250, 14110, 14250, 28050, 29000, 50500 kc., and 20 kc. inside the low end of each other band. 5) Each contact completed counts two (2) points. Each new Minnesota county contacted counts five (5) points extra. Extra points, therefore, would be the number of different counties contacted multiplied by five. The final score is the number of contacts multiplied by two, plus your extra points (each new county multiplied by five). 6) Certificates will be awarded to the highest scoring amateur in each state, province, and country, and to the three highest scoring amateurs in Minnesota. The Worked All Minnesota (WAM) certificate is offered the year round to operators working 50 Minnesota counties with endorsement stickers for 60, 70, 80, and 87 counties. 7) All log entries must adhere to FCC Rules and be received by April 10, 1960 at Box 512, St. Paul Radio Club Inc., St. Paul, Minnesota.

DELTA DIVISION

ARKANSAS—SCM, Ulmon M. Goings, W5ZZY—SEC: K5CIR. PAM: DYL. RM: K5TYW. BYJ was home from school during the holiday season. He arrived just in time to help out with traffic. A new ham, K5EAP, is reported in Little Rock. GUE was in Osceola recently visiting with his old ham friends. K5HSJ has a new final on now and is running 300 watts to a 304-TL. HFQ has a new Collins 32-S1 receiver. As is apparent from the size of the report this month, we sure need more news from the boys in Arkansas. Your activity and news report would be appreciated. Traffic: W5BYJ 237, K5IPS 221, TYW 209, W5RYM 56, K5MES 19, W5DYL 8.

LOUISIANA—SCM, Thomas J. Morgavi, W5FMO—CEZ made BPL again with a total of 877. Incidentally, CEZ is Route Manager for the State of Louisiana and ORSs should get in touch with him on all c.w. net and traffic problems. SEC MXQ is calling for EC volunteers for AREC nets. The LAN C.W. Statewide Net meets from 7 to 8 p.m. Mon. through Fri. on 3615 kc. with a code drill every five minutes of that hour. You fellows who need code practice, call in on
(Continued on page 128)



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full line of

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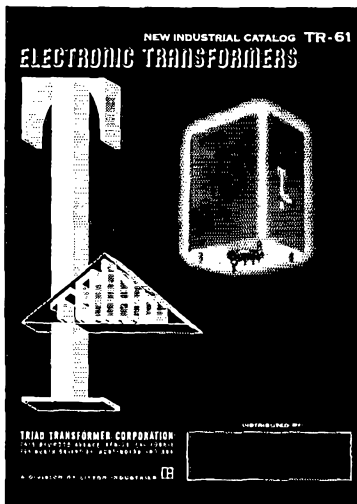
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the net and take advantage of the drill. New officers of the Greater N. O. ARC are K5USO, pres.; BVU, vice-pres.; QPS, treas. and act. mgr.; QKQ, secy.; BZ, corr. secy.; MIXQ, EC.; K5USO, QKQ, QPS, NLK and MIXQ, board of directors. K5JJY reports that LJJ, club station of the Loyola University ARC, should soon be back on the air and that code classes are being held daily for the members. The Arcadia ARC was formed last September in Crowley, La., with 13 active members and one awaiting his ticket. Club meetings are held at the Naval Reserve Electronics Facility the 1st Wed. of each month. 3975 kc. is the club frequency with a net on Sun. 9-10 A.M. The president of the new club, K5ANN, also is EC for the Crowley Area. FYZ, who dabbles on 144, 220 and 432 Mc., was awarded an Official Experimental Station certificate. He also is EC in the Minden Area. It looks like the boys in Carville soon will be on the air with some new Collins SSB equipment. They are on 2257 kc. and the calls are K5USW and K5USX. Traffic: W5CEZ 877. MIXQ 230. K5OKR 3.

TENNESSEE--SCM, R. W. Ingraham, W4UO--SEC: K4EJN. RM: FX. PAMs: PAH and UOT. BPL awards go to PL, CXY and K4CNY. PL has installed a gas-driven generator for emergency power. OGG has moved to a new home in Memphis. UVP reports from Johnson City: New Hams are KN4s RML and RMM, ANN (now in Florida) paid a visit. TCW has a new Heath converter for 6 meters and a Seneca. UVT is heard on 6 meters. AZI soon will be on from Elizabethton with big finals on 6 and 2 meters. K4OUK says the new t.r. switch helps on c.w. RRV reports Asst. Directors in Tennessee are SCT, PQP and K4PSF. UVU has built an electronic computer with a binary scaler. WBK reports the new officers of the Memphis ARA are K4s ASK, BMC, SGF, SHX, EJJ, OSK, W4s WBK, KQM, WTI and FRB. OO reports were received from K4s RSU, SGF and AMC; net reports from FX, UOT and PAH. New appointments: K4RIN as OO. K4AMC as ORS. SGI renewed his OO appointment. Congratulations to the C.W. Net NCS and 4RN representatives on the FB traffic totals. Traffic: W4PL 1517, CXY 527, K4CNY 428, W4OGG 360, VJ 318, FX 187, EIN 154, K4AMC 120, W4NHT 107, PQP 64, UO 59, UVL 37, PAH 31, PFP 26, TYV 26, UVP 24, TZG 14, LLJ 12, JVM 10, K4OUK 10, W4VTS 10, RRV 9, K4RSU 6, TYZ 6, W4SGI 2. (Nov.) W4FX 101, NHT 90, VTS 10.

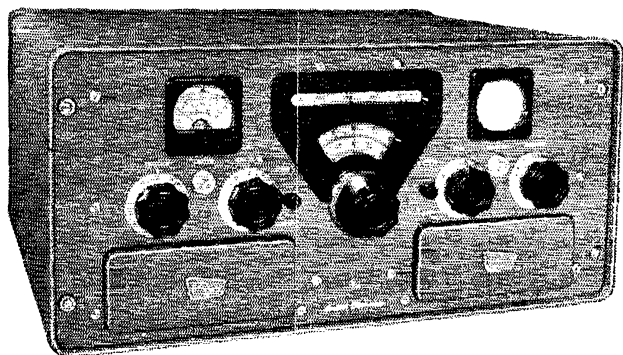
GREAT LAKES DIVISION

KENTUCKY--SCM, Robert A. Thomson, W4SUD--Asst. SCM: W. C. Alcock, 4CDA. SEC: BAZ. RM: K4CSH. PAMs: SZB and K4HCK. S.S.B. PAM: MMY. V.H.F. PAM: K4LOA. Louisville EC BAZ has established a local 2-meter high school net. Students attend Novice classes and those successful in obtaining a license operate in the net. They are instructed in the amateur's responsibility toward emergency communication preparedness. Since schools are often used as disaster headquarters, both real and simulated, this net is well placed to operate as is during an emergency. Low-frequency antennas also are installed to facilitate moving portable stations to the schools for state-wide coverage via our section nets. This pattern would be excellent for others. We need more men like BAZ. ORS and KYN Net certificates went to K4PGH and DFZ. New on KYN are GSC and K4VDN. OO reports were received from K4BUB and IFB. SZB and KJP had perfect attendance on MKPN during Nov. and Dec. KFZ has a new s.s.b. exciter. BAZ is on with a new Pacemaker. HTO was home from M.I.T. during Christmas. ADH is busy installing 6-meter traps on local TV sets. Traffic: W4ZDB 303, K4CSH 236, W4BAZ 222, K4PGH 205, W4SUD 90, K4LIQ 60, HCK 49, W4CDA 43, K4HOE 41, W4SZB 40, K4CC 38, KIS 31, HOE 25, MPV 24, PUM 21, QHZ 21, SBZ 21, DFZ 16, W4HOJ 16, JBC 15, YVI 15, SYE 14, HTD 13, K4LOA 11, W4KJP 10, K4LMS 10, WBG 9, VDO 7, W4JUI 6, K4JOP 5, W4ELG 4, K4ZQZ 4, W4VJV 2.

MICHIGAN--SCM, Ralph P. Thetreau, W8FX.--SEC: YAN. RMs: SCW, OCC, QQO and FWQ. PAMs: AQA and NOH (v.h.f.). EC appointment went to K8CWW. OBS to K8EWI. OES to K8BGZ. OCC makes BPL and K8AEM made HPI, on 50 Mc. Is this a first? EMD (OO) turned in 241 violations, 135 Novices and 227 of 2nd harmonic outside the 7-Mc. band. Other OOs, please note. FZ gets good results from an ARC-5 triple conv. superhet. TQP, PDP, UGD and K8EFY were hospitalized but all are recovering. The Saginaw Valley ARA's new officers are CTY, pres.; SXY, vice-pres.; K8JLD, secy.; LNE, treas.; COW, QPO and KNB, trustees. The club is sponsoring the ARRL "hamfest" to be held in Saginaw, Mar. 18-19. K8BCV has a new homebrew receiver and

(Continued on page 128)

THOSE "DISTINCTIVELY NEW" SIGNALS...



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UNWANTED SIDEBAND SUPPRESSION 50 DB OR BETTER

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automatic v.f.o. K8KCO is building a W9TO keyer and finished a new console. SCVARC is a nice little paper put out by the St. Clair Valley ARC, of both Sarnia, Ont. and Port Huron. KN8JWQ got her deer Thanksgiving Day. K8IWIJ "lost" the transmission line under the new aluminum siding and has a "loaded" house. Electrician QQQ took a jolt from a 440-volt line but is recovering. BFF (OES) reports that a 4-1000A 50-Mc. r.f. amplifier now is in use. DTT reports the Genesee County AREC has been reorganized with Asst. ECs AMT, RTN, RUV, QIC, K8ACQ, ABW, HWK and CHR. K8BQD made BPL IHN admits he's getting old. K8LXA is building a 200-watt transmitter. K8KMQ now is using a DX-100. HKT got only OQ5PE for the month. K8KVV has a new RME-4350A. K8ABW is working MARS. FDO says the Straits Area RC has a new club room. K8KYH got a new baritone and K8LPV a new trombone. TBP keeps out S. American BC whipper from Jan. '60 QST. K8EWI has a new Vibroplex elect keyer lever. SWF finally reports again. EGI is back from Florida. The Central Michigan ARC's officers are OCK, pres.; CKK, vice-pres.; FEV, secy.; KWO, treas.; K8AEV and DHN, directors. K8HMD got a new bug. K8HLR says he is 13 years old (aw, I was on spark at that age). K8BGZ is working 8 and 2 meters. PT reports that KFZ, JUT, GOV, CVQ, K8AHX and JZR are all active on 2 meters. The Catalpa ARS's officers are GCP, pres.; CJT, vice-pres.; VZQ, secy.; K8CFU, corr. secy.; SYR, treas. Traffic: (Dec.) W8OCC 706, K8BQD 507, W8JKX 260, FWO 246, N4N 204, RTN 137, K8AEM 117, RKK 110, W8SWG 100, FX 99, QQQ 92, IBB 90, NUI 90, K8EXE 85, W8ELW 81, K8GJD 78, W8IHN 78, NOH 75, K8LXA 55, K8AQ 52, W8HHT 47, JLP 39, K8KVV 39, NAV 35, W8PGW 34, K8ABW 27, W8AUD 25, FDO 25, QIX 22, ALG 15, BU 15, K8LPV 14, W8TBP 14, ZIE 12, AIV 10, K8EWI 10, W8SWF 9, DSE 8, K8IWP 6, W8EGT 4, WXO 3, FSZ 2, K8LOT 2, HLR 1, HMD 1, KCO 1. (Nov.) K8DJQ 98, BQD 82, KPJ 10, SAY 10, IWF 8.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM; J. C. Erickson, 8DAE, SEC; HNP, RMs; DAE and VTP, PAM, HJZ, WYS and K8IGD, VWLW joined the Silent Keys. K8LBZ has a new DX-40 and a 10-meter beam. Perry High School, near Canton, conducts code classes on Mon. and Wed. after school. December appointments were CXM, OUU and K8ONQ as ORSs; HNP as SEC; VFU as EC. WE retired from the Ohio State Highway Patrol, thus closing a 22-year career and 17 years as chief operator at Findlay. He has been an active member of the Buckeye Net for years and his wife is OTK. EQN reports the Ohio Intrastrate Contest will be held Apr. 2 and 3. There will be no CD Party or other excuse, so get your station working to make it the biggest yet. You may also get that county you need toward that hard-to-get certificate, Worked All Ohio Counties, of which only ten have been issued to date. Seneca RC's 1960 officers are K8AHK, pres.; and Ken Hydeleman (SWL), secy.-treas. Ctl. headquarters, ID, has been moved from Tiffin City Hall to the county home. At a big meeting a talk was given on "Principles and Operation of RTTY as Applied to Amateur Radio" by ex-SDZ and QAH gave a talk on "Broad Band Coll. Theory and Practice." The club toured the Ohio Bell Telephone Building. The Cuyahoga County AREC aided the Muscular Dystrophy Assn. in collecting funds during its annual drive, with BHR, GHO, IDM, IEL, LHX, NRI, NZL, SUS, TFR, UZJ, ZEP, K8s AAG, BWH, HVH, IGL, IZL, IZM, JDQ, JHJ, JIC, KEM, KNJ, MBW, MME, MSB, NIO and QPH participating. Toledo's *Ham Shark Gossip* names ADI as its "Ham of the Month" and tells us the Teen Hams of Toledo's officers are K8KAS, pres.; K8KFP, vice-pres.; K8JWR, secy.; and K8MXY, treas. Springfield ARC members heard a very informative presentation on "Sideband" given by OG. K8DEO has a new baby girl. The West Park Radiops' (Cleveland) 1960 officers are BDZ, pres.; MWE, vice-pres.; GMK, secy.-treas.; ZJQ and IDM, trustees. KYT married K8ITW. The Buckeye Net now has coverage in Cincinnati, with CXM, OUU, K8ONQ and several others carrying the mail. BZX has a new Heath v.t.v.m. kit that Santa brought him. The Piqua RC held its annual junk-box exchange. IBX received Worked Westchester County New York (WVCNY) certificate No. 114, the third issued to Ohio. Santa brought a TA-33 Tribander for K8EJN. NWR has a new grounded grid linear. K8GZT was home on leave over the Christmas Holidays. The Lancaster-Fairfield ARC's 1960 officers are K8JPL, pres.; APT, vice-pres.; K8NDZ, secy.; OXF, treas.; K8NCY editor; and PGE, trustee. The club holds code and theory classes and K8QIK is the club call. New hams in Erie County are KN8s, RHC, RLE, RMW and K8RPU. K8JSQ has a new SX-101A. K8MAZ has a new Apache and a Mohawk. LBC has a new HQ-170. K8IPD received a new Vibroplex from Santa. TZO received the WACAN Award. K8KOM received his General Class license and a new mike and

(Continued on page 130)



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... the DB23 secret weapon of Big Gun DXer's

As DX becomes more competitive and condition less ideal, the sales curve of the DB23 is rising. Try a DB23 Preselector to *hear* for yourself why many leading DX men consider it essential. Top-engineered receivers, perfectly aligned and properly matched into your antenna should give optimum performance. But few hams have the facilities, the patience, the skill or the time to keep a receiver in perfect shape. The RME DB23 is a low-noise r-f amplifier which can be used to compensate for circuit detuning inherent in the best receivers. The RME DB23 will substantially improve the performance of almost all receivers on the amateur bands from 3.5 to 30 mc.

The DB23 consists of one tuned input circuit, which matches input impedances of 50 to 75-ohms unbalanced or 300-ohms balanced, followed by two stages of low-noise, neutralized, broad-band push-pull 6J6 amplifiers. Finally, a push-pull 6J6 impedance matching stage delivers the amplified signal to the receiver with output impedance of 150-ohms unbalanced or 300-ohms balanced. Power supply is built-in.

The voltage gain which can be expected from the DB23 varies somewhat with the band in use and the output impedance selected (balanced output gives 6 more gain). Minimum gain, using a balanced output connection, will be about 26db; while maximum gain, using the same output circuit, will be around 35 db. The tuned circuit in the DB23 adds selectivity to the receiving system.

Because the DB23 is a low-noise device, an improvement in signal plus noise-to-noise ratio (or usable gain) is experienced. This feature is quite pronounced with the less sensitive receivers, but even the better receivers will benefit. An improvement of 7.5 db in signal plus noise-to-noise ratio is not unusual. One control selects the desired band, another peaks the input. Continuous tuning is not necessary. Most DX men will go through acrobatics to improve their competitive edge. Here is one way of doing it with nothing more than a screwdriver, two minutes of your time, and the modest investment of \$49.50.



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RME DX COMPUTER

An operating aid designed to make available DX information about all countries recognized officially by the amateur societies of the world. This unusual computer is a complete DX guide in a handy, compact form. It gives all call letter prefixes, time differentials, international postage rates, continent, zone and country, in addition to an address listing of all the QSL bureaus of the world. By sliding the center plate to the desired prefix, you can read all the above mentioned guides at one setting. The call letter prefix column has extra spaces to fill in your own QSL record, sent and received. Size: 13 1/4" x 4 3/4". \$1.00 Amateur Net at your local distributor, or direct from RME Division of Electro-Voice, Buchanan, Michigan.

from the RIDER Bookshelf for
more successful ham operation

SHORTWAVE PROPAGATION by Stanley Leinwoll (Radio Frequency and Propagation Mgr.—Radio Free Europe). Of special interest to those concerned with radio communications, this text provides a modern, up-to-the-minute analysis of shortwave propagation. Ionosphere characteristics are discussed together with the nature of radio waves. The book then carries the reader into the sky wave, measuring the ionosphere, ionospheric variations, the sunspot cycle, and abnormal phenomenon. Sky wave propagations are covered and the preparation of MUF curves are discussed. Includes Rider Global Time Conversion Chart. #231, \$3.90.

RIDER GLOBAL TIME CONVERSION SIMPLIFIER by Lt. Col. John G. Daiger (Ret'd). What time is it in Oslo? In New Delhi? In San Francisco? In Rio de Janeiro? No matter where you are located you can tell at a glance what time it is anywhere in the world with the greatest of ease. It lists small towns and large cities around the world; large cities and small towns in the United States. It is color-keyed to tell you immediately the correct day. Corrects for areas that have Daylight Savings Time. Has conversion tables for those who use 24-hour calculated system. Ideal for communications personnel, airlines, banks, travel bureaus and travellers. Just a few minutes acquaints you with the easy-to-use, colorful chart and map and makes it usable to anyone. #238, \$1.



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- applies Reinforced Learning — psychological principle proved successful by Armed Forces.
 - uses LP records to teach you to hear signal pattern correctly and identify it — how to transmit.
 - uses identification cards to teach you the correct letter associated with each signal pattern.
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- ... plus an imaginary instructor (in complete and novice courses) provides correct answers to speed code learning. Many people have learned to receive 5 words per minute within 9½ hours. Eliminates code plateau barrier!

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COMPLETE COURSE (0-20 words per minute) — Six 10" LP records (192 minutes of recording, 28 recordings), 47 ident. cards, book #REC-020 \$15.95.
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ADVANCED COURSE (9-20 words per minute) — Three 10" LP records (96 minutes of recording, 28 recordings), book, #REC-920, \$8.95.
 Records prepared in collaboration with the N. Y. Institute of Technology and mfd. by Decca Records.

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Vibroplex. DHU and K8EUC motored through Florida during the holidays. DAE, UPH, K8GWK and K8HKU made BPL in December. K8POL received his General Class license and a new DX-40. Those of you who hold appointments and should send in monthly reports to me are requested to do so or the appointments will be canceled. Traffic: W8UPH 2763, DAE 791, K8EUK 310, GWK 235, W8IBX 194, CXAM 90, QLJ 89, AL 81, OUU 69, K8DHJ 68, JZZ 54, ONQ 51, W8YGR 40, WE 37, FFK 32, ZAU 30, BEW 26, K8MIO 23, W8HZJ 22, GFE 18, LT 18, WYS 13, DG 12, K8EJL 12, HDO 11, HEJ 10, NCJ 9, W8LGR 8, K8BNL 6, JSQ 5, EUC 5, MHO 5, MSJ 5, EKG 4, W8BDM 2, EQN 2.

HUDSON DIVISION

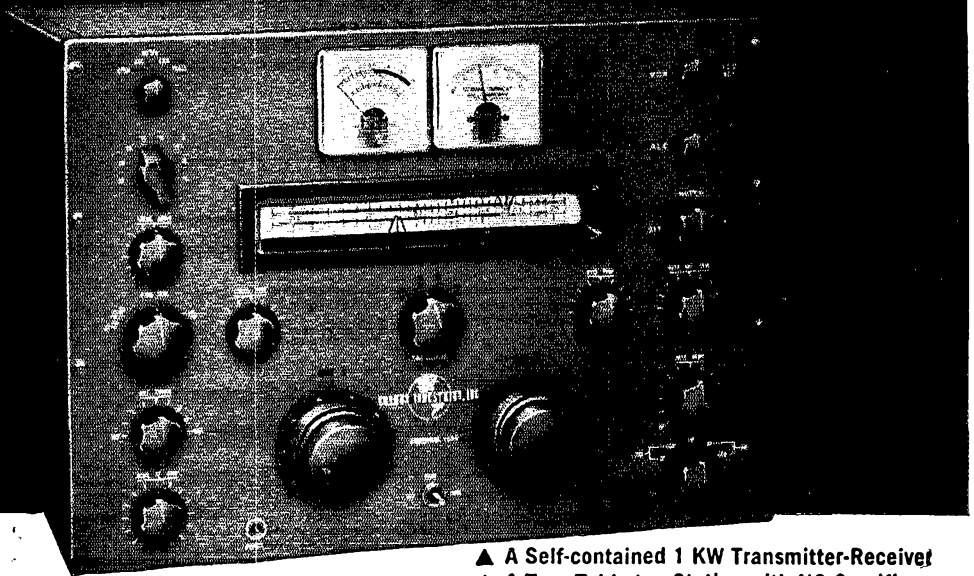
EASTERN NEW YORK—SCM. George W. Tracy, W2EFU—SEC; W2KGC, RM; W2PHX, PAMs; W2LJG and W2NOC. Section nets: NYS on 3615 kc. at 1900; NYSPTEN on 3925 kc. at 1800; LPN on 3980 at 1600; ESS on 3590 kc. at 1800; ENY (emerg.) on 29,490 (Thurs.) and 145.35 Mc. (Fri.) at 2100; AHT (Novice) on 3716 kc. Sat. at 1300. Appointment: WA2AUC as ORS. Endorsements: W2KGC as SEC and K2UTV as OBS. Congrats to our BPL winners: K2UTV, K2YAZ and WA2EKE, in Peekskill, K2YZI in Troy and K2MIBU in Yonkers. New officers for 2nd Call Area TCPN include K2LKI, K2CKG and K2AYB. Award for best attendance on NYS went to W2ATA; for most valuable member to K2UTV, Officers of the Central H.S. Club, WA2JDJ, in Purdys, N. Y., include WA2BAIB, WA2BJE and WA2AYM. The Albany Club had a dinner and dance Dec. 18, Sparked by K2YDD, W2KSH, WA2IUL, WA2EFD, WA2BAH and K2TMB, the Albany H.S. Club is back on the air. On Dec. 7 the R.P.I. (W2SZ) and Union College (W2GSB) Clubs held a radio debate on 6 meters judged by both faculties. Congrats, but we don't know the winner. W2EKR and K2TUK were guest speakers at the Communications Club of New Rochelle. K2ZDJ, WA2GXQ and K2BBC with K2MMT won the transmitter hunt in Armonk. New stations on 6 meters include W2RML, K2YDY and K2PQV. WA2IMG reported 347 contacts with 77 stations using 10 watts on 2 meters. K2YAZ has a new Apache with a Tribander beam. Arkansas made 31 states for K2BQU on 6 meters. W2IEH is the new RO for Dutchess County. K2ARO and WA2DAP were active while home from college. Traffic: K2UTV 6363, K2YZI 1095, K2MIBU 331, WA2EKE 255, K2YAZ 172, K2LKI 169, W2PQU 162, K2BIO 149, W2ATA 108, K2BHI 79, W2PHX 70, K2OZF 66, K2RKY 50, K2AYB 42, WA2AUC 38, K2INW 33, K2MLN/2 30, WA2ALO 24, K2UTI 12, W2GSB 9, W2GTC 5, K2VCZ 3.

NEW YORK CITY AND LONG ISLAND—SCM. Harry J. Dannels, W2TUK—SEC; W2ADO, RM; W2VDT, PAM; W2UGF, V.I.L.F. PAM; W2EW. Section nets: NLI, 3630 kc. nightly at 1930 EST and Sat. and Sun. at 1915 EST. NYC-LIPN, 3908 kc. Mon. through Sat. from 1730 to 1830 EST. NYC-LI AREC, 3908 kc. Sun. at 1730 EST., V.H.F. Traffic Net, 145.8 Mc. Tue.-Wed.-Thurs. at 2000 EST., BPL cards were earned by W2KEB, K2SJJ, and WA2BQK, the latter two on organizations plus deliveries. W2KEB's consecutive string of BPLs has ended on a happy note with a trip to the West Coast with OM W2KRV in their KVM-2-equipped car. WA2ITV passed his Tech. Class exam. K2SJJ found time between traffic activities to run his country total to 60. W2EW requests that any low-frequency traffic-handlers equipped for v.h.t. report into the V.H.F. Net and give a helping hand on long-haul traffic. K2DEM is nearing DXCC with 96 countries so far. W2JBQ finally retired his 25-year-old RAIE-69 and home-brew rig for an NC-300 and a Valiant. K2JHV is enjoying traffic work and is working toward improving his code speed, now at 20 w.p.m. Traffic work is new to WA2CZG, but Ed turns in an excellent first-month total. K3CIO/2 is a newcomer to the section and resides in Huntington, Welcome, Al. W2UAL is on all hands with an Eico 720 and 730 rig. W2IVA joined the married ranks; New officers of the Mid-Island RC are W2WFL, pres.; W2SMQ, vice-pres.; K2AZT, secy.; W2CLG, treas.; K2VLJ, sgt. at arms; and W2CMH, W2JBQ and W2OWP, trustees. W2SEU is stationed with the USAF in Vermont. W2BQM added phone-only country No. 203. The Stuyvesant HSRC, W2CLE, added a G-50. Experiments with parametric amps. continue at W2LRJ. New officers of the Amateur U.I.L.F. Club of Jamaica are K2RKL, pres.; K2EEK, vice-pres.; W2QPK, corr. secy.; W2HLL, rec. secy.; and K2BBO, treas. A new Viking Challenger is in operation at K2KSP. K2TPU added Arkansas and Kentucky for new states on 50 Mc. K2VUI has now worked 183 countries with WAC phone and WAZ confirmed. New officers of the Lake Success RC are W2OBU, pres.; W2YHP, vice-pres.; and K2IDB, secy.-treas. Officers of the Suffolk County RC are W2OBW, pres.; W2MZB, vice-pres.; K2IHD, secy. and W2OKK, treas. K2UBG worked 49 states in the Levittown ARC WAS Contest.

(Continued on page 138)

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COSMOPHONE "1000"



- ▲ A Self-contained 1 KW Transmitter-Receiver
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SPECIFICATIONS

TRANSMITTER

INPUT: Full 1 kw on Voice Peaks (Meters Read 2500 V at 400 ma) into a pair of 4 x 300 A's
UNWANTED SIDEBAND: 42 db down
DISTORTION (SSB): Third order products approx. 32 db down
FREQUENCY STABILITY: Drift less than 100 cycles

CALIBRATION: Built-in 100 kc marker
AUDIO CHARACTERISTICS: 200-3100 cps

MIKE INPUT: High impedance
VOX: Built-in
LEVEL: Automatic level control
METERING: Screen, plate, and grid current, plus RF output
RF OUTPUT: 52 ohms
VFO's: Dual VFO's permit transmitting on the receive or any other frequency
CONTROLS: Vox, Qt, ALC, Grid Tuning, Plate Tuning, Antenna Loading, Audio Gain, Band Switch, Meter Switch

RECEIVER

SENSITIVITY: 1 microvolt for 6 db S/N
SELECTIVITY: 3.1 kc mechanical filter plus a T-notch filter
STABILITY: Drift less than 100 cycles from a cold start at room ambient
TUNING KNOBS: Coarse gear ratio of 20:1, fine gear ratio of 100:1 gives a 1 kc dial reading per division
CALIBRATION: Built-in 100 kc marker
IMAGE AND IF REJECTION: Better than 50 db
AUDIO DETECTOR: Balanced detector for SSB and CW, diode detector for AM
MODE SWITCH: Selects up or low SSB, or up low AM, or CW
DUAL RECEPTION: Two VFO's permit reception of any two frequencies on one band with the flick of-a switch
BFO: Crystal controlled
METERING: S-meter
CONTROLS: T-notch filter, audio gain, RF gain, antenna trimming, tune selector, phone jack, tune A and B

"The COSMOPHONE 1000"—a complete Station, Receiver, and Transmitter. Dimensions: 17 inches wide, 12 inches high, and 15 inches deep. Power Supplies packaged separately, can be placed under operating desk. Price: "The COSMOPHONE 1000" with Power Supplies...\$1,550.00.

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CITIZEN BAND-CLASS "D" CRYSTALS

All 22 Frequencies in Stock
3rd overtone. .005% tolerance—to meet all F.C.C. requirements. Hermetically sealed HC6/U holders. 1/2" pin spacing—.050 pins. 1.093 pins available, add 15¢ per crystal.

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The following Class "D" Citizen Band frequencies in stock (frequencies listed in megacycles): 26.965, 26.975, 26.985, 27.005, 27.015, 27.025, 27.035, 27.055, 27.065, 27.075, 27.085, 27.105, 27.115, 27.125, 27.135, 27.155, 27.165, 27.175, 27.185, 27.205, 27.215, 27.225.

Matched crystal sets for Globe, Gonset, Citi-Fone and Hallcrafters Units . . . \$5.90 per set. Specify equipment make.

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In stock for immediate delivery (frequencies listed in megacycles) sealed crystals 26.995, 27.045, 27.095, 27.145, 27.195, 27.255, tolerance .005% . . . 1/2" pin spacing . . . pin diameter .05 (1.093 pin diameter, add 15¢) . . . **\$2.95 ea.**

FUNDAMENTAL FREQ. SEALED CRYSTALS

in HC6/U holders
From 1400 KC to 4000 KC. .005% Tolerance. **\$4.95 ea.**
From 4000 KC to 15,000 KC any frequency
.005% Tolerance. **\$3.50 ea.**

SEALED OVERTONE CRYSTALS

Supplied in metal HC6/U holders
Pin spacing .486, diameter .050
15 to 30 MC .005 Tolerance. **\$3.85 ea.**
30 to 45 MC .005 Tolerance. **\$4.10 ea.**
45 to 60 MC .005 Tolerance. **\$4.50 ea.**



QUARTZ CRYSTALS FOR EVERY SERVICE

All crystals made from Grade "A" imported quartz—ground and etched to exact frequencies. Unconditionally guaranteed! Supplied in:

FT-243 holders MC-7 holders DC-34 holders FT-171 holders
Pin spacing 1/2" Pin spacing 3/4" Pin spacing 3/4" Pin spacing 3/4"
Pin diameter Pin diameter Pin diameter Banana pins
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1001 KC to 2600 KC:
.01% Tolerance. **\$2.00 ea.**
.005% Tolerance. **\$2.75 ea.**
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.005% Tolerance. **\$2.50 ea.**
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.01% Tolerance . . . **\$1.50 ea.**—80 meters (3701-3749 KC), 40 meters (7152-7198 KC), 15 meters (7034-7082 KC), 6 meters (8335-8650 KC) within 1 KC
FT-241 lattice Crystals in all frequencies from 370 KC to 540 KC (all except 455 KC and 500 KC) **50¢ ea.**
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missing only North Dakota. K2PNK passed the General Class exam and is on the air with a Globe Chief and an HQ-100. New officers of the Saurice RC are: W2BQI, pres.; W2MIB, vice-pres.; W2ISS, secy.; and K2GQA, treas. A new HQ-170 is in use at City College ARC. W2HJ, Ex-K2JHN, now signing KH6DNY, sends regards to the NYC-LI gang. K2DNL 6 and his XYL, K2ZOY/6, also send regards from Berkeley. WA2GAB is working c.w. on 144 Mc. WY2IKN is on the air with a DX-35 and an SX-99. A TBS-50D and an HQ-110 are in use at WA2RWT. Traffic: (Dec.) W2KEB 4370, K2SJP 357, W2FW 346, K2UBG 246, W2WFL 230, WA2BQK 194, W2JGV 151, W2VDT 141, K2DEAM 111, K2YQK 107, W2OME 90, W2BO 81, W2GPF 65, W2JHQ 60, WA2BST 55, K2JHW 48, WA2CZG 45, K2JVB 42, WA2GSE 40, WA2GPT 35, W2TUK 34, WA2JHEU 28, K2UAG 28, W2UAL 26, K2GCE 25, K2CMJ 24, W2AEE 22, K2IRS 22, K2BH 18, K2UT 17, K2AAW 16, K2PTS 15, W2LDC 14, W2EC 12, K2KVL 12, K2AZT 7, W2PF 7, K2AEM 6, W2SEU 6, WA2HWT 5, W2HNG 5, K2VDR 5, W2ZRA 5, K2OFD 4, K2PJJ 3, WA2DZX 2, W4IQG/2, WA2BVH 1, K2GB 1. (Nov.) K2UBG 165, WA2BQK 164, K2MIG 56, K2IRBW 16, W2IAG 12, WY2DXH 7, W2EC 7, W2DRD 2. (Oct.) K2UBG 112. (Sept.) K2UBG 102.

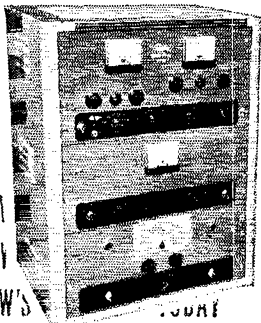
NORTHERN NEW JERSEY—SCM, Edward Hart, jr., W2VWV—SEC; WA2APY, RAIs; W2AIDE and W2RXL, PAAls; K2KVR, W2REH and K2SLG, NJN, 3695 kc. daily at 1900, held 31 sessions with an attendance of 623 and handled 667 messages. NJ Phone Net, 3900 kc. at 1800 daily, except Sun. at 0900, held 31 sessions, with an attendance of 593 and handled 175 messages. N.J. 6 and 2, Wed. and Sat. at 2300 on 51.15 Mc. held 11 sessions, had an attendance of 171 and handled 52 messages. W2ZK, of Oceanport, left Jan. 12 for 3 months in the Antarctic. He will be on 14,260 kc. from KC4USG at midnight EST for contacts. K2LXJ, is having fun on 75 meters with a 10-watter. WA2EBZ says "Ugh! What a call!" He used to be W1RWS, W2LRO spent time fixing a TBS-501D. W2FSL has been sending code practice. K2PTI was off because of homework. The first report was received from mother/daughter combination WA2AKM and WA2GIV. W2VWZ is having trouble with chirp. K2CBG has just completed a Heath Seneca to be operated by himself and jr. operator K2MGC. W2NIY has been working ex-New Jersey hams after they move away and picks up a little traffic that way. K2AGJ has a 32S-1 and a 75S-1. Santa brought WA2EJZ an SX-100. K2VYL and K2ZHK made RPL, ZHK the hard way. W2BVE is building RTTY. W9LL/2 and W9VWRQ (now WA2JHC) are new arrivals near Dover. W2REH had trouble with everything! K2UCY, another BPLer, originated 91 Holiday Greetings to G.I.s. one of which went to a P.O.W. behind the iron curtain via A.P.O., Alaska. W2VMX was promoted from captain to major in the C.A.P. W2AZZ still is using the 20A on c.w. and doing fine. K2PVH sold his 2-meter gear and now is stuck on the low d.e. bands. K2MFX has a homebrew 100-watter on 2 meters. We need ECs. If you can help, please write to WA2APY and he will forward information. Traffic: (Dec.) K2ZHK 678, K2UCY 364, WA2COO 270, W2RXL 250, W2CQB 155, W2VWV 148, K2VYL 129, K2VNL 117, W2BVE 103, W2ANG 98, K2MFF 84, K2LWQ 67, W2ZCH 60, W2EBZ 55, W2BSC 30, W2RZO 29, K2PVH 23, WA2AKM 24, WA2EJZ 21, W2BRC 21, K2OGD 21, W2CVW 18, W2DRV 12, K2BWC 16, W2ADE 15, K2LXL 13, K2CBG 12, WA2EBZ 12, K2SLG 12, W2OXI, H, K2JTU 10, WA2CCF 8, W2NIY 8, K2MFX 7, K2KVR 6, W2CPR 5, WA2GIV 2, W2REH 2. (Nov.) K2SLG 22, K2PVH 17, W2AZZ 16, K2LXL 10.

MIDWEST DIVISION

IOWA—SCM, Russell B. Marquis, W0BDR—K0TGO, Creston, has joined Silent Keys. VWF, State RACES Radio Officer, spoke at the Central Iowa Club meeting. K0AFN renewed his EC appointment. APL and FMX are vacationing in Arizona. A new Iowa S.S.B. Net is operating on 3970 kc. at 1900 CST. The Sioux City Amateur Radio Club and Tri-State Club have merged. KJN is now on s.s.b. K0RTF reports hearing several good 2-meter openings in December and is working on a 2-meter walkie-talkie. K0EME is a new TLON member. K0DQI has a new 450-watt rig and is working some new DX. NGS expects to be on s.s.b. soon with a CE 20-A driving his Johnson 500. The first traffic report received from BTL is for a BPL. K0PIV is on leave from military service. Because of recent legislation Iowa amateurs are now permitted to display their call signs in place of their regular car license plates. NGS reports 1490 QNS and 268 messages handled for the 75-Meter Phone Net for December. BTX reports 707 QNS and 52 messages handled for the 160-Meter Phone Net. The TLON also reports the best month of the year. Traffic: (Dec.) W0BDR 4184, LGG 2977, LCX 2497, SCA 2322, BTL 577, NGS 100, NTB 73, QVA 64, VWF 57, K0MIMS (Continued on page 134)

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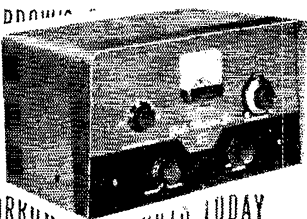
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GLOBE KING 500C

A completely bandswitching, 10-160M transmitter for 540w AM and CW, 700w max. on SSB (PEP) with any 15-20w external exciter. Has built-in antenna relay, VFO, and separate power supply for modulator. Commercial type compression circuit. Grid block keying for signal clarity. Pi-Net matches most antennas 52-300 ohms. Optional crystal operation. 31x22x14 1/2" cabinet designed for TVI-suppression. Net: \$795.00.

GLOBE'S 6-METER CONVERTER

For Fixed Station or Mobile Use Improved circuit for higher gain; better signal-to-noise ratio • Completely shielded. • Highly stable, crystal controlled oscillator. • Printed circuit for ease in kit assembly. • For most receivers on market today; B plus requirements 150-250v at 15-18Ma. Provisions for changing filaments for 6 or 12v operations. • Only 3x5 1/2x4 1/4"; complete with tubes and cable. Available: 6PMC-1 for 10-14Mc; 6PMC2 for 600-1600Kc. Wired: \$29.95. Kit: \$21.95.



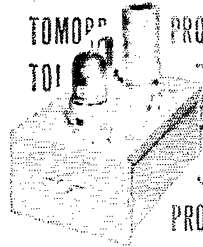
GLOBE MATCHER SR. ANTENNA TUNER AT-4

Combination tuner with built-in SWR Bridge. Handles any Xmtr. with final RF input power up to 600w, 80-10M. Fixed link coupling in output circuit. Coax input. 2-wire balanced output. Built-in switch allows bypass of tuner circuits for coax input and output. SWR Bridge constantly in circuit. Wired, \$79.50. In kit form, \$69.50.

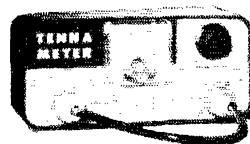
GLOBE TENNA-METER TM-1

The Model TM-1 Tenna-Meter is designed specifically for metering antenna current, tuning Citizen Band transceivers and amateur transmitters for max. power radiation from antennas. Built-in tuning meter and sensitivity control. Determines whether antenna is performing properly, is properly matched. Easy to use by technician or amateur, it is housed in rugged, compact (2 3/4" x 2 1/2" x 5 3/4") steel case. Only \$15.95.

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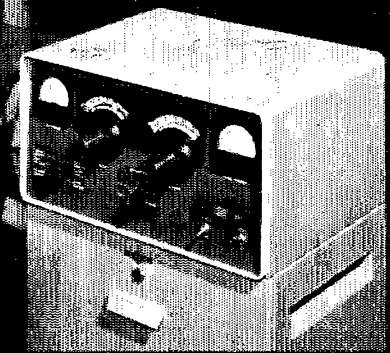
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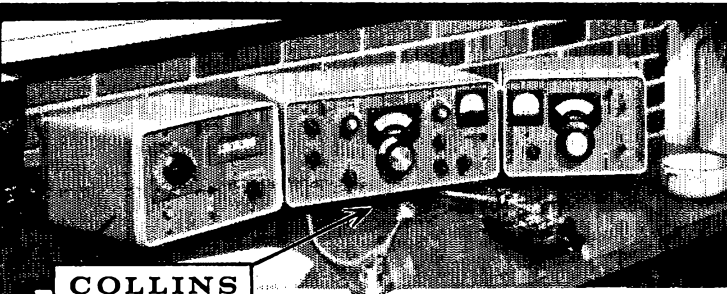
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1. 516F-2 AC Power Supply (\$105.00) with SC-301 Antenna Control Console (price not yet announced).
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49. QAI 39, W0NYX 38, KEFA A 32, W4PRTX 35, K4RTPT 22, W4BP19, K4GBD 16, H3C 10, W4TONX 16, K4K5L 13, W4BEG 12, K4M1 12, K4HLD 9, W4UTXD 9, K4MNS 8, K4Q8, W4BTR 8, K4BIB 6, J4P 6, G4I 6, W4HTF 6, K4BDN 6, W4TVD 6, K4SEW 5, W4QZ 5, K4GQA 3, K4MZ 2, Q4V 2, W4P1L 3, K4JCC 2, K4B 2, W4NSY 3, K4HIC 3.

KANSAS—SCM: Raymond E. Baker, W4FNS—SEC: JFR, Asst. SEC: LOV, NMI: Q4G, PAM: VZAL, V4HF, PAM: HAJ, K4NNW, EC Zone 10, organizes his emergency net meeting each Tue. at 1730, 3920 kc. AHEC training, BYY is improving and hopes to be more active as OO. LNZ is the new president of the W4ARC. The Wichita Club is starting a 6-meter project building converters and transmitters. A4GIC is active on 6 meters but couldn't make contacts because of high time noise. I4AT, formerly NCS of QNS, was heard from his new QTH at Emporia. W4BHRG, ex-4B0T is visiting with Dad, Q4G. K4JF found time to work some nice DX on 15 meters as well as help handle the QNS Net. We received a copy of the log publication of the P4IARC, which had its 5th anniversary with LCD as editor. PKD is the new president of the C4RC. H4N's new QTH is Salina. K4BHX is soon to become a guest of Uncle Sam. Cliff is one of our hardest workers and we certainly are going to miss him. S4F again is very active on QNS and 10 meters, having gotten most of his building done. My thanks to all section members. L4s and all for your help this past year and may we again lean on you in 1960. Traffic: (Dec.) W4OUJ 1382, B4I 921, FNS 423, Q4G 232, S4F 217, ABJ 216, SYZ 215, K4VOA 189, H4N 174, W4BRL 153, K4NZX 110, W4UTO 107, TOL 90, ORB 72, S4HR 57, W4VZM 54, IFR 32, K4QWV 27, W4WFD 25, H4LHF 23, S4IG 17, T4NV 17, G4G 16, W4GJG 14, K4WCG 12, W4P4D 7, K4M4X 7, W4STC 7, K4M4Z 7, K4M4D 4, W4NSY 3, K4OOB 3, E4T 2, W4LOW 1, (Nov.) K4MVX 49, I4L 46, J4D 12, W4P4D 5, K4M4R 5, W4G 3.

MISSOURI—SCM: C. O. Gosch, W4BUT1—Net reports: A4ON (3580 kc., 1900 CST A1-S) 27 sessions; Q4C 307; Q4I 183, NCS, Q4UD 6, K4RONK 5, K4BL4 4, K4KIBD 3, K4OQO, RTW 1 each, S4IN (3580 kc. 1600 CST Sun.) 4 sessions; Q4C 23; Q4I 16, NCS, Q4UD 3, K4RONK 1, A4EN (3885 kc., 1800 CST, M.W.F.) 13 sessions; Q4C 156; Q4I 407; NCS, Q4IC 2, Q4V 2, Q4W 2, VPQ 2, RTW, recorder for A4ON and S4IN, reports the traffic total was tripled in December. The net meets more stations north of the Missouri River and in the southeastern part of the State. Q4C has added a pre-selector ahead of the receiver. Q4C has a new electronic keyer. LGZ reports increased activity on 144 Mc. in Pulaski County. W4YL, one of our most active Q4s, has a new job as brasspounder for the St. Louis Police Dept. S4J has a new transmitter, receiver and antenna. H4M is attending Kansas U. but managed to get home to enter the SS, DBW reports that a "Worked all Pulaski County Award" is available. Those interested should contact him. G4L reports activity on A-1 emission. B4Q reports activity on 6 meters. Several stations in the section are becoming active on RTTY. Among those reporting such activity are Q4MI, I4W, F4Y, L4P, AH and K4V. Q4MI received his 5000 "Trailblazers certificate. P4F reports receipt of his W4C certificate. Thanks and appreciation are extended to all clubs that sent copies of their publications during the year. If your club hasn't been mentioned in this column, send a copy of its publication, or a card or letter to the SCM. New officers of the SYMARC (Springfield) are BUB, pres.; L4P, vice-pres.; G4I, secy.; AH, treas.; L4J, treas. Appointments: Corrections: K4P4P as ORS, K4H4Y as QPS, New: LGZ as OO, Endorsements: K4B and K4K as ORSs; H4U as EC, Traffic: (Dec.) K4OONK 922, L4J 683, K4BD 654, L4P 265, S4J 329, Q4C 291, B4I 259, W4BKX 219, K4O4C 134, W4B4V 120, Z4BR 117, Q4UD 103, A4O 98, VPQ 83, Q4V 43, B4L 10, K4H4Y 35, W4O4NI 32, RTW 31, K4P4P 29, O4P 14, LGZ 8, W4P4E 8, W4P 8, A4NH 7, G4I 4, Q4M 4, K4LVX 163, W4G4E 2, (Nov.) K4H4O 4, W4G4E 1.

NEBRASKA—SCM: Charles E. McNeer, W4EXR—The Western Nebraska Net, on 3890 kc. starts with N4E as NC, reports Q4I 645, Q4C 483, a total Q4I for 1959 was 7650, Q4C 9172, total 314 sessions, held and 100 per cent reporting. K4B4Q, K4V4C, D4V, B4BLU, G4G, K4B4O and K4M4E for December. During 1959 K4B4Q and D4V missed only 3 sessions. The Nebraska 75-Meter Emergency Home Net, ZOU, reports Q4I 440, Q4C 41, G4X and K4SEK are new members. N4S reports the new net on 2000 meters has very good state coverage and meets at 2000 CST Monday, Tue., Thurs. and Fri. on 1920 kc. N4U reports the Nebraska Section C.W. Net had 30 sessions, Q4I 240, Q4C 230, K4A has been missed from the main bands after slipping a heat stack but is doing nicely and will be heard soon. K4N4U4 is now using a new linear amplifier. ZOU is building a

(Continued on page 150)

20 db GAIN

- over precipitation static!

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Unity-Gain
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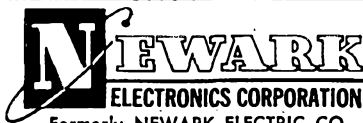
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new higher-power mobile rig. Some net and individual reports were not received in time for this report. Please have these reports in by the 6th of the month. Traffic: (Dec.) W0GGP 595, NYU 560, RDN 321, K6JHW 282, W0ZJF 176, K0QFK 150, RRL 112, CDG 85, BDF 84, W0NIK 79, K0KUA 53, BR5 43, W0CUC 42, K0CYN 40, DFO 39, K7Z 32, ELQ 31, MZV 30, W0VZJ 28, K00AL 27, URP 27, MRS 25, W0RSAL 25, K0ULQ 25, W0BOQ 24, K0SCM 23, W0ZOU 23, K0MISS 22, DAV 20, W0VEA 18, K0LXS 17, W0KDW 16, K0TUB 15, ELU 14, ODF 12, W0YFR 12, OKO 11, K0KJL 9, W0LJO 7, ZWG 6, K0KJP 4, W0WKP 2. (Nov.) K0MRS 14.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Victor L. Crawford, W1TYQ —EPW, HJG and OBR made KPL, VW handled considerable holiday traffic on MARS. KICAK has finished his new transmitter, BFS built a Commanche receiver, FYF enjoyed the holidays home from school, GVJ is building a 2-meter rig using a 2E26 final, BDI enjoyed some 2-meter work in Boston. ROX still has trouble with his 1DX-100, MDB was elected Asst. Alternate Director and secretary of the 1st call area TCPN, DHP is now a reporter for the *Williamite Chronicle*, NJM has added dual operating positions, KIGCS has been awarded the W-Conn. Award, FOM has a pair of 6146s and a twelve-element co-linear on 2 meters, KIMOT, from W2-Land, is on from Noroton with a DX-20, YBH reports that CPN met 31 times during December, handled 544 messages, and had an average daily attendance of 27 stations. High QNI goes to VQH, 30; TVU, 29, DAV, 28; HIG, MWB, YHH, 27; FHP, 26; KIAQE, 25. HCZ has a 4-65A on 6 meters, FHP lost his 44-element 2-meter beam during an ice storm, WHL is on 6 meters using an 829, ODG was given a silver engraved key and life membership to CQRC at its Annual Christmas Party, YOG has moved to New York State, Santa left KIEJS the Collins S/Line, KYQ advises that CN handled 501 messages during 31 early sessions, plus 172 messages during 24 late sessions. Average attendance was 13 on the early and 4 on the late. High QNI goes to OBR, RFJ and KIHAN, DNJ has a new Pacemaker to go with his Thunderbolt, ZIQ lost the final to his Globe King, ZZK is driving his Johnson KW with a 20A, BTU is arranging another contest between the Southington ARA and the VP9 Radio Club, MFB added an XYL, MEX is active on s.s.b, GVZ has a new NC-109 receiver, WHL reports the Conn. 6-Meter Net handled 12 messages during December, PYY left for Ice Station Charlie Jan. 8, KQW has a new Hi-Bander on 2 and 6 meters, AXV's new Tribander beam blew down, NDN added 60 countries with a new three-element beam on a 65-ft. tower, KIHOP wants to try s.s.b. KIHMU, now attending Yale, has a pair of 4X150As on 2 meters, FHP advises that CVN handled 134 messages during 12 sessions with 84 stations checking in. High QNI goes to HJG, 11; KNIKEA, KNIKGI, FHP, 10. KIITW will spend five months in Holland as a 4H exchange student, KIBCI has a new Apache, TYQ is a new OO. The CQRC had 76 stations check in their 5 "on-the-air" meetings. Appointments renewed: KICAK and FYF as OPSS, EJJ and PRT as ECs. Reports received: OES from FOM and PYY; OO from KIEFI, TYQ, and VW. Traffic: WIOBR 877, EFW 559, OQC 476, AW 394, NJM 383, YBH 382, KIWCM 378, WIFHP 264, KYQ 230, CHR 208, KIHAN 177, WIQJM 168, KIAAE 145, HWF 136, WIRFJ 122, HJG 115, YU 105, KIJAD 100, WIMWB 90, KIDKG 85, W1TYQ 85, MDB 48, CJD 45, VY 44, ROX 43, KIHOO 42, AQE 40, CBV 40, WIVOV 38, BDI 31, GVJ 18, CUH 14, KIBSB 8, WIEJH 8, KIHOP 6, KNIKRY 6, WIFYF 6, BFS 5. (Nov.) WIQJM 75.

MAINE—SCM, Jeffrey I. Weinstein, W1JMN—SEC: JMN, PAM; BXI, RM; EFR, The Sea Gull Net meets Mon. through Sat. at 1700 on 3940 kc.; the Pine Tree Mon. through Fri. at 1900 on 3596 kc. New appointments: KFY as EC. A committee, headed by KIGUC, has been formed to assist your SCM in spear-heading a drive for call letter license plates which will come to a climax during the first part of 1961. I know that this is of particular importance to everyone in amateur radio and, therefore, should not need an extreme amount of stress to obtain the cooperation of every amateur in the State of Maine. If you would like to exercise your part in bringing call letter plates to Maine, write your SCM for information and details. The PAWA recently elected JRM, pres.; KIBAY, vice-pres.; KIAOX, secy., BTR, treas.; KIDPM, chief op.; KIUU, asst. chief op. JMN was appointed as program committee chairman. GKJ has 90 watts on 2 and 6 meters. The AREC in Maine is in full swing. If you have not yet joined, you're not doing your part in PICON. Applications are available from your SCM-SEC on request. Congrats to LER (OO) for his accurate measurements in the November

(Continued on page 138)

NEW CRANK-OVER ANTENNA HEAD

NOW from VESTO!

**PLUS HURRICANE-PROOF
CONSTRUCTION! NO GUY WIRES!**



Vesto 60-ft. Tower supporting
Telrex Model TBS-416 Beam
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TILTS HEAVIEST BEAMS TO ANY ANGLE!

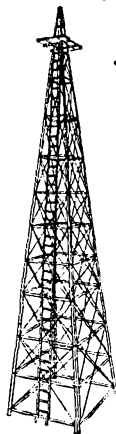
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makes it easy to work on any part of the beam!

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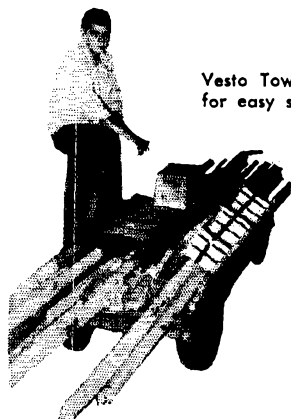
Send for Vesto's FREE literature showing how
easy these towers are to assemble and erect.

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Hot-dip Galvanized after punching and cutting,
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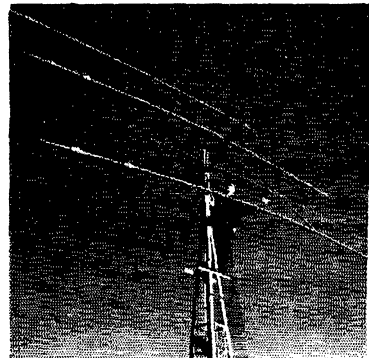


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22 to
100 ft.

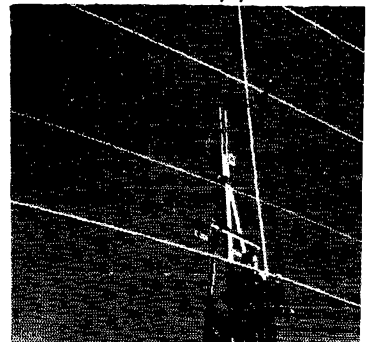


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Beam can easily be cranked
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Even outmost portion of beam
is readily accessible.

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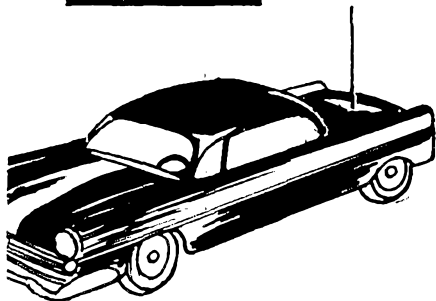
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New **normal mode
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Now — an efficient distributed-load antenna built into a Shakespeare Wonderod! You can mount this shortened antenna on trunk or fender . . . where radiation pattern is best. Superior Shakespeare fiberglass construction, using high grade dielectric materials to reduce power loss.

Style	62-1	62-2	62-3	62-4	62-5	62-6	62-7
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Approx. Length	4'	4'	4'	4'	6'	6'	6'
Price	15.90			18.75			

Special 40 & 80 meter bumper mount antennas in 8' lengths — \$21.

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STATE OF MAINE QSO PARTY

March 26-27

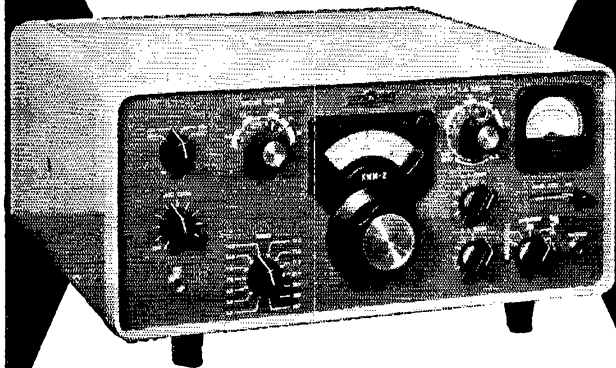
The Portland Amateur Wireless Association, in cooperation with the SCM, announces a State of Maine QSO Party in which all amateurs are invited to participate.

Rules: 1) Time of contest 6 P.M. EST March 26 to 11:59 P.M. EST March 27. 2) Suggested congregating frequencies are 3600, 3940, 7025, 7250, 14050, 21075, and 28100 kc., and 50 and 144 Mc. 3) The same station may be worked for additional credit on more than one band. Phone and c.w. are separate contests, requiring separate log entries. 4) General calls "CQ ME" on c.w. and "CQ Maine QSO Party" on phone. Maine stations identify themselves by signing "DE (call) ME K." Phone stations by "this is (call) in the Maine QSO Party." 5) Contact procedure: Maine stations send QSO number, RS or RST report, QTH, and county. Outside stations send QSO number, RS or RST report, and QTH (state, province, or country). Maine to Maine contacts will not count for score. 6) Scoring: Each completed contact counts 10 points. Outside stations multiply contact points by number of Maine counties worked. Maine stations multiply contact points by the number of states, provinces, and countries worked. Multiply QSO/multiplier points by two (2) if input power remains under 150 watts during the entire Party. 7) Logs must contain date, time, emission, and power input, as well as the prescribed contact information. 8) The Worked All Maine, WAM, certificate will be issued by the PAWA to those who succeed in working all 16 counties in Maine using any or a combination of emissions. In addition, congratulatory letters will be sent by the SCM to the highest scoring station in each state, province, country, and Maine county. 9) Contest logs postmarked no later than April 5, 1960 should be addressed to: QSO Party, c/o Jeffrey I. Weinstein, WIJMN, SCM of Maine, 79 Caleb Street, Portland 4, Maine.



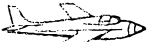
1959 ARRL Frequency Measuring Test (1.1 parts/mil.). JMN's Official Bulletin frequency is 3600 kc. The MASN meets Tue., Thurs. and Sat. at 1730 on 3726 kc. JMN will be on or about 3600 kc. during most of the State of Maine QSO Party. I hope to see everybody joining in on the Jun Mar. 25 and 26! Tralite: (Dec.) WIISO 173, EFR 65, KIHQK 43, WIOTQ 31, KIBDQ 26, DYQ 26, JMB 26, GVQ 21, RZD 15, WIVEH 9, JMN 5, TKE 2. (Nov.) KICJK 5.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, jr. W1ALP—New appointments: RFN as OO, TWG Lexington as EC (also the new Radio Officer). PEX is Alt. R.O. LJS is Radio Officer for Sector 2-B, FJI for 2-A, BCN for 2-C, TZ for 2-D. KXN has retired. KIHVF has his Tech. Class license. How about a report from some of the school and college radio clubs in this section? Heard on 75 meters: LIN, NA, KLO, DBH, SZB, IBY, QME, K1s J1W, DSS, CSO, JCC, WA2CFR/1 Falmouth. Heard on 2 meters: HNK, AKD, FCJ, BVP, K1s BYL, GDR, DTJ, KMN, MCC and KNIKHP. Sorry to have to report the death of PI in Derry, N. H. BGW, WAJ, TZ, KILJK, WK and MNK finished in that order in the Nov. F.A.I.T. The T-9 Radio Club met at RCA's QTH. EED gave a talk and showed a picture "Rescue Breathing" at the QRA. The Braintree Radio Club held a Christmas Party. The North Shore Radio Assn. had Bill Stevens speak on Radio Soudé equipment and showed a film. FZJ spoke at the Framingham Club, on v.h.f. of course. KN1MJY has a DX-40, and RME-84 and an S-38 in Taunton. KICTI and WIPKV have new HQ-170s. TUP is home for a while. KIIWP has an SR-34 transmitter. KN1LLU has a DX-20 and an RME-4350. WAJ says he will be sending code practice later. K1LFA/KN1LFA has a Knight Kit 50-watt c.w. transmitter. Our sympathy to MUD on the death of his father and to K1GYM, who lost his father-in-law. LMZ and K1BRO were on 2 meters during the holidays. OFK is OBS for our Eastern Mass. 2-Meter Net. A license plate bill has been filed by the Cape Cod and Islands ARA. The Winthrop group still is active, per DEL. AHE and a few others are active on 2 meters in the A.M. on the way to work. NKA worked K8AOM, W. Va., and W3LTD, Pa., on 8 meters and up on Mt. Wachusset and had a QSO with K1AVL/M, (Continued on page 140)

HERE IT IS AT HARVEY



THE NEW COLLINS KWM-2 TRANSCEIVER

Distinctive modern styling and easy mobility make the lightweight KWM-2 an attractive unit for the **CAR**  **BOAT**  **AIRPLANE**  or fixed station.

Featuring operation on all bands between 3.4 mc and 30 mc on either voice or CW, the KWM-2 has the quality and performance of the time-proven KWM-1 and famous Collins S/Line.

Filter type SSB generation and crystal-controlled double conversion also are features of the KWM-2, in addition to VOX and speaker anti-trip circuits. ALC keeps the signal adjusted to its rated PEP resulting in an increased average talk power.

The KWM-2 is easily moved between mobile and fixed station installations. For mobile use, the transceiver slides into the mount and the power, antenna, selector and car radio speaker plugs connect automatically. These same four connectors are used in a fixed station installation.

The KWM-2 mobile transceiver transmits on SSB or CW with a nominal output of 100 watts for complete coverage on all amateur bands. Any of fourteen 200 kc segments of the 3.4-30.0 mc frequency range may be utilized except the 5.0-6.5 mc range on transmitting. Other frequencies (such as MARS) outside the amateur bands may be obtained by inserting the proper crystals.

PRICE — \$1095.00

Type/Description	Net Price
516E-1 DC Power Supply	\$262.00
351D-2 Mobile Mount	\$110.00
351E-4 Mounting Tray	\$14.45
516F-2 AC Power Supply	\$105.00
SC-301 Antenna Control Console	TBA
312-B5 Speaker Console	\$333.00
30S-1 Linear Amplifier	\$1470.00
136B-2 Noise Blanker	\$120.00

For complete versatility in either fixed station or mobile use, Harvey has a full line of Collins accessories for the KWM-2.

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26.965 mc to 27.225 mc—3rd Overtone
Herm. Sealed or FT-243 \$3.75

13.4825 mc to 13.6125 mc—2nd Harmonic
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2 Meters { Exam: *8010.6 x 18=144.190
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Exam: *8340 x 6=50040

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Thin-Line FT-243—6 Mel-50 meg. to 52.44 meg. . . . \$1.79
52.45 meg. to 54 meg. \$2.39
2 Meters, 144 meg. to 148 meg. \$1.79
Hermetically Sealed Fund. .01 Tol. \$2.50

NOVICE BAND FT-243 Fund. or DC-34 Freq. \$1.29

80 Met. 3701-3748—Steps of 1 KC. FT-243 or DC-34
40 Met. 7150-7198—Steps of 1 KC. FT-243 only
Dbl. to 40 Met. 3576-3599. Steps of 1 KC. FT-243 or DC-34
15 Met. 5276-5312—7034-7083 Steps of 1 KC. FT-243

4035	5305	5975	6400	4873	7444	7441	7810	8026	8375	8408	3
4045	5335	5995	6405	4875	7473	7450	7820	8032	8380	8410	3
4080	5345	6000	6406A	4900	7475	7453	7825	8040	8383	8416	7
4095	5375	6006	6421	4906	7482	7430	7830	8042	8390	8420	3
4110	5385	6015	6440	4925	7500	7464	7840	8050	8410	8435	3
4145	5397.5	6019	6450	4940	7506	7470	7847.7	8073	8400	8430	3
4190	5437.5	6029	6473	4950	7508	7473.3	7850	8075	8404	8433	3
4215	5450	6032	6475	4973	7510	7475	7853.3	8100	8408	8436	3
4235	5485	6045	6500	4975	7516	7480	7860	8120	8410	8441.7	3
4280	5495	6100	6506	5000	7520	7490	7870	8140	8410	8445	3
4295	5497.5	6104	6521	5006	7522	7490	7873.3	8147	8425	8440	3
4300	5485	6125	6540	5100	7530	7500	7873.3	8147	8425	8440	3
4320	5480	6140	6555	5104	7532	7490	7876	8146	8420	8440	3
4340	5475	6150	6563	5125	7540	7506	7880	8146	8420	8440	3
4395	5487.5	6173	6575	5130	7541	7510	7880	8123	8420	8440	3
4445	5700										3
4490	5704.7										3
4495	5725										3
4525	5730										3
4540	5740										3
4620	5750										3
4635	5760										3
4680	5772										3
4695	5775										3
4710	5782.5										3
4725	5800										3
4780	5806.7										3
4785	5825										3
4815	5840										3
4840	5850										3
4845	5852.5										3
4852.5	5860										3
4880	5875										3
4885	5880										3
4900	5875										3
4910	5890										3
4930	5892.5										3
4950	5900										3
4980	5900										3
4995	5907.5										3
5030	5925										3
5035	5940										3
5090	5950										3
5127.5	5955										3
5165	5973										3

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Conn. K1AII worked 2nd district stations on 8 meters. ZSS is net manager of the Eastern Mass. 2-Meter Net. Ten made BPL in December: K1GRP, MMQ, AWA, UIR, PEX, KIDIO, EMG, NJL, K1BYV and K1JAW. It is good to see fine cooperation between all of our nets, both phone and c.w. KIDIO had a 1/2-hour QSO with K4JSP on 6 meters. K1BYV has a new mike. K1JAW received a certificate for the highest QNI in H.T.N. and has 45 for WAS on 40 meters. K1JCC has a 1-kw. final. AUQ is active again. K1JME has a new mobile rig for 6 meters. K1IXT is joining MARS. K1DJG is going to college and has a new SX-101, a DX-100 and a three-element Tribander. HIC has a new v.f.o. for 6 meters. AQE will be on 8 and 2 meters. LGO was on the Melrose Class B champion football team. Our SEC, AOG, wants to remind all ECs to send him monthly reports. HIC and ANB are working in the u.h.f. and microwave regions. NF still works DX. The Chelmsford Club holds meetings the 2nd Mon. of each month. K1CHB has a new SX-101A receiver. The New England Phone Net will be on 3870 kc. at 9 a.m. Sun. This is for ragchewing and a general get-together for all. LJK has a new Valiant transmitter and Hornet Triband beam. The Texas Tower Net meets on 3935 kc. at 1230. TZ is on 8 meters and has a new 50-ft. tower. He is busy as Radio Officer for Sector 2-D. WU was away for a month. BW lost his pole and K1BUR lost his tower in a bad wind storm. UIR's chimney went through the roof. DBY says his XYL, KNMIGP, is not too well. K1DNG is going to college in Boston and is on the air. KH6LJ/1 visited RCQ. K1DNG finished installing a kw. all-band transmitter donated by NWO at K1LMM. K1MMQ is a new OPS. K1JOV and K1K1QC/1 are on 2 meters. Appointments endorsed: WAJ as OO, BHD and K1IWP as OESS, BHD and LMZ as OBSS, K1AQI Burlington as EC, K1BYV is a new ORS. K1KCG is back on the air. Traffic: (Dec.) W1AWA 1523, K1GRP 1288, MMQ 875, W1UIR 805, PEX 766, K1DIO 525, W1EAG 523, EAE 321, NJL 261, K1BYV 254, W1OFK 202, ZSS 198, K1JAW 171, BYL 117, JCC 112, W1AUQ 111, K1BGK 77, W1KLO/ADL 72, K1JME 59, W1CZW 54, SIV 54, K1GVR 48, W1AKN 46, K1CMS 45, M1HM 41, MHC 40, W1TWW 35, K1DTJ 32, W1AOG 31, QPU 31, K1LLX 28, W1TY 28, K1DNG 26, W1GEB 26, K1LCO 22, IXT 21, W1NKA 18, RQL 17, K1EJW 15, JML 13, DJG 11, GYM 10, W1TZ 8, HIC 7, LMZ 6. (Nov.) K1LXT 13, W1LGO 8.

WESTERN MASSACHUSETTS—SCM. Percy C. Noble, W1BVR—SEC: BYH, RM: DVW, PAM: DNX. WMN meets on 3560 kc. at 7 p.m. Mon. through Sat. MPN meets on 3870 kc. at 6 p.m. daily. MPN daily averages: 16.32 stations, 15.52 messages handled, \$2.84 minutes. West. Mass. areas covered on WMIN out of 25 sessions reported: Springfield 24, Pittsfield 21, Worcester 10, North Central 19. WMIN now is set up with a different NCS each night in the week, thus spreading the load nicely. BVR spent a most enjoyable Christmas at the RM's new home, 69 Van Meter Drive, RFD #3, Amherst. BYH made BPL on originations plus deliveries. QJB has replaced ICW as C.D. Area 4 Itadio Officer. Sincere thanks to ICW for his splendid work over the past 5 years! K1ICM is active on 6 and 2 meters. ZPB is adding many refinements to both the receiver and transmitter. WEF has a new antenna, a new v.f.o. and a new keying system. MHS is active in the Boston Region Post Office Net, MPN and TCPN. The New England Emergency Phone Net has been reactivated and is meeting on 3870 kc. Sun. at 10 a.m. DGA has now worked 41 states on 50 Mc. LVQ, of ARRL Ha., was the December speaker at the Berkshire County ARA. UEY is active on 50 Mc. with both c.w. and phone. K1JGW has a new Hornet beam and an Apache. DPY showed pictures of his Costa Rican banana boat trip at the December meeting of the Pittsfield Radio Club. WF and AZW worked a rare one—Z86P/Z58 at Basuto-land. BKG has a new electronic key. At the Montachusett Radio Club, Rev. Bonifazzi, VQ3RJB, presented a most interesting talk on his experiences in Tanganyika, Africa. K1BBV has a new Valiant. NEV bought his wife some nice Christmas gifts—a 2-meter Gonset and a D-104 mike! K1KED has a new rotator for his 10-meter beam. QKX has a new shack and is operating all bands with his Viking II. BVR now has a Heath Citizen Band transceiver—revamped for 10 meters—in his car. Traffic: W1DXS 531, ZPB 282, BVR 237, MHS 210, BYH 182, K1GCV 113, W1IPN 101, DVW 93, K1LJV 92, LBB 44, W1AGM 42, K1ICM 30, JDC 20, W1WEF 2.

NEW HAMPSHIRE—SCM. Robert H. Wright, W1RMH—RMs: K1BCS and K1IKK, PAM: HJ, V.H.F. PAM: TA. The GSPN meets at 1900 Mon. through Sat. and at 0930 Sun. on 3845 kc. The NHN (c.w.) meets nightly at 1830 on 3685 kc. The northeast V.H.F. Net meets daily at 1930 on 145.8 Mc. The Concord Brass-pounders will sponsor another annual N. H. QSO Party some time in April. Details later. New officers of the Concord Brasspounders are TNO, pres.; TDJ, vice-
(Continued on page 142)

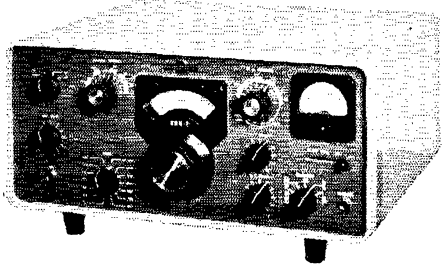
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pres.; CVB, secy.-treas. On Dec. 21 the GSPN conducted its annual Santa Claus program for the children of net members, with ONT as master of ceremonies. ARR is stationed in Spain with the Air Force and GVL is attending A.F. school in Colorado. The Manchester Radio Club conducts code and theory classes every Tue. at 1900 at the County Courthouse in Manchester. K1JDN received 268 DX cards at once from the QSL Bureau; representing 116 countries. The Manchester Emergency Nets meet at 1900 on Fri. on 29, 30.4 and 145.1 Mc. All comers are welcome. Traffic: (Dec.) K1PDP 1724, BCS 1503, CIF 844, HK 305, W1EVN 25, CUE 21, CVB 17, K1JDN 17, W1IQ 15, K1DKD 9, CSJ 6, MID 6. (Nov.) K1MID 6, W1AJJ 3, K1CIG 2.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: PAZ, RM; SMU, PAM; YRC. New appointees are SMU as RM and ESK as EC. Westerly Area. Endorsements: LUO Middletown, VSZ North Providence, BBN Portsmouth, ISE Warren, BTV Cranston as ECs. The Newport County Radio Club announces that for the first time in its history a YL has been elected president. K1CUY, who is a lieutenant in the WAVES, received the honor of being the first YL president. Other officers are DPY, vice-pres.; LRR, treas.; MICW, rec. secy.; Phil Gaudet, sr., corr. secy. Officers were installed Jan 11 with Rev. Burdick of the Seaman's Institute as the Installing Officer. The NCRC also announced that its QSO Party will be held Mar. 20, 1960, from 1100 to 1700 EST on all bands. The RIN reported total traffic of 311 and R1SPN reported total traffic of 53. Reports were received from GR (OO), SMU (RIN) and YRC (R1SPN). The Associated Radio Amateurs of Southern N. E., AQ, announced the election of the following officers for 1960: K1BDN, pres.; LXX, vice-pres.; BBK, secy.; JZL, treas. Traffic: W1SMU 1245, K1LSM 1000, W1TXL 176, K1BBB 160, W1CMI 71, VBR 43, YRC 29, K1AAV 13, W1WED 9.

VERMONT—SCM, Harry A. Preston, jr. W1VSA—SEC: EIB, RM; K1BGC, PAM; HRG. Vermont frequencies: C.w., 3.520; phone, 3855; R'TTY 3820. Nets: C.w., M-W-F at 1830; VEPN, Sun. at 1730; VTPN, Sun. at 0900; GMIN, Mon.—Sat. at 1730. A Central Vermont Amateur Radio Club meeting was attended recently by the SCM, SEC and PAM. A large and impressive group was on hand. KIAUE gave a technical talk on modulation. The Middlebury Mike and Key Club gave an interesting demonstration recently on the location and plotting with maps of a hidden transmitter. KIAUE, HRG, K1IRH, K1KSS and WOD all have new Valiants. K1GBF has now made BPL twice in a row. The Vermont Phone Net is relaxing the emphasis on traffic and expressing a desire to have all stations check-in on Sun. morning with comments. The Vt. Emergency Phone Net invites emergency-minded amateurs to join in Sun. for the discussions. 3TSG is looking for counties in Vermont on the VTN at 1830E. OK1IB is looking for Vermont on 10 meters on 28.1-Mc. c.w. Your SCM will be looking for the gang at the Mar. 19 meeting of the CVARC in Barre. NOL has dropped the "N." Traffic: W1OAK 389, K1GBF 275, W1KRV 197, K1HMQ 120, V2AZI/W1 108, W1HRG 71, ELJ 55, K1JG 39, K1KVN 31, W1E1B 20, FPS 14, K1BKH 4.

NORTHWESTERN DIVISION

ALASKA—Acting SCM, Kenneth E. Koestler, K1YBZO—The Anchorage Radio Club held its Annual Christmas Dinner Dec. 12 at the Anchorage High School. Some of the guests were CFW, Art Zylstra, formerly HCRIZ from Ecuador, soon to be a K1Z, BEC, from Katzebue, and Gordon Nelson, from California. The Amateur Radio Club elected BK, pres.; ANG, his XYL, secy.; CAH, vice-pres.; CEJ, treas. and CNR, act. mgr. MF has 165 countries confirmed. We hope our very dear friend Pappy will be back with us soon after a speedy recovery from his recent illness. We wish to congratulate MZ and ALZ on their fine work recently when a small plane was lost in Alaska and landed safely at Haines. The pilot's wife in California could get no results from long-distance calls. Finally through K8MTC in California she was kept informed of the search and 10 minutes after word was received at Elmendorf Air Force Base that he was found safe. Geri and Nick relayed the message to his wife. This is a fine example of what amateur radio operators can do when necessary.

IDAHO—SCM, Mrs. Helen M. Maillet, W7GGV—New EC appointees are J1A, Driggs, and EVP, Salmon. Honors for the greatest number of check-ins on the morning c.d. nets go to HNG, VQC and K7BWV in District 4, and K7GHX and K7ARJ in District 1. District 6 is getting set up on 5-watt transceivers for a net on 10 meters. WDK and EEQ are communications officers for the Women's Councils of C.D. in their counties. Reports of new gear come from K7IMB, an HQ-160; GCO, an HQ-180; K7GNS, an NC-300; K7ENE, an SX-101; DWE, Heatkit mobile twins; EYR, an Elmac

(Continued on page 144)

JIM HATH WROUGHT A MIGHTY FB KEYER!

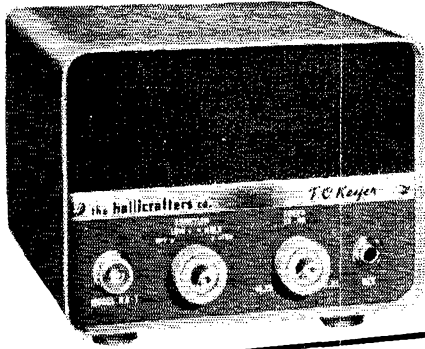
(See Page 91, January QST)

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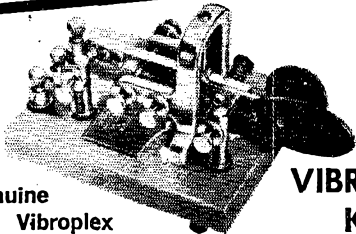
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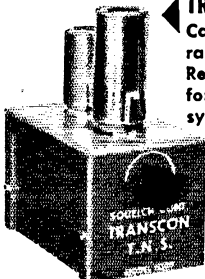
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mobile transmitter; DTK, a home-brew transmitter working FB all bands. GMC has built several switches as per a QST article, June '57. The bug bit K7CVB's dad and he is now K7KRO. BQY and K7BQB moved to Utah. Farm Net traffic: 84. Traffic: W7GMC 134, VQC 55, K7GHG 51, BWV 50, AYU 48, W7EEQ 23, GGV 19, DWE 6, K7GHX 5, W7EAMT 4, K7ENE 2.

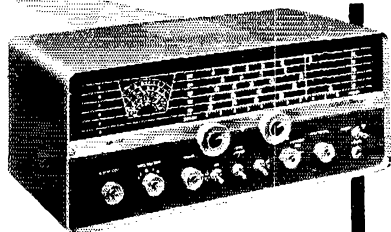
MONTANA—SCM, Vernon L. Phillips, W7NPV/-WXI—SEC: KUH. PAM: EOI. RM: KGG. MPN meets M-W-F at 1800 on 3910 kc. MSN meets T-T-S at 1830 on 3530 kc. About 100 amateurs participated in Montana QSO Day, Dec. 6. OGT and VLZ got married. K7CCZ has a new jr. operator. JPD and OSW have a new baby girl. CJB and EGN worked on 6 meters across 135 miles of rugged mountains. KJX repaired LOD's receiver. New calls: K7JXM Fort Peck, K7IMZ Missoula, KN7KJH Miles City, K7S GVZ, GWA, GVB and GWD Lewistown, KN7IOS Stockert, K7KME Helena and K7JBL Columbia Falls. LBK is in school at Fort Knox. K7DFR moved from Great Falls to Seattle/w/FAA. KØJTY, ex-VPY, is back in Great Falls. K7DPH moved from Cut Bank to Great Falls. The Rimrock Radio Club is a new club at Sunburst and has 43 members. New officers of ECRC are ODK, pres.; CRD, vice-pres.; K7CYU, secy.-treas.; AU and K7BYB, directors. Appointments: K7BKH as OPS and EGN as OPS. Traffic: K7BYC 708, HWZ 618, BKH 386, GHC 117, W7SPK 21, OIP 11, DNX 4, NPV 4, TPE 4, YQZ 4, K7BON 3, W7EVR 2, K7JBII 2.

OREGON—SCM, Hubert R. McNally, W7JDX—Those c.w. experts, BDU, ZR and K7CLL, all made the HPL agam, ZB's XYL met with an accident and is in a local hospital. K7CLL got his Apache working on 80 meters at last and expects good reports from now on. The new AREC Net on 3875 kc, reports nice progress with improvement in check-ins each month. What happened to the Globe Champion, Doc? Thought we would be hearing K7AXF on it by now. K7GSR has a new Globe Hi-bander, a v.t.o. and a Hy-Gam Yagi. We regret to announce the death of DKV, of Bonneville. K7DVK has been transferred to Salem. The OSN is going great guns under the new net manager, ZFH. BRATS were ZB, MTW, ZFH and K7CLL. K7CJB is active on three nets and that sure keeps him busy. MTW has resolved to get more CP certificates. We hear that FTA has a new HQ-180. DIC is visiting California. K7CSM is busy transmitting ARRL Bulletins on the AREC Net. K7EZZ is busy checking in on everything. A nice letter was received from OMO, who is in Warden, Wash., now and ready to stir the air there. There has been fine v.h.f. activity in the Portland Area lately. RACES has issued eight 2-meter rigs and there are now about 25 v.h.f. mobiles. VS is the new Radio Officer. A nice report was received from GLZ. Traffic: W7BDU 153, K7CLL 752, W7ZB 556, K7AXF 255, W7ZFH 111, LT 47, K7CJB 32, W7MTW 30, DEM 29, K7PEO 18, W7DIC 15, BVH 13, K7CSM 10, W7WPW 10, K7EAU 8, CNB 7, EZP 1.

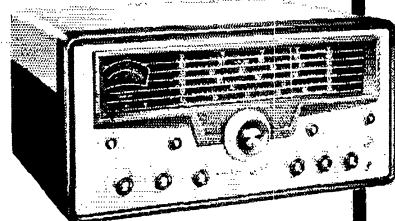
WASHINGTON—SCM, Robert B. Thurston, W7PGY.—New officers of the Spokane Amateur Radio Club are ZNN, pres.; K7AFE, vice-pres.; HCF, secy.; UOJ, treas.; EQU, NCJ, JYO and OPR, trustees. K7GQU received his General Class license. VWR is attending U. of W. in Seattle. EKT replaces EHH as Northeast Director for WARTS, the Spokane AREC Net meets every Tue. following the Official Bulletin transmissions on 146.16 Mc and 29.6 Mc at 1845 and 1900 PST. YFO is signing up members for the AREC in the Richland Area. CWN has lots of things to do but no time and ambition, he says. The Skagit Club is laying plans for a banquet in the spring. The Anacortes Club is starting a 2-meter walkie-talkie project. GSP finally got his kw. de-bugged. IEU reports the big rig is down for repairs. K7INK is building a new console for equipment and installing full break-in. The Lower Yakima Valley Radio Amateurs again is running code and theory classes. K7APJ is QRL school and does not have much time on the air. JWE made his DXCC Nov. 2. K7AJT is the new president of the Grays Harbor Amateur Radio Club. UWT renewed his EC appointment. PRU his ORS and AIB his RM. OIV has a new 1960 Oldsmobile and plans to install 6- and 2-meter mobile rigs in it. CMQ and family moved into their new home near Eatonville. The Annual Banquet of the Valley Amateur Radio Club will be held in Puyallup Feb. 19. 41MQ is chairman. CZQ has a new Tribander up. OEB was a visitor in Puyallup from Richland where he recently moved. The following participated in the RACES drill during December from the Puyallup Area: W7s CMQ, HMQ, JJK, OIV, SGJ and WIV. KN7IYI works 15 meters from the Richland Area. Fifty members of the Northwest Chapter of the QCWA attended the Semi-annual Dinner in Seattle Dec. 6. New officers of the Chapter are ER, chairman; JY, vice-chairman; OS, secy.-treas.; HF, historian; LQ, curator of museums. OMO moved from Oregon to Warden, Wash. QI.II re-

(Continued on page 146)

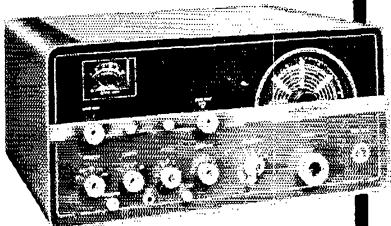
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ports some 1400 pieces of traffic handled on RN7 during December for a new high. The WSN had 20 sessions with 278 QNIs and 139 QTCs for the month of November. MHL, EVU and RGL are building portable 2-meter transceivers for AREC use. FBI is moving to Bremerton. HOD is QRL on an inboard cruiser. HMQ and WHV attended the Rose Bowl Game in Pasadena. DNV had seven successful Novice applications. Washington FCs are requested to report to the new SEC. If your county or area has no EC, get in touch with HMQ, your Section Emergency Coordinator, and make application or recommendation. Traffic: W7BA 2111, D7X 1213, PGY 724, HUT 586, QLI 538, KZ 240, APS 235, A1C 210, GIP 116, BSW 71, K7INK 62, W7GYF 44, K7AJT 39, W7IEU 30, LFA 28, K7CWO 27, W7EKT 27, JHS 27, ZDQ 18, OIV 12, JCY 11, UWT 11, YFO 8, K7GNA 4, W7IGF 4.

PACIFIC DIVISION

HAWAII—SCM, Samuel H. Lewbel, KH8AED—KH6AJF, with Doug as chief operator, still remains the only consistent reporting station. Clubs in Hawaii should have their secretaries send in a monthly report of member activity for inclusion in this column. Address the notes to the SCM and get them in his hands as soon after the first of the month as possible. ANR was the first in Hawaii to be on with a new 100V transmitter. The inter-island ragchewers are slowly but surely moving to 75 meters and we suspect they will be followed by the mobilers. The Hilo and Kona gangs, under the leadership of AFQ, are running in high gear in preparation for the ham convention to be held in Hilo this year on the July 4-7 weekend. Traffic: (Dec.) KH6AJF 1004. (Nov.) KH6AJF 407.

NEVADA—SCM, Charles A. Rhines, W7VIU—SEC: JU. PAM: KHU. OES: MAH. ORS: VIU. OO: KHU. ECs: HJ, PC, IWT, HOP. KHU is the new PAM/OO and turned in a nice OO report for December. He is building a Seneca for 6 and 2 meters. VJR has moved into his new home. ZEW is trying out the Collins S/Line. MAH finds 6 and 2 poor lately. VIU still is chasing certificates, his latest is the "R6K" from the Central Radio Club of Moscow. YET and IZFA/7 are on 75-meter phone from Reno. KOI has a new Globe Champ. QYK bought KOI's Viking II as a Christmas present from his XYL. QYL, K7CMI is out of the hospital and again chasing 10-meter DX. AHA is the proud owner of a new SB-10 to go with his DX-100 and also has a new YL jr. operator. CWV continues with traffic work. We still need more appointments in our section. Your SCM attended a very fine meeting of the NARA in December. Traffic: W7VIU 199.

SANTA CLARA VALLEY—SCM, W. Conley Smith, K6DYX—The North Peninsula Electronics Club's officers for 1960 are W6BEE, pres.; W6EJS, vice-pres.; W6HZK, secy.; and K6EQE, treas. The Stanford RC expedition in Europe is on the air with a DJ8 call. The Party Liners of Monterey enjoyed a breakfast get-together Jan. 10 at the home of W6GED. Congratulations to W6PLG, a new member of the A-1 Operator Club. W6ZRJ has a new beam working on 20 meters. K6SRG also has a new homebrew, full-size Triband beam. It is good to hear K6GZ back on the air from the new QTH. K6HCQ also has a new location but still is in San Jose. K6ZCR reports that her radio gear and 40-meter dipole were installed and operating before any furniture or household appliances were moved in. OMs should call this to the attention of the XYL on the next move. K6TEH has added an SB-10 to the station. W6AAU runs full power s.s.b. on 6 meters. W6ASH has three (3) rigs on 2 meters. Good luck to K5ZBS, ex-W6WNL. W6DEF is back on the graveyard shift at United AL and will be QNI the traffic nets for a while. W6HC has started a subalitical leave. K6EWY is QRT indefinitely. W6ZRJ is getting ready to take over the SEC duties from W6NVO. A new appointee is W6OKK as OO. Traffic: (Dec.) W6RSY 1173, K6DYX 329, K6ZCR 255, W6YBV 170, W6AIT 122, K6GID 112, W6HC 76, W6DEF 64, W6PLG 57, W6FON 47, K6VQK 39, W6OII 31, W6ASH 17, W6AULT 12, K6TFH 11, W6ZLO 8, W6ZRJ 5, K6YKG 4, K6GZ 2, K6HFK 2, W6OWP 1. (Nov.) K6GID 161, W6PLG 28, W6ZRJ 6, K6TEH 4.

EAST BAY—SCM, B. W. Southwell, W6OJW—SEC: K6DQM. ECs: W6EFI, W6ZZF, K6EDN, K6JNW and K6ESZ. K6ZYZ is Route Manager for the East Bay section. K6GK reports that traffic picked up during December. Ex-W6QQG now is W6HOT. W6JOH is handling traffic on NCN. K6ZYZ made BPL. Congrats. K6KWP gave an FB talk on TVI problems at the EBARC meeting. CCRG held its December meeting at the QTH of W6QIE. K6EAG and the HARC had a successful Operation Santa Claus. K6TWB was portable/7

(Continued on page 148)

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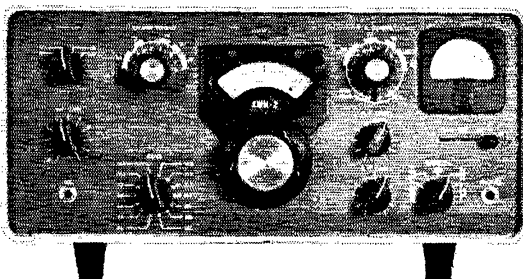
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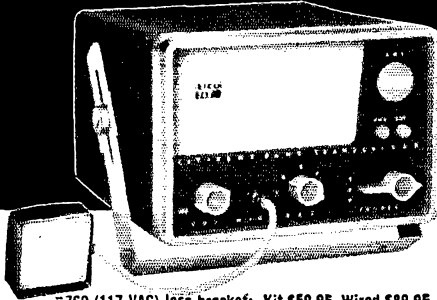
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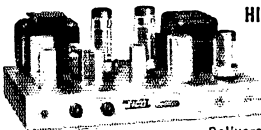
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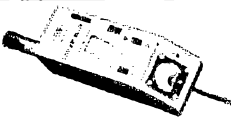
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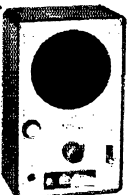
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in Nevada and had eyeball QSOs with W7FLU and K7JZY. WV6IVW, WV6GUM and WV6IMC are new Novices in the HARC. K6YBS has a new Ford and is building a mobile rig for it. WV6IMC worked WV6FFC for a 200-mile QSO with a 1-watt transistor rig. WV6FKM has RAO going. W6LGE has a new SX-101A. WA6INF is a new call in the Hayward Area. WA6AHF is building a pair of C.B. rigs. W6IPY is building a mobile rig. K6UHV is on 6 meters with a Gonset Communicator and a halo whip. WV6FTQ visited K6ARJ in Idaho. W6AOX is out of the hospital and OK again. WA6ATS has a new Globe 880A rig. W6KLM won the MIDARC hidden transmitter hunt. WA6BXG is a new General Class licensee in Walnut Creek. WA6BKS and WA6BXS are new members of the MIDARC. W6QJW got a Heath SB-10 from Santa. New officers of the MIDARC for 1960 are K6PIL, pres.; K6DEG, vice-pres.; K6IRB, secy.; W8JYZ, treas. The HARC's 1960 officers are W6IPY, pres.; K6AHW, vice-pres.; K6TGV, secy.; K6JNW, treas.; and WV6FFQ, sgt. at arms. New 1960 officers of the Richmond Radio Club are K6ZBG, pres.; K6VSU, vice-pres.; K6PQP, secy.; K6TTX, treas.; and W6URH, sgt. at arms. The Richmond Radio Club is starting code and theory classes. Contact K6PQP for details. Traffic: K6ZYZ 534, K6GK 355, W6JOH 32, K6OSO 22.

SAN FRANCISCO—SCM, Leonard R. Gerald, K6ANP—Asst. SCM; Jeri Bey, W6QMO. RM: K6PQG. PAM: W6PZE. ECs: K6EKC Fortuna, W6OPL San Rafael, W6JWF San Francisco, OO: W6GQA Class 1, K6OHJ Class III, W6OKR Class III. OBS: W6GGC. ORS: K6PQG, W6GGC, W6QMO, W6OPL, W6BIP, W6QY, K6QJB, OPSS.; W6PZE, W6GGC, K6OHJ, W6FEA. The San Francisco Radio Club's Christmas Party had an attendance of almost 100. Highlights of the entertainment were an all-ham band consisting of W6PDU, WA6ADX, K6DJC, K6OHG and WA6GQC, and the BAYLARC'S K6QCL, K6H1W and W6BDE as singers of the Christmas Carols. The Marin Amateur Radio Club hosted the CCRC at the January meeting in San Anselmo. New officers of the Bandsanners are W6HVN, pres.; WA6ATL, vice-pres.; K6HYW, secy.; and K6OIH, treas. and new CCRC delegate. The BAYLARC elected the following new officers for 1960: W6BDE, pres.; K6QCL, vice-pres.; WA6JGR, secy.; and WA6GQC, treas. W6JWF is the new delegate to the CCRC from the American Legion Net. K6USA will be the official station operating from Squaw Valley for the Olympic Games. Special QSL cards will be offered to amateurs contacting the station during the games. W6GB is building a 4-1000A linear final to augment his Collins S/line station. Look for big noises here. Congratulations to W6GQA on being among the top 16 in the latest F.M.T. W6MXJ and W6PIS have leased a private telephone company line between their QTHs and are running teletype and voice signals simultaneously. K6GND is sporting a new Collins S/line station. Traffic: W6QY 1774, K6QJB 275, W6QMO 185, W6FEA 32, W6GGC 26.

SACRAMENTO VALLEY—SCM, Jon J. O'Brien, W6GDO—Asst. SCM; William van de Kamp, W6CKV. SEC: K6IKV. RAI: W6CMA. PAMS: W6ESZ and W6PIV. Taking over for 1960: Aerojet Club—W6LQT, pres.; K6JDA, vice-pres.; W6UUT, secy.; W6EID, treas. Chirps—WA6DGH, pres.; K6HHD, vice-pres.; K6PBG, secy.; K6RHH, treas. McCellan ARS—K6DJJE, pres.; K6UGC, vice-pres.; W6DMA, secy.—treas. North Hills RC—W6GBE, pres.; K6HGG, vice-pres.; W6QYJ, secy.—treas. RAMS—W6GTG, pres.; W6OOR, vice-pres.; K6RRD, secy.—treas. SARC—W6HGW, pres.; W6PIV, vice-pres.; K6YIL, secy.; K6LRL, treas. Sac Sig Depot RC—K6JJK, pres.; K6TWE, vice-pres.; K6GAU, secy. The new Radio Officer for the Sacramento City-County C.D. is K6BNB, taking over from K6QIF, to whom we send sincere thanks for a job well done. W6CKV and YKU have moved into their new home. K6SXX kept his promise to make BPL and also completed his WAS. K6EIL has a new 10-meter beam and worked his 30th country. K6RFT has a 20-meter beam up. W6GDO is going s.s.b. on 2 meters soon. Activity is low here because of moving, and lack of reports from YOU leaves me with nothing further for this time. If you want to see news here about things going on in your part of this section, let me know about it so I can put it here. My crystal ball is broken! Traffic: K6SXX 318.

SAN JOAQUIN VALLEY—SCM, Ralph Sarovan, W6JPU—The Fresno Amateur Radio Club will hold its Annual Hamfest at the Towne and Country Motel in Fresno May 14, 1960. This year's Hamfest promises to be the best yet, so try to be there. New officers of the Delta V.H.F. Amateur Radio Club are W6RRN, pres.; W6UWV, vice-pres.; W6FUF, secy.; WA6BTK, treas. K6GTI has a new SX-101A. W6FXV, K6BCK, W6BAN

(Continued on page 150)

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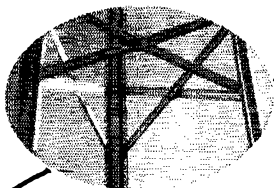
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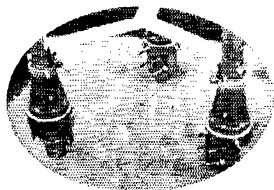
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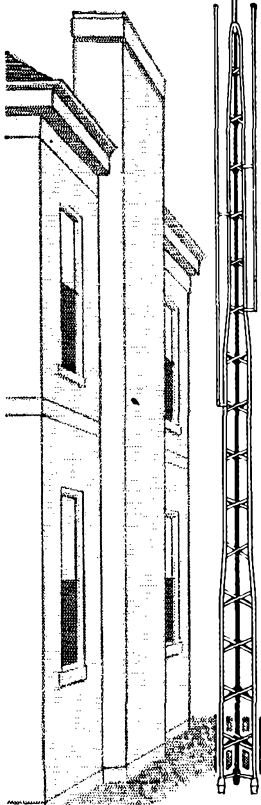


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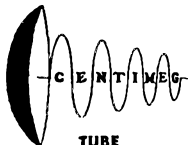
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and K6JGH are using 3-phase power supplies in their mobile rigs with Leese Neville generators and are able to run considerable power. W6PXP is looking up information on full-sized beams for 10, 15 and 20 meters. The code classes sponsored by the Fresno Radio Club are being held at the YMCA at 7:30 P.M. every Mon. W6LOS overhauled the gear works in his HRO and reports excellent results. W6HAB has a pair of 813s on the air. K6OZI is on 6 meters with an NC-240D, a Heath converter and a DX-40 modified for 6 meters. K6GOX made WAS on 50 Mc. and is first on the list. K6ROU got his WAS certificate. W6BXD has his Apache going. The San Joaquin Valley Net had 27 sessions with 582 check-ins and handled 124 messages on 3940 kc. W6PIE has a Triband beam and an SB-10. W6OVR is going on a vacation to England. W6LRS is building a final using a 4-125A. W6VPV has a 15-meter beam and is giving up DX. The new officers of the Stockton Radio Club are W6UWY, pres.; W6LRS, vice-pres.; K6UII, secy.; W6RLG, trans.; and K6QDU, sgt. at arms. Traffic: W6EJT 22, W6ARE 10, K6ROU 5, K6SAIZ 4.

ROANOKE DIVISION

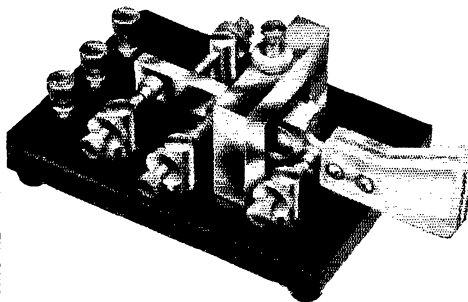
NORTH CAROLINA—SCM, B. Riley Fowler, W4RRH—PAM: DRC, V.H.F. PAM: ACY, TJA, secretary of the Tar Heel Emergency Net, very kindly sent me a set of Rules for the Net and the division of the counties by areas. Those of you who have received this information, please be advised that the ECS are divided likewise: Area 1, JPY; Area 2, BAW; Area 3, upper K4KDV, lower RJ; Area 4, QC; Area 5, none; Area 6, upper YQX, lower ZKE; Area 7, upper AEH, lower AJT; Area 8, K4DVE; Area 9, upper FUS, lower DGF; Area 10, upper DSO, lower TMO; Area 11, GXR. If you desire to know what area you are in join the Tar Heel Emergency Net and file your ARRL Form 7 with the EC in charge. It is most important that you register your station and equipment with the Emergency Coordinator so that he will know what he has to work with in case of an emergency. Emergency Coordinators should file Form 5 report cards with the SCM. In case an SEC is active you are to file these reports with him. See the top of this article for his call. You will note that Area 5 has no EC. The SCM will welcome applicants. Emergency Coordinators and RACES Radio Officers push the use of v.h.f. for area and county activity. Leave 75 meters for state activity. Follows, the job of keeping activities coordinated is a big one. All can help by cooperating. FQQ and DTO kept communications open between Camp Lejeune and Jacksonville when land lines were out. The Northeastern N.C. ARC doubled its membership last year.

SOUTH CAROLINA—SCM, Dr. J. O. Dunlan, W4GQV—SEC: K4PJE, PAM: K4ITE, RM: K4AVU, ONJ is slowly recovering from a severe auto accident. CVO was able to get a death message within 10 miles of destination in South America. The 1959 "Secret Project Contest," sponsored by the SPARC, came off with great success on Dec. 8 with the winners being K4IDD, LNO, W4ZGQ, K4JFS and K4LEI. At the election meeting on Dec. 29 the following were elected: K4LNO, pres.; ZFC, vice-pres.; K4LEI, secy.-trans.; LNJ, act.; ICG, publicity; IVE is a new OBS to assist K4MYR on the 3950 kc. Phone Net. K4TOY advises that the Blue Ridge Radio Society and the Greer RC plan a Hamfest about May 1. K4OCU is the new NCS on Wed. for the S.C. Phone Net. HPW is the new president of the Rock Hill RC. The 1960 editor of *Scrab* will be chosen at the next meeting to succeed K4BVX, the editor for 1959, who has done an excellent job. Read your issues of *Scrab* for a full calendar of 1960 events. EDQ and WA are back on the Sun. A.S. Phone Net after a long absence. We still are looking for HDR. Traffic: K4GAT 233, PIA 226, W4AKC 175, K4VAU 158, ZHV 113, W4RFH 80, K4VVE 71, W4PED 47, K4LJN 42, WCZ 37, K4ITE 22, MBN 10, W4CXO 7, VIV 6, K4KUC 4, MVO 3.

VIRGINIA—SCM, John Carl Morgan, W4KX—This column will appear after QDY has taken office as SCM. Let me (KX) thank each of you for your exceptional support during my six years in the job. Thanks to live and enthusiastic net managers, I am able to turn over to Bob three prospering section nets, VN, VFN and VSN, plus several up-and-coming local nets. SEC K4BLJZ reports gratifying progress in building a healthy AREC organization. As with any living organism, there still is plenty of room for growth. The c.w. nets could use wider coverage of the State, and we welcome all traffic-minded Virginians. A number of counties and cities need energetic EC appointees. I know you will continue to give QDY the fine backing you've given me, and that you'll find him an able and en-

(Continued on page 152)

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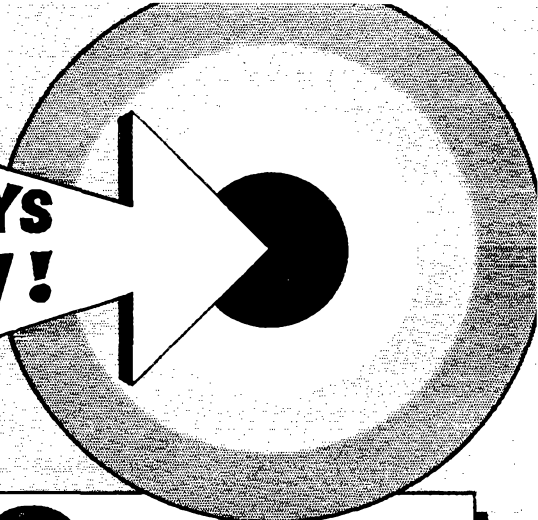
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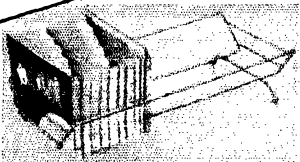
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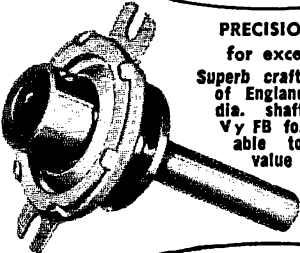
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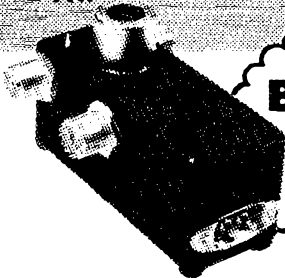
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AMERICAN RADIO RELAY LEAGUE

West Hartford 7, Connecticut

thusiastic SCM. K4QER has produced her first issue of *V.A. Ham*. Very FB. Ann. K4VWK reports the Va. Teen Net meets on 3821 kc. Tue. at 1530 and Sat. at 0800. 3MGL4 has transferred to New Jersey. CVO reports from KZ5. CXQ has the rig on at V.P.I., and YZC is operating Pappy YE's AGI from Wake Forest. K4AET skeds son K7KCI at the U. of Ariz. ATQ reports that nine of his Novice Class students took the exam and all passed. New calls in Winchester are JTC and KTR. Ex-3YOR now is KTK in Fredericksburg. Harrisonburg again participated in the WSWA-TV Polio Telethon. New club presidents include K4GMC, of the Old Dominion ARC; OWV, of Harrisonburg ARC; and JXD, of Alexandria ARC. A number of the gang report that Santa was generous with new gear. Traffic: (Dec.) K4QES 1328, SQJ 1132, W4SHJ 969, K4QJX 633, GFR 425, W4QDY 331, K4KNP 277, W4DVT 261, K4AET 240, AJL 170, JKK 128, MNF 122, W4BGP 98, OOL 94, RHA 78, BZE 64, K4HP 40, W4KX 39, YVG 37, PVA 31, K4ASM 25, SSA 25, ASU 22, W4ATQ 22, CFV 21, LK 16, K4JRE 14, TFL 14, W4AAD 13, CXQ 8, JÜJ 7, PRO 7, OWV 5, K4VWK 4. (Nov.) K4VWK 16, HTA 4.

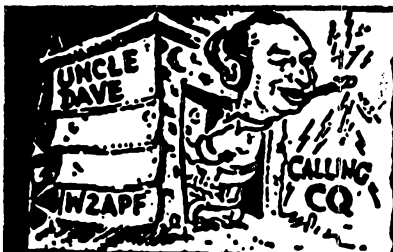
WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: HZA, PAM: K8BIT, RMs: GBF, K8IID, PBO, VYR. WVN-C.W. meets on 3570 kc at 1900; Phone on 3890 kc at 1730 and 1830 EST. It is with deep regret that I report the passing of BWK, one of West Virginia's "Ole Timers." K8JLF made HPL again. New officers of the Tri-State ARC at Huntington are, K8KDL, pres.; QWO, vice-pres.; 4BBD/8, secy.; K8OUT, treas.; K8AMZ, prop. mgr. The Wheeling Wagon Train 6-Meter Net meets on 50.1 Mc. at 2230 Fri. and offers a certificate to all working 5 members. Six-meter mobiles, Wheeling Area, are K8INK, K8AOM, GFML, CEB. Active on 6 meters and higher are K8QPA, K8NLF, K8NTX, K8DKQ, W8OGM, New ORS appointees are K8AEN, K8GMG, K8MMZ, K8LGN, IHV, DFC. The 6-Meter Mountaineer Phone Net, on 50.250 Mc. Mon.-Fri. at 2000, offers a certificate for working 6 members and now has 30 on the roll. K8CRM and K8HTS are active in EC work. K8CSG has a new 500-watt final, GBF is back with full power and is active in OO, CD, LO and 3.5-Mc DX work. PNR is active on 75-meter a.m. and s.s.b. and reports, "West Va. SSB stations are on 3897 kc. at 2000 nightly." K8CSG, GBF, K8JLF, TVO and OIV are doing excellent F.M.T. work. Traffic: K8JLF 680, W8PBO 274, K8CNCB 105, BIT 83, W8IHY 74, NYH 67, K8IID 53, MMZ 51, W8FNI 39, ELN 35, HZA 32, K8CRM 18, W8JM 17, K8AEN 16, HTS 16, W8DFC 15, K8GAG 14, W8JSX 8, K8CSG 6, OEQ 3.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Carl L. Smith, W6BWJ—SEC: NIT, RMs: EDK and WME, PAMs: CXW and IJR, OBSS: KQD and DCC. K8EGJ is the new EC for Montrose County. The largest AREC group is Pueblo with 50 members. CCW now meets an hour earlier at 1900 on 3655 kc. Highlights of '59 were a new and growing CCW and increased CWXN, HNN and CEPN activity. These gains with top quality liaison to TWN and PAN increases Colorado's leadership in traffic for all of the mountain states area. Nineteen Section Net certificates were issued in December—10 to CCW, 5 to HNN and 4 to CEPN. In addition, AMPS certificates were awarded to 22 members of CWXN and 14 of HNN. AMPS is the Award of Merit for Public Service and is established for recognition of amateurs who perform outstanding service in the public interest, convenience and necessity. Top QNI records for '59 are held by CWXN members—NVU with 313 for 100 per cent; SHJ 311—99 per cent; and VLS 302—96.5 per cent. IA had high WX QTC with 706 in December. Bob, the romantic rebel at K8PDX, has moved to the sand-dunes of HZIAB. SLD is a leading certificate collector with additions of WHRC, WAF and BS Net (Breeze Shooters). New KNS reporting are WWJ and YCH. EGD, DTK, ANA, EDI, TAM and YQ made the EPL. Traffic: (Dec.) W8IQD 1050, K8DTK 917, W8ANA 645, K8FDH 525, TAM 466, BDK 464, W8WME 272, YQ 175, K8DCW 169, RTI 154, EYG 135, W8ENA 76, K8SHG 68, W8CBI 54, BJA 46, NIT 46, K8QGO 31, W8IA 27, K8LCZ 23, RBI 13, SLD 10, CEN 6, W8SN 3. (Nov.) W8IA 20.

UTAH—SCM, Thomas H. Miller, W7QWH—Asst. SCM, John H. Sampson, 70CX. Officers for 1960 of the Utah Amateur Radio Club (Salt Lake) are K7CLF, pres.; K7COM, exc. vice-pres.; BLE, vice-pres.; OOK, secy.-treas.; VTA and his XYL, VSZ, *Microvolt* editors: VFY and BRV, program committee, POU and jr. YL, EHX, are on the air with an Apache and an HQ-100C. Both were active in the Sweepstakes to help many with that elusive Utah contact for WAS. The Beehive Utah Net (BUN) is now a going concern. The

(Continued on page 154)



FORT ORANGE

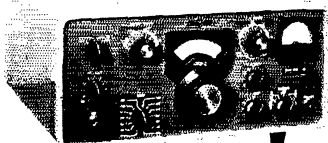
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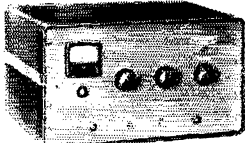


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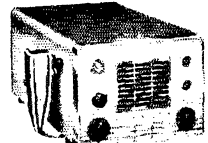
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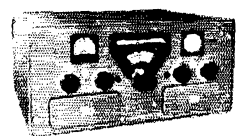


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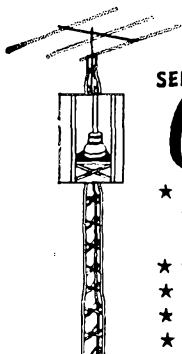
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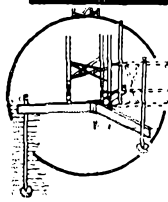
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transition from a weekly to a daily basis has worked even better than anticipated. Thanks are due K7BYR and K7BDX for their efforts in making the change. K7ELR has a new Seneca. Please send station activity reports to the SCM by the first of each month. New Novices in American Fork are KN7S, KIE, KDF and KNQ. Traffic: (Dec.) W7OCX 381, QWH 15, K7DVT 1. (Nov.) K7DVT 12.

NEW MEXICO—SCM, Allan S. Hargett, K5DAA—SEC: CIN. PAM: ZU. V.I.F. PAM: FPB. RM: ZHN. The New Mexico Breakfast Club meets Mon. through Sat. at 0700 MST on 3838 kc. The New Mexico Emergency Phone Net meets Sun. at 0730 MST on 3838 kc. Tue. and Thurs. at 1800 MST on 3838 kc. The BPN meets Mon., Wed., Fri. on 3570 kc. at 1900 MST. The TWN meets Mon. through Sat. on 3570 kc. at 1900 MST. Try to check in on any many of these nets as you can. They all need your support in order to stay alive. The nets are for the benefit of New Mexico stations. K5VLH and K5VLG are back in New Mexico in Truth or Consequences. K5OGO is going mobile with an Elmac and a PAIR-7. LEF is the proud owner of a new beam and tower. DRU is in very serious condition after suffering a heart attack while visiting in California. K5EDB is partially paralyzed from a stroke. K5PAT is having trouble with the rig and has reworked same. The V.H.F. Net met four times with a total of 57 check-ins. Traffic: (Dec.) K5WSP 1828, W5ZBN 655, W7AVN/5 548, K5GOJ 74, LMJ 60, W5UBW/5 49, K5DAB 36, DAA 12, LWN 10, W6KWR 8, K5PAT 6, W5CIN 5, ETF 4, GB 2, ZU 1. (Nov.) K5PAT 6.

WYOMING—SCM, Lial D. Branson, W7AMU—SEC: CQL. The Pony Express Net meets Sun. at 0830 MST on 3920 kc. The Wyoming Jackalope Net meets Mon. through Fri. at 1200 MST on 7255 kc. for traffic. The YO Net is a c.w. net on Mon., Wed. and Fri. at 1830 MST on 3610 kc. AMU celebrated his Golden Wedding Anniversary Dec. 20, 1959. Officers of the Casper Amateur Radio Club are BIII, pres.; 5GWX/7, vice pres.; K7IAY, secy.treas.; CQL, act. mgr. A new TVI committee and a new membership committee have been appointed. The Natrona County EC has resigned. Traffic: W7BHH 171, DXV 54, AXG 40, AUY 7, NMIW 6, AMU 4, BKI 3, CQL 2, K7HEA 2, W7ISR 2, AEC 1, K7AHO 1, 1BU 1.

SOUTHEASTERN DIVISION

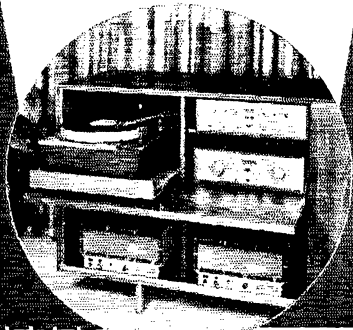
ALABAMA—SCM, William D. Dotherow, K4AOZ—Asst. SCM: O.K. Gibbs, K4BTO. SEC: JDA. RM: RLG. PAMs: PHH, BTO, OCV. New appointments: BTO as Asst. SCM; JDA as SEC; OCV as V.I.F. PAM; HVN, OCV and SPP as OPS's; HVN as OBS; RQS as OO; RSB as EC. We regret the passing of NUB to Silent Keys. UHA passed the Extra Class and 2nd Class Commercial exams. DFE and K4DSO completed remodeling the shack. We welcome K4AWN and K4RJM to AENB. Thanks to PVG for acting as RM while RLG recuperated from an operation. Alabama was 100 per cent on RN5 in November. AENB handled a total traffic of 2368 in 1959—the highest ever! PFM is sporting a Globe Champ, an HQ-170 and a Super-Pro. UEE hopes more Alabama stations will participate in contests. We welcome FXR, OCV, SPP, UGR, K5TFD and K8SGJ to AENP. All teen-agers should join the AENT on 3005 kc. at 1630 CST daily for games, contests, traffic and emergency training. RJM has swapped DX for AENB traffic. IPF made WAS. ATK is crumming for a degree at Howard College. The XYL of ZBX is studying for her license. DGH is boasting a new shack. SCM K4AOZ appreciates the good wishes and offers of assistance. Traffic: (Dec.) W4RLG 341, K4PFM 241, RIL 161, W4KIX 156, K4SAV 136, UEE 130, W4USM 113, K4JDA 112, W4OKQ 86, K4YGS 82, W4PVG 63, K4AOZ 59, BTO 49, WAH 42, K4PHH 39, W4YRO 38, K4YEN 34, W4CIU 33, K4DJJ 31, RJM 27, HVN 26, IPF 24, W4CIN 23, ATK 21, K4ISZ 20, JSP 19, RSB 19, HFX 12, ZNI 12,AWN 10, OCV 9, W4AYU 8, K4ZBX 8, K4JD 6, W4CEF 5, K4UGR 5, SPP 4, W4DGH 3, K4RLX 2, TSN 2. (Nov.) W4WAZ 5.

EASTERN FLORIDA—SCM, John F. Porter, W4-KGJ—SEC: IYT. RM: K4SJH. PAM: TAS; V.H.F. PAM: RMU; New officers of the St. Pete ARC are K4PNK, pres.; BAV, vice-pres.; K4USK, secy.-treas.; RUR, UFR and K4BAR, trustees. WPD was hostess to the SPARCYLS and Florida YLs Sun. Dec. 6. The All-Florida Net (QFN), operating on 3850 kc. at 1830 EST daily except Sun., is growing bigger and bigger. What about you c.w. hounds giving them a hand? For information drop K4UBR, Lot 16, Postal Point Trailer Park, Elgin AFB, Fla., a letter or radiogram. Congrats to K4KKZ on his fine work in getting medicine to the sick boy in Lima, Peru, via radio coordination with OA4CS. New clubs in Florida are the Dinosaur Valley

(Continued on page 156)

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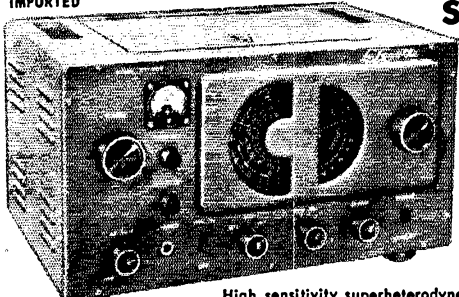
- 5 Crystal Controlled Transmitting Positions: Operates at a maximum FCC legal power input of 5 watts fully modulated.
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- Complete with Transmitting Crystal: Removable front plate for easy accessibility of crystals.
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- High Output Crystal Microphone: 2 positions push to talk slide switch; especially designed for sustained transmit operation with a minimum of background noise.
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Superheterodyne Circuit Utilizing
8 Tubes & Rectifier Tube

- BAND SPREAD FOR EASY TUNING
- BUILT-IN "S" METER WITH ADJUSTMENT CONTROL
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- EXCELLENT SELECTIVITY • ALL TRIMMERS PRE-ALIGNED
- COVERS 455KC. to 31MC. IN FOUR BANDS
- VARIABLE BFO AND RF GAIN CONTROLS
- BUILT IN PRE-CALIBRATED "S" METER
- SWITCHABLE AVC AND AUTOMATIC NOISE LIMITER

High sensitivity superheterodyne circuit utilizes 8 miniature tubes plus rectifier tube and transformer input, full wave rectifier. The 80-40-20-15 and 10 meter amateur bands are clearly indicated on the illuminated dial face, and can be easily tuned with the pre-calibrated band spread. The receiver has complete band switching, thus eliminating the need for bothersome plug-in coils. Band spread is laid out on easy-to-read 0-100 scale, and features a weighted control knob which offers smooth, precise tuning. Coverage of from 455 KC to 31 MC is obtained through the use of four switchable ranges (455-1600 KC/1.6-4.8 MC/4.8-14.5 MC/10.5-31 MC). All controls, switches and phone jack are located on the front panel, while an optional accessory socket delivering 360 volts DC and 6.3 volts AC is located in the rear of the receiver. Signal to noise ratio is 10 DB at 3.5 MC, with 1.25 microvolt signal. Selectivity is - 60 DB at 10 KC, image rejection is - 40 DB at 3 MC. Panel is grey metal with white lettering, and controls are black bakelite with aluminum trim. Hinged top makes inside of receiver readily accessible to operation. 7 1/4" H x 15" W x 9" D. Shpg. wt., 22 lbs.

KT-200
IN KIT FORM
64.50 5.00 Down
HE-10 WIRED
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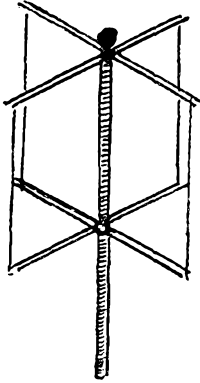
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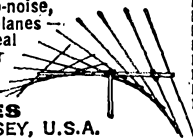
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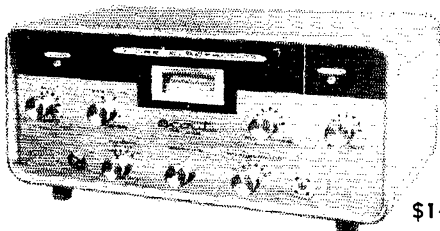
RC in Polk County and the Everglades Radio Club in Homestead. R.M.U. at Jacksonville, is working LIP in Miami regularly on 50 Mc. Allen is running 900 watts on c.w. and s.s.b. K4DAS has a new DX-100B and an NC-183D. SMK is sending code practice on 29 Mc. in the Ft. Myers Area. FE has a new HQ-170. The Ft. Pierce RC now meets in the new Red Cross Bldg. K4BY handled the local club arrangements for a station at the Manatee County Fair. K4QLG, SJH, LCD, FMA, BY and ODS made BPL. We now have a total of 1051 AREC members, 754 Full and 297 Supporting. There are 247 Official Mobile Units and 179 Emergency Radio Units. We have a total of 38 emergency nets with 34 tied into section or long-haul traffic nets. The total number of AREC drills for December was 14. How about the rest of your ECs sending in your monthly reports? Traffic: (Dec.) K4QLG 1539, SJH 1021, LCD 749, FMA 581, BY 527, W4SDR 407, K4ODS 318, KDN 297, LCF 214, EHY 198, ILB 191, W4GJI 172, PFF 144, FPC 137, K4AZM 132, RNS 131, COO 101, PAC 91, W4GEJ 80, W3EGJ 75, K4ZNC 71, W4FE 53, K4ISR 49, W4SMK 43, SGY 39, IYT 35, K4BHL 34, FIM 34, SZC 29, TDT 29, W4KGJ 22, K4ZRH 21, FXG 18, JZZ 16, KN4GQT 14, W4BKC 13, KN4GLI 13, K4MTP 11, W4YNM 11, K4AHW 10, W4DQS 9, IWM 8, GOG 4, K4DAS 3, W4RMU 1. (Nov.) W4FFF 41.

WESTERN FLORIDA—SCM, Frank M. Butler, jr., W4RKH—SEC: HKK, PAM; RZF, RMs: AXN and BVE. New appointments for the year: HKK as SEC, PQW as EC for Escambia Co., QVL as EC for Walton Co., DSH as EC for Calhoun Co. and OSY as OBS. An EC for the Marianna Area is needed badly. Madison: RCO is moving the shack into the house to beat the cold WX. PBO is changing the date of the monthly EC drill to improve participation. Tallahassee: GAA has renewed his OBS appointment, and will expand schedules with s.s.b. equipment during 1960. Port St. Joe: MXN operated/MMI during the holidays, and kept in contact with home via the W. Fla. Phone Net. Panama City: CEF is now DXCC. He also is concentrating on OO activities. OLD published an FB edition of *Sparks*, the newsletter of QFN, All-Florida C.W. Net. KN4JDK is a new ham in town. Ft. Walton/Eglin AFB: The Eglin ARS traded the DX-100 for a new Apache for SRX. Membership is up to 65. New officers are UXW, pres.; K5GBS, vice-pres.; RKH, secy.-treas.; SMM, act. mgr.; K5QJD, editor. K4UBR has upped power with a DX-100. Pensacola: EQR finished the Viking 6N2 rig for the V.H.F. Club. A new ham in the area is K4STL. KN4DOT is now General Class. IVD, QAC and TZS have been working 6-meter a.m. K4BSS is going high power. K4KOS is active again. IJK and SPP, former locals, were worked on 10 meters recently. 10-meter mobiles furnished communications for a sports car rally. SGU has been transferred to Ohio. Traffic: K4UBR 589, W4GAA 16.

GEORGIA—SCM, William F. Kennedy, W4CFJ—SEC: PMJ, PAMs: LXE and ACH. RM: DDD. GCEN meets on 3995 kc. at 1830 EST Tue. and Thur., 0800 on Sun.; GSN Mon. through Sun. at 1900 EST on 3595 kc.; DDD as NC.; GTAN Sat. at 1000 EST on 7200 kc.; 75-Meter Mobile Phone Net, each Sun. at 1300 EST on 3995 kc.; K4JTC as NC.; ATL Ten Meter Phone Net each Sun. at 2200 EST on 29.6 Mc., KWC as NC. GPYL Net each Thurs. on 7260 kc. at 0900 EST. K4DNL as NC.; GAN on 7105 kc. at 1800 EST Mon. through Fri.; K4EKP as net mgr. The Amateur Radio Club of Augusta's new officers are OKL, pres.; K4JEN, vice-pres.; K4KAR, secy.; K4KAB, treas.; AAY program dir. KN4FWB passed the Conditional Class exam. ZKU, K4EJI, K4MIH and K4VHC made BPL. DDD is doing a wonderful job as net mgr. and NC for the GSN. Let's support him each night on 3595 kc. at 1900 EST. Santa brought a new SX-110 to K4MIH. K4VHC is planning to build a new 500-watt rig. New officers of the Atlanta Teen-Age Radio Club are K4DGL, pres.; K4VHC, vice-pres.; K4DDJ, treas.; K4YDN, secy.; WKP, act. mgr. K4CZR and CFJ were visited by ETD, and K4LVE during the Christmas holidays. K4TTY operated on emergency power from Mt. Ogelthorpe during the week end of Dec. 12. LNG gathered a lot of information during the Gemini's shower on Dec. 10-14. FWH is reading Bulletins regularly on 50 and 144 Mc. KN4RVO and KN4RTM are new hams of the FIZ family. The Confederate Signal Corps new officers are K4CFN, pres.; ORI, vice-pres.; LDE, treas.; Robert Grey, secy.; K4ASO, act. mgr.; K4BPK, editor. Traffic: W4ZKU 861, K4EJI 518, MIH 432, VHC 250, W4DDY 186, K4PHA 164, LVE 163, OSL 115, BAI 89, VTH 57, LEM 3.

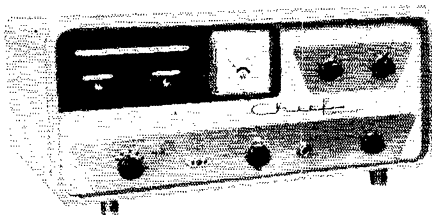
WEST INDIES—SCM, William Werner, KP4DJ. SEC: AAA. The PRARC's Christmas Party was attended by 144. Three ham stations were in operation on 40, 15 and 8 meters. 50-Mc. Net members held an outing at Lares Dec. 20. Among those present were ALY, (Continued on page 168)

GLOBE SCOUT DELUXE



\$149.95 net

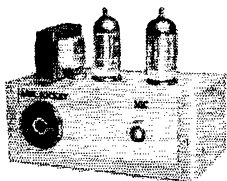
A versatile 90w CW, 75w fone transmitter of smart modern design, packed with top performance features. Bandswitching 80-6 meters, straight through operation of final on ALL bands; high efficiency and output on ALL bands, panel adjustment of loading on ALL bands. Pi-net matches 50-300 ohms on 80-10, and 50-75 ohms link output on 6 meters. High level plate modulation using new husky 7027A modulator tube. Just plug in VFO or crystal. Dual Xmtr./VFO keying provisions for CW. More output on 6 meters than some exciter linear combinations. Extensively shielded and filtered with separate final RF shield and built-in power supply and many other features.



Wired: \$79.95
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Also features the compact-modern design. 90 watts CW for the advanced CW enthusiast or novice (at 75w input). Choice of cathode or bias keying; — no rewiring to use external 755A VFO, UM-1 or SM-90 modulators . . . just plug in. Built-in power supply. Husky parallel 807 final for time-proven performance. New design Pi-Net for extra wide-range matching and standard coax output terminal, relay voltage and other features. Easy multi-color kit diagrams for simple assembly.

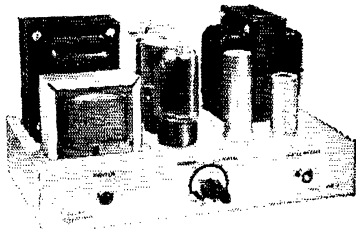
SM-90 SCREEN MODULATOR



The Screen Modulator SM-90 is the perfect, low-cost method of converting CW to AM phone. It is perfect for coupling with the Globe Chief Deluxe, but contains instructions for adapting to use with similar CW Transmitters. Is self contained. Printed circuit board included for easy, simplified construction. Contains all parts and complete instructions.

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The UM-1 is a Class A or AB-2 modulator, driver for higher power modulator, or PA amplifier. Matches output impedances 500-20,000 ohms. Carbon or crystal mike may be used. Supplies up to 40w audio with proper output tubes. Provisions for addition of external meter for monitoring modulator cathode currents, for remote control of modulator.

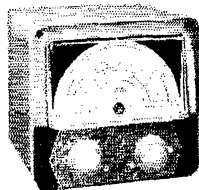
Wired, with tubes: \$49.95

In kit form,
less tubes: \$34.95

GLOBE VFO 755A

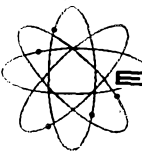
Wired:
\$59.95

Kit:
\$49.95



The 755A VFO combines simply with the Sidebander, the Scout or the Chief by simple plug-in. Covers 10-160M bands with output on 40 and 160M. New smooth non-slip cable drive, 13:1 tuning ratio. Self-contained, well-filtered power supply with voltage regulation. Approx. 50 RF volts output. Temperature compensated for utmost stability. Calibrate switch for zero beating.

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**THE AMERICAN
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AMJ, AEJ, AHP, AHQ, AHF, ASH, ABN, CK, CL, SR and UL. Using CK's G-50 seventeen KP4 station in all parts of P.R. were worked, plus an OA4 in Lima. Activity continues high on 6 and 40 meters. Listen on 50.1 and 7.245 Mc. AMG raised the 10-15-meter Quad to 30 feet and installed a rotator. AZ has a new Ham-M rotator to turn the five-element 20-meter 'Telrex on top of a 70-ft. tower and is enjoying s.s.b. with 200 watts while building a kilowatt using two 4-400As. DJ raised the 10-meter beam to 30 feet and spends most of his time on 10-meter phone and c.w. ALY is getting daily code practice from AZ while both are on vacation. URO and the gang are on 7245 kc. daily during sessions of the Nontime Ragchewers Club. AMG built a kw. final using p.p. 813s. VUH sold the Telrex Christmas-tree array and 45-ft. fold-over tower to the RCPR. WF finished his Stateside studies and is back in KP4-Land to stay. CO, AP, RA and WT are holding out on 3925 kc. Wed. 7 P.M.-8 P.M. AST built traps to convert the 10-meter beam to 10-15 meters. Our OO, AM, spent his vacation touring P.R. and visiting hams around the Island. AQQ has an Apache ready for General Class. RC has a kw. on s.s.b. now. Traffic: (Nov.) KP4WT 63.

CANAL ZONE—SCM, Ralph E. Harvey, KZ5RV—The month of December added several new hams to the ranks of the Canal Zone amateurs. December also was a period of heavy rains, raising the level of lakes and rivers to flood stage. Prompt action on the part of the persons in charge of spillways and dams, plus the reporting by radio of lake levels, kept the waters flowing out to sea. RM and his XYL and family spent the Christmas season in Miami Springs. LH has returned to the States. The Crossroads Amateur Radio Club held its annual election and elected CD. pres.; AD, vice-pres.; OB, secy.-treas.; and MM, act. mgr. The Canal Zone Amateur Radio Association elected new officers Jan. 7. The Crossroads Club has completed another class in code and theory and expects several new licensees. New hams: GM, DZ, JZ, GS, MD, MM, RA, RE, TS, EJ, MS, LC informs us that W8MKS is en route to the Galapagos for another DX-Pedition, and stopped by for a visit with Bud Devine in the Canal Zone. Bud soon will be on the way back to the Galapagos, and probably will be back on the air as HC8GL. Traffic: KZ5SW 113, OB 91, UJ 90, OA 71, AD 67, RJ 30, VF 21, UR 19, RM 5, CC 3, LC 3, RV 3, VR 3.

SOUTHWESTERN DIVISION

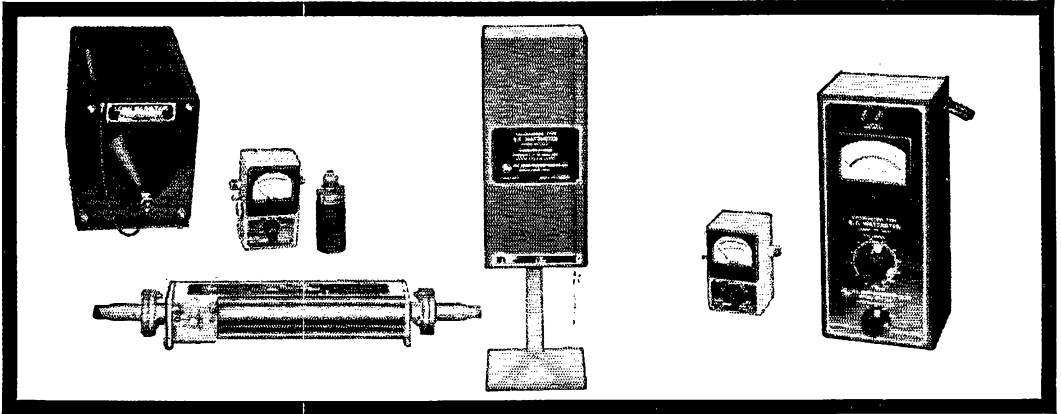
LOS ANGELES—SCM, Albert F. Hill, jr., W6JQB—SEC: W6LIP. RMs: W6BHG and K6HLR. PAMs: W6BUK and W6ORS. The following stations made BPL in December: W6GYH, K6WAH, K6OZJ, W6BHG, W6WPF, K6LVR, K6JSD, W6ZJB, K6EA, W6EEO and K6PXQ. Congrats, fellows! W6ORS is busy with a new home and mountain cabin. W6NAA's XYL presented him with harmonic No. 3! New officers of the Radio 50 Club are W6USY, pres.; W6ORS, secy.; W6GYH, treas.; W6RH, dir.; W6OCT, sgt. at arms. K6COP has the new integrated break-in system working. K6TJG is on s.s.b. with a 20-A and an LN-1. K6TPL still is knocking off strings of JA stations on 40 meters. W6FB has a new 220-volt service for the shack and is sorting out gear. K6PZM now is an MARS station. Congrats, Joe! W6GTE is the new treasurer of the L.A. County Employees Assn. Congrats, Virge! W6DHA is running six watts on 2 meters to a ground-plane. K6CLS/6 is putting up a new 20-meter beam. W6AM is chasing VU2ANI for a new one on phone. W6OIV is working some fine DX on 15 meters. W6RPH is sporting a new '60 Ford. K6UNM reports some good openings on 6 meters. W6SRE visited several hams in Oregon while there on business. K6PXQ worked a W1 on 8 meters running one-watt f.m. Nice going, John! Support your section nets: On c.w., the SCN meeting nightly at 1900 PST on 3600 kc., and on phone, the SoCal Six Net meeting nightly on 50.1 and 50.4 Mc. at 1900 PST. Traffic: (Dec.) W6GYH 1908, K6WAH 1032, K6OZJ 802, W6BHG 766, W6WPF 690, K6LVR 885, K6JSD 633, W6ZJB 584, K6EA 451, W6QR 422, K6CLS/6 416, W6CCKR 327, K6LJY 239, W6EEO 237, K6PXQ 178, K6GGS 129, K6PZM 94, W6USY 70, K6SIX 57, K6TPL 55, W6CK 42, W6DHA 32, W6DWP 29, W6BUK 23, K6COP 15, K6MSG 14, W6SRE 13, W6NAA 5, K6PLW 2, K6TJG 2, (Nov.) K6MICA 2020, W6ZJB 682, K6JSD 123, K6HVC 112, K6TPL 27, W6SRE 20, K6PYP 13.

ARIZONA—SCM, Cameron A. Allen, W7OIF—SEC: CAF, PAM CRN: PAIZ. Operation 52 put on by both the OPRC and the CRC of Tucson was a success. 88.3 per cent of the children were able to talk to their parents on Christmas Day. I don't have the calls of all those who took part but HEW, FEV, K7HYO and K7CET were the spark plugs. HEW is leaving Tucson

(Continued on page 160)

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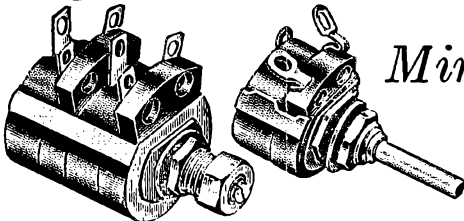
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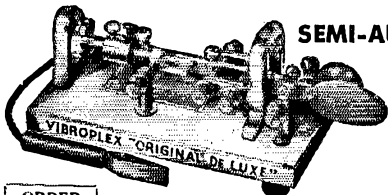
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to take up residence in Missouri, 9GDM wishes to thank K7CCI, K7GRU and K7CXB for the many hours they spent keeping him in contact with his brother in Phoenix when his wife became ill here and passed away. On Dec. 11 SEC CAF and myself attended a joint meeting of the OPRC and the CRC in Tucson. We had a very nice trip and enjoyed meeting the group, many of whom were new to us. The Christmas Party of the AARC in Phoenix was the largest ever. The large meeting room of the United Fund Bldg. was overflowing and many came from other parts of the State. Traffic: W7PVD 177, AMM 74, OIF 27, CAF 9.

SAN DIEGO—SCM, Don Stansiter W6LRU—W6YKF and his XYL W6AEVU are both active with a Viking I from Potrero, about two miles from the Mexican border. The newest ARRL affiliated club in the section is the El Cajon Valley High School group, WA6CDD is treasurer, and reports they have a DX-100 and an AF-87 on the air, K6TPT, our OO in National City, reports his Globe Chief is on phone and c.w. all hands with a new 70-ft.-high sky hook, WA6AEQ, in Imperial Beach, saved money from his paper route and now has an HQ-110. The South Bay Amateur Radio Society, at this early stage, challenges all other clubs in the section on the Field Day coming up in June. Wow, such optimism! K6TXR, phone DXer in San Diego, received Worked All ZL certificate No. 1 for phone. The new officers of the San Diego DX Club for 1960, elected at the December meeting at the home of W6LRU are W6RCD, pres.; W6OME, vice-pres.; and W6NXP, secy.-treas. K6BX, of Bonita, is a new member of the DX Club. W6CAE is now active on 10 and 15 meters with his new Triband beam. Five stations in the section made BPL for December, and the traffic total was 7908, an all-time high. Traffic: W6YDK 4056, W6EOT 2053, K6BPI 1383, W6IAB 702, WA6CDD 318, W6ELQ 282, WA6ATB 75, WA6DJS 42.

SANTA BARBARA—SCM, Robert A. Hemke, K6CVR—SEC: K6EAAQ. The Ventura County Radio Club's Annual Dinner was attended by K6QBF, HAV, ARK, OFO, CVR, W6AINE, KCD, W6RST/6 and their XYLs. After dinner everyone adjourned to W6KCD's QTH for coffee and a ragchew. K6UOT was appointed EC for the Oxnard Area. The Santa Barbara Radio Club did not hold a meeting in December. K6VMN has returned from a vacation in Missouri. K6KPI recently bought a complete station—an RA1E 182 receiver, a Q5-er, a Harvey-Wells Bandmaster transmitter and a 10-meter beam. K6BF was heard on 3515 kc. by K6VQV. The Paso Robles Radio Club presented W6FXW with an engraved Deluxe Vibroplex at its Annual Christmas Party. Our newest licensee in Paso Robles is W6GJJ. Traffic: WA6BLM 370, W8YCF 19, K6CVR 8, W6PYW 4.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, 5NFO. SEC: K5AEX, PAM: BOO, RM: K5ETX, K5MBB got on a building spree and came up with a new VT keyer, a c.w. and phone monitor and a 6- and 2-meter converter. GOS has a new jr. operator, K5BWL and K5BWL Jr. are operating in Clovis, N. M. QOV did a fine job handling traffic when the ice storm put all telephone lines out of order. K5DEN is back on the air in Plains, Tex. K5KIF is back in Denver City, Tex. KYM was busy handling traffic for the telephone and power companies during the ice storm in December. K5IBB is new assistant manager for the NTO Traffic Net. K5AEX brags about the Christmas present he received, a boy born Christmas Day. K5BKH is the proud owner of a new Collins S/line. BKH, GY and UTW made BPL. LR reports progress in the organization of the Quarter Century Wireless Association. You old-timers should contact LR for information and join. The suggestion has been made that the North Texas Emergency Net hold a training session each week, the first subject to be "Motor Vehicle Laws." It sounds like a good idea. Judging from the reports I get from official Observers it would be a good idea to start a training session on FCC regulations and amateur operation. All members of the Division extend their sympathy to Mrs. and Vice-President Groves, NW, on the loss of his mother, Mrs. Francis Marvin Groves, Jan. 5. Traffic: W5BKH 636, UTW 544, GY 504, ACK 235, BOO 98, K5BKH 91, W5VEZ 54, ACD 47, KP8 39, K5IRB 36, RAV 29, IMC 19, W5LR 17, COP 13, K5PXY 12, W5KYM 11, MBR 10, HWN 7.

OKLAHOMA—SCM, Adrian V. Ren, W5DRZ—New OPSs: BNP, K5DLP, LYM and JOA. New ORSs: K5INC, QEF, DYW, YGW, W5WDD, WAX, UCT and DRZ. Official Bulletins are read on 80 and 40 meters, s.s.b., c.w. and a.m. Ask for an OBS schedule on OPEN or from the SCM. New OBSs: RST, VAX, K5AUX, (Continued on page 168)

NEW AMECO 2 & 6 METER CONVERTERS

2-METER FEATURES INCLUDE:

- Crystal controlled.
- New 6ES8 high gain, low noise, cascode first RF amplifier. 6U8A second RF amplifier-mixer. 6AU6 oscillator.
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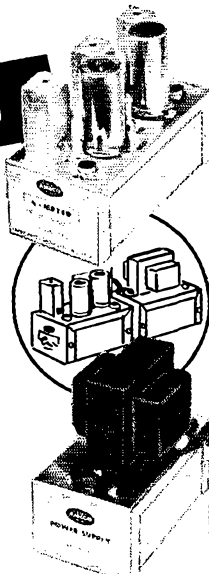
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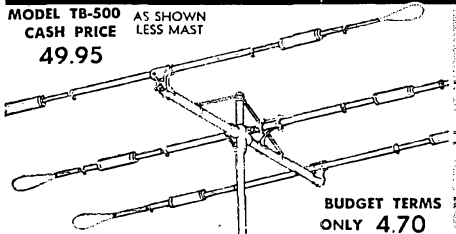
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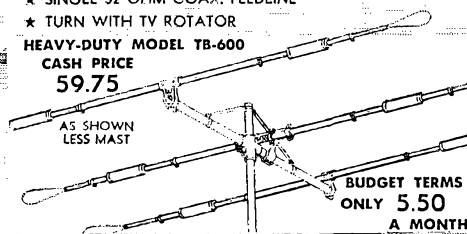
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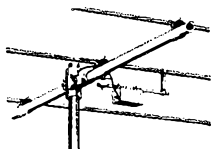
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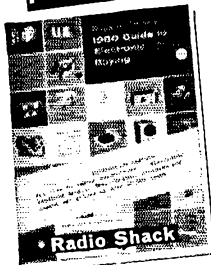
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K5ELG and K5REH. CFF, TNV and IER are building the s.s.b. rig in Nov. QST. YJZ is mobile. K5JEA, ERV and EHC worked HC8JU. The SCM listened to the Muskogee AREC drill Dec. 28 and must say that the gang is developing a fine AREC. WAX is EC. We regret to learn of the death of K5ISE, Perry, Okla. Virgil was just getting started as EC of Noble County. Fifty-four amateurs took part in the State Civil Defense Drill Operation Roetgen on Dec. 7. Amateurs gave a good account of themselves. K5AUX is sporting a new HQ-170. IWL made 700 contacts in the Sweepstakes. His NYL, K5BNQ, took part in the YLRL Contest and came out with WAC/YL, DXYL and other certificates. GQ gave a very interesting talk on his recent trip to Ethiopia at the Enid Hamfest. Traffic: (Dec.) K5JGZ 320, W5DRZ 283, VVQ 226, K5CAY 207, USA 159, W5JXM/5 158, EJK 109, FEC 90, KY 81, K5QEF 56, CBA 52, DLP 47, ELG 47, DUJ 45, DJA 41, W5UYQ 38, MFX 37, SWJ 32, WAF 29, K5OJD 24, QEE 22, W5CCK 20, PNG 20, K5INC 17, LUR 15, W5WDD 15, K5JOA 14, W5EHC 13, K5EZM 11, YGW 10, LYM 9, QZJ 3, W5IER 1. (Nov.) K5DLP 23, BAY 8, BNQ 7.

SOUTHERN TEXAS—SCM, Roy K. Eggleston, W5-QEAM SEC: QKF, PAM: ZPD, RM: K5BSZ, K5GSA was the winner of the Worked All El Paso Contest with 14,168 points. K5KO was second with 11,180 and NGW third with 11,097. HYG and his XYL are known as the travelingest couple in El Paso. The Sun City Amateur Radio Club has its TVI committee in operation. The 7290 Traffic Net had 44 sessions, 1514 stations and 1069 messages. Good work, gang. The Corpus Christi Amateur Radio Club had an FB Christmas Party. The San Antonio Radio Club honored K5DKM for his good work as chairman of the TVI committee. This is one of the most important jobs in a club, and these members deserve all the honor and credit a club can give. The v.h.f. gang in San Antonio still manages to work DX on 6 meters. K5BSZ soon will be on phone with a new s.s.b. exciter. K5MMV was heard mobiling over Alabama way. CWS still is building 6-meter gear for the 6-meter emergency net. ZTB is getting the rig installed in a new Falcon. K5DEG can be heard on mobile. UXO's big cat has been sighted in the big thicket. It chased a wood crew out recently. Why don't you catch him, Bob? Congratulations to K5MNO and K5LGH on making the BPL. Traffic: K5MXO 194, W5BHO 110, K5LGH 110, BSZ 28, W5ZPD 21, K5RYS 18, WIC 18.

CANADIAN DIVISION

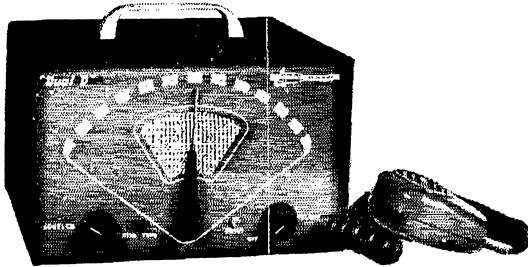
MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCMs: A. D. Solomon, VE1OC, and H. C. Hillyard, VO1CZ. SEC: BL. New appointments include VO2AW as OPS. AAW is operating s.s.b. as VO2AD from Hope-dale, Labrador. Congratulations to OC, who makes DXCC with 102 countries. VO2NA adds WACAN, WFRG, DVQ, WRA and WWCNY (first to a VE station) to his already long list of awards. VO2AW has a new vertical antenna. OM reports that the Maritime Keyers Net is operating at 2000 daily on 3577 kc. with a good turnout but is looking for more members, especially from Cape Breton. OZ reports that AFO, KH and LV are now in Moncton with CPR Microwave. Here is a suggestion for clubs having trouble collecting membership dues! The Halifax Club holds its meetings at the Police Station and members must show their membership cards to the officer on duty before gaining admittance. Deepest sympathy is extended to the family and friends of ZL, who passed away recently. Traffic: (Dec.) VE1ADH 25, DB 20, BY 18, OM 14, FF 13, OZ 10, CL 2.

ONTARIO—SCM, Richard W. Roberts VE3NG.—One of the nicest Christmas presents was the issuing of auto license plates to the VE's in Manitoba. Congrats, boys. We in Ontario envy you. Let's keep working toward getting ours. NF was in Toronto for an operation and is well again. Mike Dun has the call 3DUN. The Nortown Old Timers Assn. held a grand reunion in December. Twelve of the O.B.s. had a good time. DTO has returned from the West. DXZ is on 10 meters. BZA had a busy time handling traffic for the boys in the Arctic to Ontario folks during Christmas. The ice storms in Ontario caused many of the gang to lose their antennas. Recovery has been slow because of bad WX. CH and DEX have left our country and are located in Jamaica. Look for them on 10 or 20 meters. By the time you read this the "Sport-man" Show in Toronto will be in the offing. Look for the call ONE from there with traffic. Drop in and visit the booth. Five new hams are operating in the Sarnia Area—CXF, CXL, CNZ, CYF and CYE. BXI is trying for WAS on 80 meters. The Ottawa Valley Mobile Club will announce its new officers soon. GX is owner of a home-brew

(Continued on page 164)

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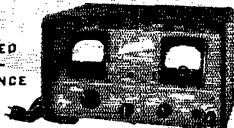
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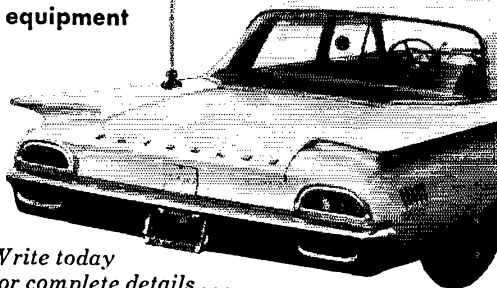
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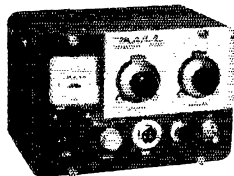
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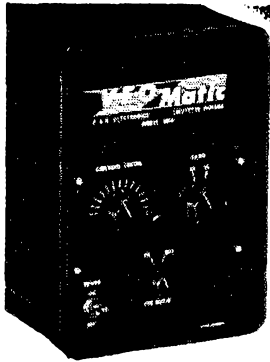
organ. The Quinte ARC voted in RW, pres.; EHT, vice-pres.; BNT, secy., BOB, treas. The London Net is on Sun, at 1100 on 3750 kc. CFR was reelected president of the London Club. ELO is now in Quinte District. I was glad to hear from the Sudbury Club, which has a nice paper and a good program. Thanks CNV, keep the news coming. OM NG and his XYL DZA thank all of you for your kind Holiday Greetings. DPO excelled himself with his Christmas issue of *GBRA News*. Traffic: (Dec.) VE3DPO 147, NG 115, NO 78, AUH 76, CFR 30, DZA 29, DTO 28, DWN 27, KM 19, RW 19, RN 18, CO 16, EHL 13, PR 9, AVS 8, DH 7, DLC 5, AMZ 4. (Nov.) VE3CK 20.

QUEBEC—SCM, C. W. Skarstedt, VE2DR—More VE2 hams are requested to join the QON C.W. Net, which operates daily on 3535 kc, at 1900. After 28 years DR finally made the BPL WT seems to make it every month. BG is unofficial president of the Professional Loafers Club, OO and BE are active members. Very successful Christmas Parties were held by the Montreal and South Shore Clubs. KN is back and now runs a DX-40 and an NC-100 receiver. XO, at Yamachiche, always has a hefty but clean signal on 75-meter phone. APC does well on 20 meters with parallel 807s. QO, at Pointe Claire, operated out West as VE6AF during the summer. PT divides his operating time between Verdun and Rawdon. His 6L6 does well. It is rumored that the gang at CBC has started a ham club. AGI now operates in Montreal. ACS is on 20 meters with a converter coupled to a 10 Set. An interesting contest was sponsored by a Montreal firm, and by working a certain station at Payette, Idaho, PD won a nice receiver. The Morning Coffee Club is heard on 75 meters between 0815 and 0845. IC presides and VV, AKN, TY, MH and JE are active members. XX still is building s.s.b. but basement renovations receive priority. TY is expected on s.s.b. VV joined the Ottawa Valley Mobile Amateur Radio Club. In last month's column we mentioned the possibility of a second QSL Bureau operating. This proved incorrect and our apologies to ABE who, through kindness, distributed a batch of old QSL cards. The postman isn't exactly getting fallen arches from the weight of mail brought to your SCM each month. A few more reports would be appreciated. Traffic: VE2WT 817, DR 256, WA2CNS/VE8 212, VE2HG 40. EC 31.

BRITISH COLUMBIA—SCM, Peter M. McIntyre, VE7JT—Guess we are back in the groove after an absence of some months. KX has resigned as SEC and APH as EC for the Western section. Thanks to both for the fine job they did. The BCEN is doing yeoman service as you have been informed by AOT, its net mgr. Congrats to AAF on making BPL. It seems Brent is doing most of the message-handling between BCEN, RN7 and TCC. The VARC's Annual Christmas dinner was attended by 26 members and their XYLS. KX holds code classes on 80 meters Tue. 2130-2200 on 3650 kc. AIK recently married. ACK tells the Nanaimo hams after a recent visit to Holland, that they are not so bad off after all. XN, formerly 2XR, is a recent arrival to VE7-Land. SEC, RM and other appointments are open. Traffic on BCEN held high in December, in relation to the number of check-ins. JQ and YB held the net together during the entire period. AEC and AAF are back in the swing now that the school exams are over. BCEN constantly is on the lookout for new members, particularly in interior points. ALV is working on a 50-in. model of a CESSNA 170, radio-controlled on 6 and 2 meters. Any ideas on special stunts, etc., for performance will be appreciated. Address E. D. Hull, Bull Harbour. B. C. ABQ is wielding one of the most potent signals on 75 meters. AUF still is working on cleaning the Viking I of TVI. Ex-RM TF made a quick showing on 80 meters after several months on 40-meter RTTY. ALY is gradually turning the helm over to other prominent stations on the BCAREC Net, in preparation for his absence which will be necessitated with the removal of his present repeater station to another location atop a mountain. Nominations are open until Feb. 29 for manager of BCEN. Eligibility lists for votes will be placed by QNC message each Wed. and Thurs. until Mar. 15. AIY will be one proud papa by the time this is in print. JQ and YB are recommended for SNC; JQ for ORS. Thanks to AOT for the news. Traffic: VE7AAF 456, JQ 161, KX 66, AOT 58, AMW 14, XN 7.

MANITOBA—SCM, J. Elliott, VE4IF—The Manitoba ARRL Phone Net has now been divided into a Northern Net and a Southern Net. The interest in the Manitoba ARRL Noon Phone Net is almost non-existent. HB is getting the rig fired up now and again and we occasionally hear him on 75 and 10 meters. UR is appearing on 75 and 10 meters once in awhile. TE has a new Apache transmitter. NZ works c.w., a.m. and s.s.b. VJ keeps busy on s.s.b. on 20 meters. CB and BR, Ethel and Bris, keep knocking off the DX on

(Continued on page 166)



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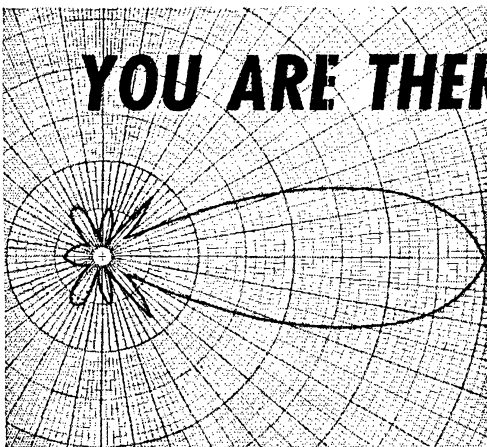


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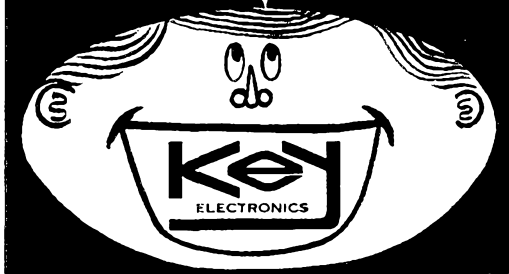
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20 meters. We hear these people occasionally on 75 meters. EG has been operating portable from Dunree, where he is staying for the winter. We understand that JQ has TVI, but occasionally his mobile signal reaches Winnipeg. PH has been quite active on 10 and 20 meters. GX, BG, BR and CB also have been quite consistent on 20 meters. Has anyone heard RK? A new voice on 75-meter phone is RA. Traffic: VE4SL 62, KF 51, AV 16, PE 15, JY 14, MW 10, RB 6, BR 5, XP 5, IW 4, PA 4, RR 3, TE 2.

SASKATCHEWAN—SCM, Lionel O'Byrne, VE5LU—The long-awaited news has arrived. VE5 boys will have their call letter license plates on their cars for 1960. KY has a new "V" beam. QL remodeled his mobile. EN has a new SB-10. RE has a new QTH—Kindersley. New phone stations in Saskatoon are HQ, CR and QC. Transmitter troubles have been repaired at HQ and HX. DC, at Smtaluta, is on phone. DG has made some nice contacts in W-Land on RTTY. We regret the passing of Olive, the NYL of JK. Our sympathy, Jack. LE is having good luck with s.s.b. XX is back with his smoke signals. WP spent a few days in VE4-Land. NA, of Swift Current, was in Regina looking for a transmitter. The Sask. Amateur Radio League has been activated again to handle the license plates for VE5 and has 240 members at present. The club address is P.O. Box 842, Regina. Traffic: (Dec.) VE5QL 36, DS 21, FU 21, LM 18, DR 15, BF 14, LD 10, EO 9, HF 8, NX 5, PQ 5, HX 3, RE 1. (Nov.) VE5LM 22, CM 16, RE 13, QL 10, BF 6, WG 6, AT 5, HX 2, PQ 2.

QST

How's DX?

(Continued from page 85)

and RSB headquarters was a most memorable occasion. Harris had worked a good many of those VP9s present. "The society plans to move to a luxurious location in Hamilton City where a more elaborate VP9HDA operating facility will be installed. Most of the gang work 20 phone and c.w. regularly, with occasional stops on other bands. VP9DC presented me with a handsome pewter mug inscribed with his call and a map of Bermuda which he gives to all DXers having "eyeball QSOs" with him."

QVARA DX chasers are delighted at the performance of their six-meter club liaison net Jamaica, Swan, Pitcairn and the Marquesas are possible imminent operational layovers for *Yasme III* (VP2VB/min). W8LNI may sign aboard to make it a fearless foursome West Gulfers detect possible Cocon (TI90A) and Malpelo island (HK) landfalls by TG90A-TG90A, a Guatemala-to-Peru raft venture of ethnological import. Malpelo also remains the objective of W3PZV 4KVX and 9EVI after earlier delays. The final week ends of ARRL's 1960 DXtravaganza are target periods for other DXpeditionary efforts, too. Better stick around!

Ten Years Ago in "How's DX?"—Your March 1950 column commences with the questionable observation that DX pursuit seems more relaxed now that the postwar frantic '40s are behind us GD4UB, GM8UM and other Europeans score 160-meter two-ways with the States The 80-meter joint is jumpin' with CT3AB, EK1AO, HA4SA, JA2AZ, MI3SC, PY7WS, SPICM, SV0WH, TA3GVU, VP5BF, YO3RI and ZS5YF. Ws 4HRB and 2QH11 have garnered 75 and 62 3.5-Mc. countries respectively Our east coast is dazzled by daily daylight contacts with VK5KO and ZS2A on 40. Other 7-Mc. favorites are EA6AF, HA4SB, LX1BO, MD2PJ and PK5WB Steady 20 c.w. is good for C3MY, EP2A, FN8AD, FY8AA, HLIUS, MD7XP, MI3GH, PJ5RE, TA3s AA FAS, VRIAR, ZDs 4AM and 8B. On 14-Mc. phone there are AR8BC, CR5UP, HZ1KE, M1D, MI3US, VK1AD5, VS7s GR SV, VU7AH, W6COI/KB6, YK1s AA AC, YO7WL, ZCs 1AR 2AL and ZS8A Ten phone features EK1s AD CH, EQ3SAM, MD7HV, MF2AA, PK3SJ, ST2KR, TA3GVU, ZC6UNJ and ZD4AU Gossipwise we hear that there's a Spanish amateur radio boom ahead. ON4QF shipped forth 750 LX1QF QSLs. Well-worked MP4BAD terminates an 11-month Bahrain stand. FY8s become FY7s. HC8GRC Galapagos activity is imminent Alaal Poor Jeeves duels an eagle.

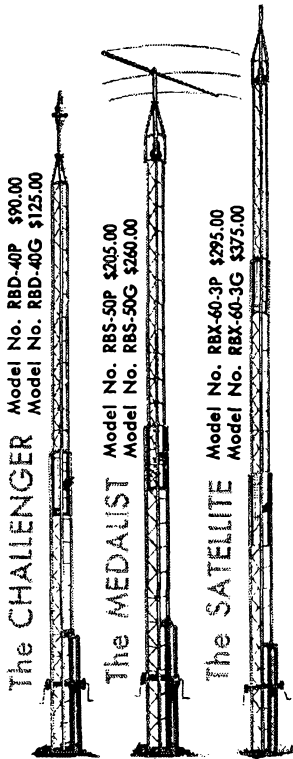
QST

The "Magkee"

(Continued from page 27)

to prevent more than one "bit" from being shifted when making a dash. Without this resistance, one dash is formed on closing the dash

(Continued on page 168)



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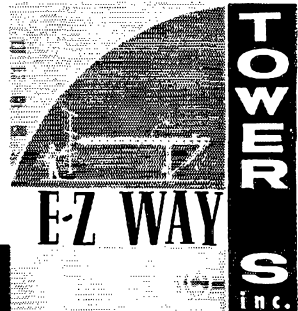
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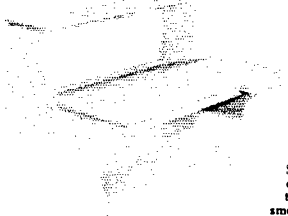
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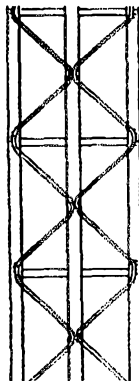
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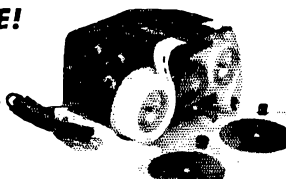
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contact of the key, but if the contact is kept closed the initial dash is followed by a series of dots instead of the desired series of dashes. The value of resistance required may vary with circuit tolerances, so it would be advisable to use a variable resistor and set it to the optimum value as indicated by best operation of the keyer. The design using the unijunction oscillator required no resistance.

Because of the higher peak-current requirement of this circuit it was necessary to add additional filter capacitance, C_1 , in the power supply.

General

The "Magkee" was designed more for the purpose of seeing what could be done in this field with magnetic cores than for any other reason, but it has nevertheless turned out to be a very satisfactory device for everyday operating. Since the dot-dash-space timing is oscillator-controlled the ratios of these time values are completely independent of speed within the range covered by the keyer, so there is no problem of maintaining the proper ratio when the speed is varied. For the same reason, the "weight" of the characters is not within the control of the operator except insofar as it can be affected by adjustment of the relay tension; the dots, dashes and spaces are performed integral multiples of the timing period. In the writer's opinion it seems a shame to provide a means for very accurately controlling the lengths of the dots, dashes and spaces -- as is the case in the "Magkee" -- and then provide for manual adjustment of these intervals to change them independently.

Since the oscillator is free-running the characters are not actually initiated at the instant of closing the key lever. This feature may cause some eyebrows to raise among electronic-key users, but I did not find it to be a disadvantage. In fact, the spaces between separately initiated dots and dashes within a letter are either accurately timed dot-length intervals or there is an error of one dot length -- there is no in-between. The spacing between letters is likewise an accurately timed multiple of one space length, and therefore tends to result in better-timed sending than is the case when a character is actually initiated by the key contacts. The only time when there is a noticeable delay between closing the contacts and the beginning of a character is at very low speeds -- around 10 w.p.m. -- and it is easy to get used to it. QST

Preventive Maintenance

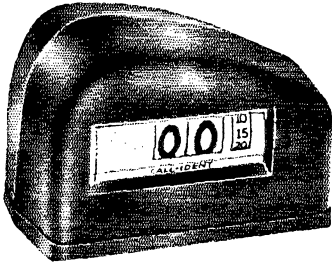
(Continued from page 22)

time you did. Do any of the feed-line wires show signs of wear -- maybe from rubbing against a tree? Be wise; repair or -- better -- replace it. If that antenna flat-top is over three years old, my friend, it is high time you replaced it, too. Yes, I know it may still be working and might work for some time longer; but chances are

(Continued on page 170)

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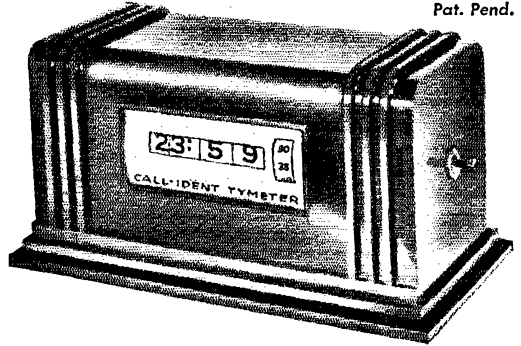
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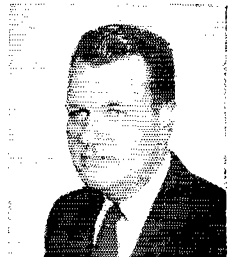
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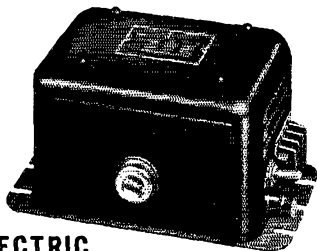


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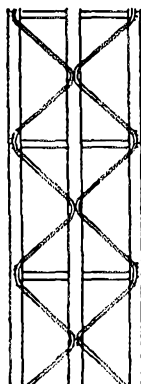
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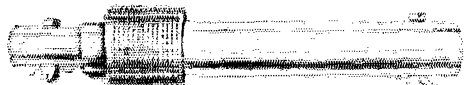
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that it isn't up to par because of rust or corrosion, and the connections to the end and center insulators (if used) may be in pretty sad shape after two or three winters of ice, rain, snow and sleet. Likewise, if you are using a lightning arrester (as you should be) its contacts need to be cleaned at least yearly, as should also any outside ground-pipe connections. Rust or corrosion in such a connection can have such high resistance that the ground might be ineffectual.

Well, that is just an idea of the kind of preventive maintenance that can save you a lot of headaches, breakdowns, and trouble shooting later on. It is indeed worth considering if one wants to maintain the reliability of one's rig, be it a Novice 35-watt or an old timer's kw. It is still true that a stitch in time saves one a lot of headaches. **QST**

Parasitic Beams

(Continued from page 46)

also a radiator.

A change in any one of these parameters is immediately reflected as a change in resonant frequency, with a consequent change in s.w.r. Under these circumstances there is no recourse but cut and try, a practical step procedure for which has been covered in a previous article.²

Of interest is Fig. 6, which shows a typical plot of change of s.w.r. with rotation of the antenna. This was made at 144 Mc., but at lower frequencies the "people," "metal table," and "floor lamp" might just as well be a tree, power line, or portion of the house. Which way was your beam pointed when the s.w.r. run was made?

As W2AWH³ points out, perhaps we are making a fetish of s.w.r., and in most instances it is just a conversation piece. But it's mighty comforting to know that yours is "right on the nose" (no pun intended!). **QST**

³ Beers, "Match, or Not To Match?," QST, September, 1958.

Geneva

(Continued from page 64)

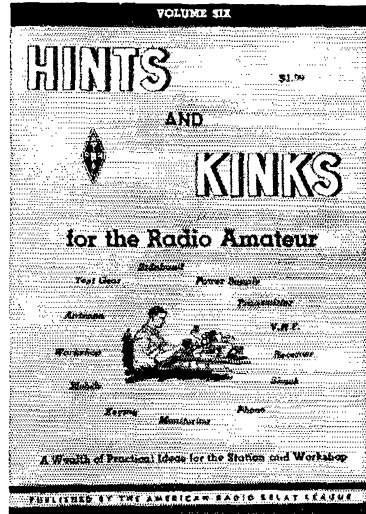
Atlantic City conference, as one of many possible examples.) Consideration of the resolution in Committee 5 came up the afternoon of Thanksgiving Day. It is impossible here to convey the sense of sheer drama of that session but when "the votes were in" the U.S. position prevailed and its resolution adopted for transmission to Committee 4. Thus we had broken through one major barrier.

But the battle was not yet over. Immediately following the meeting of Committee 5, C-4 met for what turned out to be a late evening session. Committee 5 chairman Dr. Joachim (OK1WD), conveyed the U.S. resolution but also spoke at length presenting arguments of the minority. This tended to start the wrangle all over again. U.S.S.R. offered a resolution authorizing out-of-

(Continued on page 172)

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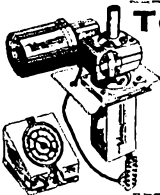
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band h.f. broadcasting stations to continue sharing such frequencies with other services until space could be found within the assigned bands, and it was supported by Bulgaria and Czechoslovakia. The U.S. spokesman in Committee 4 (W3ZM) pointed out that the action proposed by Russia would legalize out-of-band broadcasting and destroy the work of the Geneva and other conferences; he won his point when the Russian proposal was defeated, 33 votes to 11. As the discussion continued, the U.S. requested a vote on a motion to adopt the table of frequency allocations in *status quo* (except for very minor changes previously agreed) and by 39 votes to 1 the motion was adopted! The remainder of the allocation table then began to slide through, progressing relatively smoothly (to 1600 Mc.) until it was necessary to stop at nearly midnight because of sheer exhaustion of many of the delegates (and the fact one of the translators kept falling asleep!). But the remainder of the table was no problem in a subsequent session and the allocations part of the conference became, for all practical purposes, a settled matter.

Non-Allocation Matters

And that nearly finishes our story. Regulations affecting amateurs in non-allocation matters were substantially continued as in Atlantic City — e.g., definition of the amateur service. Article 41, "Amateur Stations," continues the ACy language except that responsive to proposals by Australia and Czechoslovakia it was amended to grant individual governments the right to issue amateur licenses without an examination in code when only frequencies above 144-Mc. will be used (the present figure is 1000 Mc.).

For the record, we publish herewith pertinent language:

Amateur Service: A service of self-training, intercommunication and technical investigations carried on by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.

Amateur Station: A station in the amateur service.

ARTICLE 41 Amateur Stations

1. Radiocommunications between amateur stations of different countries shall be forbidden if the administration of one of the countries concerned has notified that it objects to such radiocommunications.

2. (1) When transmissions between amateur stations of different countries are permitted they shall be made in plain language and shall be limited to messages of a technical nature relating to tests and to remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunications service is not justified. It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties.

(2) The preceding provisions may be modified by special arrangements between the administrations of the countries concerned.

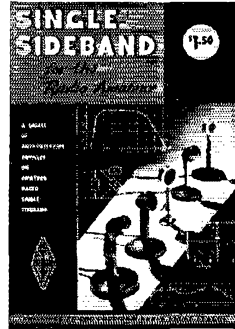
3. (1) Any person operating the apparatus of an amateur station shall have proved that he is able to send correctly by hand and to receive correctly by ear, texts in Morse code signals. Administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 144 Mc/s.

(2) Administrations shall take such measures as they judge necessary to verify the technical qualifications of any person operating the apparatus of an amateur station.

(Continued on page 174)

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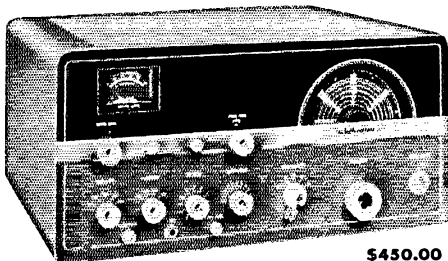
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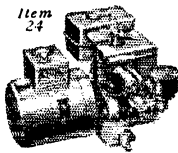
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4. The maximum power of amateur stations shall be fixed by the administrations concerned, having regard to the technical qualifications of the operators and to the conditions under which these stations are to work.

5. (1) All the general rules of the Convention and of these Regulations shall apply to amateur stations. In particular, the emitted frequency shall be as stable and as free from spurious emissions as the state of technical development for such stations permits.

(2) During the course of their transmissions, amateur stations shall transmit their call sign at short intervals.

As we indicated earlier, the effective date of the new Geneva regulations is May 1, 1961.

The Future

While we have now drawn the final curtain on the Geneva story as related from the standpoint of the amateur radio service, this report would not be complete without a few words as to the future. Although no date has been set for a subsequent world conference, general indications are that there is a possibility one will be held within the next five years. For one thing, the Geneva conference set up machinery for an international "Panel of Experts" to study the increasingly serious problem of congestion in all the bands between 4 and 27.5 Mc. There is no definite timetable for the work of this group but it is contemplated that they might hold meetings in 1961 and 1962, after considerable preliminary fact-finding work by the International Frequency Registration Board. Then the ITU Administrative Council (roughly equivalent to a board of directors) must, after examining the report of the Panel of Experts, eventually decide whether an Extraordinary Administrative Radioconference should be called for the purpose of acting on the report. A second indication is that there were informal expressions of sentiment favoring the holding of some kind of conference in the year 1965 because that is the 100th anniversary of the founding of the ITU organization. Thus, while no date has been set, it is possible that an international radio conference in one form or another will be held within five years. Whatever the date may be, the League again will represent the amateur radio service — in the extensive preparatory work as well as at the conference itself.

Strays

In January **QST** WISNN ("The S.S.B. Package Plus") offered full sets of drawings of the mechanical layout merely for the postage. However, he has now run out of these drawings, with many requests unfilled. If you'd like copies, please send him 55¢ per set to defray reproduction and postage expenses.

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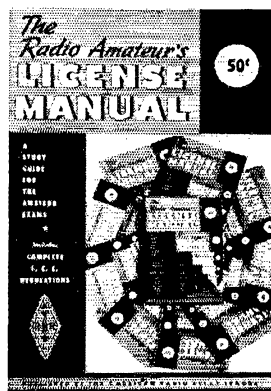
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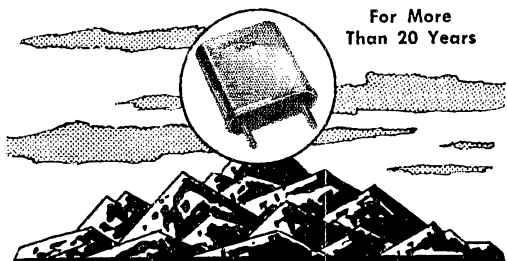
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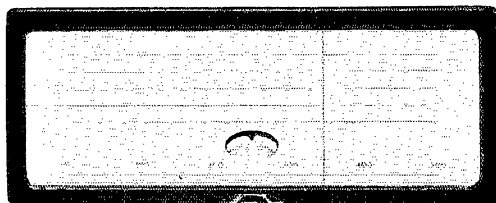
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TRANSFORMERS (3) W2EWL Special. \$3.00 postpaid. SSB, latest design, 1000 VA, 3 xfrms, disc ceramic mica condenser coils L1 thru L7 for W2EWL Special (Mar, 1956 QST), \$10.95 postpaid. Vitale, W2EWL, Denville, N. J.

ANTENNA 80-40-20-15-10. \$21.95. Patented. Lubin, W4JRW, Box 44, Owensboro, Ky.

WANTED: All types of transmitting & receiving tubes including Klystrons, Magnetrans, special purpose, also military or commercial air ground test or ham gear. Ted Dames, W2KUW, 308 Hickory, Arlington, N.J.

DON'T Fail FCC tests! Check yourself with a time-tested "Sure-check Test". Novice, \$1.50; General, \$1.75; Extra, \$2.00. We pay the postage. Amateur Radio Specialties, 1013 Seventh Ave., Worthington, Minn.

1000 400V DC capacitors. \$5.00 each, or 2 for \$9.00. F. G. Dawson, 5740 Woodrow Ave., Detroit 10, Mich.

HAMS! In Central Illinois, it's Knox Electronic Supply, Inc. Where your trade-in is always worth more. 67 N. Cherry St., Galesburg, Ill.

COAXIAL Cable. New surplus RB-54A/U. 58 ohms impedance—30 ft. prepaid, \$1.00. Radio magazines, buy, sell, trade. R. Farmer, 3009 No. Columbia, Plainview, Texas.

HAM licenses, resident courses. Novices and General classes, 3 evenings weekly, Delchancy Institute, 117 East 11th St., New York City 3, N. Y. Tel. GR 3-6900.

MOBILE Hams! Stop generator whine ignition noise regulator clicks. \$5.25 postpaid. Specify frequency. Gerald Electronics, 19 Salem St., Cos Cob, Conn.

"PIG-IN-A-POKE?" Not if you visit Ham Headquarters, USA and see and choose from the hundreds of "Like-New" bargains in the world-famous Harrison Trade-in Center. More for your money, because tremendous turnover makes lower overhead! Terms, trades. Send postcard for mouth-watering photograph and price list Q-6. For the best in all new and used equipment, it pays to come to "Ham Headquarters, USA" (BCNU), 73, Bill Harrison, W2AVA, Greenwich St., New York City, N. Y.

USA DX QSL Comp. Box 5938, Kansas City 11, Mo. Save time and \$ DX QSL ing. Only 1¢ per card after membership. \$2, 3 yrs. \$5.00, 10 years. QSL Bureau. Return env. service, \$1.50 year. Free info.

MOTOROLA used FM communications equipment bought and sold W5BCO, Ralph Hicks, 204 E. Fairview, Tulsa, Okla.

WANTED: Military or Industrial laboratory test equipment. Electronicraft, Box 399, Mt. Kisco, N. Y.

FREE Flyer monthly, Electronic surplus. Kurtz, 702D Bay, Staten Island, N. Y.

KWS-1, Serial 246. All factory modifications. Spare 4X250B. Will send through factory for complete check. Take receiver or airplane in trade or \$1250 cash. K0DUI, 2990, 15th Ave., Marion, Iowa. Jim Newton.

S.S.B. xfrms, exact set of 3 (hermetically sealed) for W2EWL Special, brand new, \$3.00 postpaid. New compact G-E 100-watt modulation xfrm, multi-impedance (10 lbs.), \$6.25; new Eimac vacuum condenser, 12ufd at 32 kilovolts, \$5.50; G-E Pyranols, 20 uf at 1000 v.d.c. (330 v.a.c.) plus min. 4 for \$6.00; 4 uf at 1000 v.d.c. (330 vac) min. 4 for \$3.50. Please include postage, no c.o.d.'s. Tucker, W2HLT, 51-10 Little Neck Parkway, Little Neck 62, N. Y.

QSL'S? SWL'S? Finest and largest variety samples, 25¢ (re-funded). Callbooks (Spring); American calls, \$5.00; foreign calls, \$3.00. Religious QSL samples, 10¢. Sakkers, W8DED, P.O. Box 218, Holland, Mich.

QSL-SWLS, 100, \$2.85 up. Samples 10¢. Griffith, W3FSW, 1042 Pine Heights Ave., Baltimore, Md.

QSL, Glossy 2 and 3-colors. Attractive, distinctive, different, 48-hour service. Samples 10¢. K2VOB Press, 62 Midland Blvd., Maplewood, N. J.

QSL'S "Brownie," W3CJ1, 3110 Lehigh, Allentown, Penna. Samples, 10¢ with catalogue, 25¢.

QSL-SWLS, Samples 10¢. Malgo Press, 1937 Glensdale Ave., Toledo 14, Ohio.

FAST Service. Send stamp for QSL samples. Koster, K2UAX Press, 2941 Ewell Place, Wantagh, L. I., N. Y.

DON'T Buy QSLs until you see my free samples. Bolles, 7701 Tisdale, Austin 5, Texas.

QSLs, Cartoons, colors, samples 25¢. Chris, W9PPA, 365 Terra Cotta, Crystal Lake, Ill.

QUALITY QSLs, Samples and prices, 10¢. Savory Press, 172 Roosevelt Rd., Weymouth, Mass.

QSL'S New design, lower prices, fast delivery. Catalog 25¢ (coin only), refundable. Dick Crawford, K6GJM, Box 607, Whittier, Calif.

QSLs, Twenty exclusive designs in 3 colors. Rush \$3 for 100 or \$5 for 200 and get surprise of your life, 48-hour service. Satisfaction guaranteed. Constantine Press, Bladensburg, Md.

C. FRITZ says, "Is your QSL as sharp as your signal?" Be proud of both! Samples 25¢ deductible. 1213 Briargate, Joliet, Ill.

CREATIVE QSL and SWL Cards. Are you proud of your call? If not let us print your next order. Write for free samples and booklet. Personal attention given to all requests. Bob Wilkins, Jr., KN5ZMT Creative Printing, P. O. Box 1064-C, Atascadero, Calif.

QSL-SWLS, Samples free. W4BKT Press, 123 Main, McKenzie, Tenn.

QSLs Samples dime. Sims, 3227 Missouri Ave., St. Louis 18, Mo.

QSL Samples, 10¢. Refundable. Also net award certificates and membership cards. W3KJP Press, 1806 Water St., Westleyville, Penna.

QSLs, Taprint, Union, Miss.

SUPERIOR QSLs, samples 10¢, Ham Specialties. Box 3023, Bellaire, Texas.

QSLs, 3-color glossy, 100—\$4.50. Rutgers VariTyping Service, 7 Fairfield Rd., New Brunswick, N. J.

PICTURE QSL Cards of your shack, home, etc. Made from your photograph. 1000, \$12.00. Raum's, 4154 Fifth St., Philadelphia 40, Penna.

QSLs, Get the best from DX. Samples 25¢. Payne, 2 Kulik St., Clifton, N. J. Shop telephone GR909 3-4779. Home: GR909 1-7885.

QSLs WAT, Box 1, Brecksville, Ohio.

QSL's-SWL's, That are different, colored, embossed card stock, and "Kromekote." Samples 10¢. Turner, K8ALA Box 953, Hamilton, Ohio.

GLOSSY QSLs, 100, 4 colors, \$3.50. Others less. Samples 10¢. Dick, WRVXK, 1018 Arthur, Mt. Pleasant, Michigan.

QSLs, \$1.00. Riesland, Del Mar, Calif.

QSLs, Label pins, samples dime. Kephart W2SPV, 4309 Willis, Melrose, Ill.

QSLs-SWLS, XYL-Oms (sample assortment approximately 90¢), covering designing, planning, printing, arranging, mailing, eye-catching, comic, scudate, fantabulous, DX-attracting, prototypical, snazzy, unparagoned cards (Wow!). Rogers, K6AAB, 737 Lincoln Ave., St. Paul 5, Minn.

DELUXE QSLs, Petty, W2HAZ, Box 27, Trenton, N. J. Samples, 10¢.

QSLs, SWLS, Samples 10¢. Onondaga Press, Onondaga, Mich. QSLs Samples, dime. Printer, Corwith, Iowa.

QSLs-SWLS, reasonable prices. Samples free. Robert Bull, WIBX1, Arlington, Va.

QSLs, Samples free. Phillips, W7HRG, 1708 Bridge St., The Dalles, Oregon.

QSLs, High quality, low prices. Fast service. Samples 10¢. Dave, 601 E. Maude, Sunnysvale, Calif.

QSLs, Stamp brings samples. Eddie Scott, W3CSX, Fairplay, Md.

QSLs, SWLS, Reasonable. Paye, W4ZKK, 824 Avandale, Cocoa, Fla.

QSLs-SWLS, 100 2-color glossy, \$3.00. QSO file cards, \$1.00 per 100. Samples, 10¢. Rusprint, Box 7507, Kansas City 16, Mo.

QSLs: Send 25¢ (refundable) for samples. W6CMN, Schuch, 6707 Beck Ave., North Hollywood, Calif.

QSLs-SWLS, Free Samples. Spicer, 4615 Rosedale, Austin 5, Texas.

QSLs-SWLS, 3-colors, 100 for \$2.00. Samples, dime. Bob Garra, Lehighton, Penna.

QSLs-SWLS, distinctive, reasonable. Samples 10¢. Al-Mar Crafts, Box 6052, Riverton Heights, Washington.

QSLs-SWLS, file cards. Samples 10¢. W0YLU, Wahler, Pleasant Hill, Mo.

RUBBER Stamps for hams, sample impressions. W9UNY, Hamm, 542 North 93, Milwaukee, Wisconsin.

WANTED: Johnson Matchstick, in new condx, also 52 to 52 ohm balun coil. K6MQJ, 400 Arenas, Palm Springs, Calif.

REWARD of twenty-five dollars (\$25.00) for information leading to or the obtaining of small control box type No. CI057/ARC34. Send C.o.d. to Ted Dames, W2KUW, 64 Grand Pl. Arlington, N. J.

WANTED: Commercially built Single Sideband transmitting and receiving equipment like Collins or equivalent. Al T. O'Neil, Lake City, Minn.

LEECE-NEVILLE 6 volt 100 amp. system—alternator regulator and rectifier, \$45; also 12 volt 100 amp. system, \$85. Guaranteed no ex-police car units. Herbert A. Zimmerman, Jr., K2PAT, 115 Willow St., Brooklyn 1, N.Y. Tel. ULster 3-3472 or Jackson 2-2857.

NEW Service for amateurs. List your equipment for sale. Let us know your needs. No charge to buyer, small brokerage fee to seller after transaction. W2EJL, Herbert Greenberg, 821 Rutgers Road, Franklin Square, N. Y. IVanhoen 6-0809.

TOROIDs: Unused 88 mhy like new. Dollar each. Five. \$4.00. pp. DaPaul, 101 Starview, San Francisco, Calif.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan. Tel. NOrmany 8-8262.

HAM TV Equipment bought, sold, traded. Al Denson, W1BYX, Rockville, Conn.

CASH for your gear. We buy, trade or sell. We stock Hammarlund, Hallicraters, National, Johnson, Gonset, Globe, Hy-Gain, Mosley and many other lines of ham gear. Ask for used equipment list popular surplus receivers, transceivers, \$3.00 pp. Kishwaukee St., Rockford, Ill.

SEND For list of good buys at bargain prices. Box 575, New York 8, N. Y.

SAN Francisco & vicinity: Communications receivers repaired and realigned. Guaranteed work. Factory methods. Special problems invited any equipment. Assoc. Electronics, 58 So. P. St., Livermore, Calif. W6KF, Skipper.

WANTED: 6 to 12 304TL tubes. Callanan, W9AU, P.O. Box 155, Barrington, Ill.

WESTERN Radio Amateur: Third largest ham magazine in the U. S. 1 year, \$2.00; 2 years, \$3.50; 3 years, \$5.00. Also publisher "Surplus Handbook", over 90 pages schematics and photos of popular surplus receivers, transceivers, \$3.00 pp. California, add state tax. Western Radio Amateur, 10517 Haverly St., El Monte, Calif.

CASH For used Short-wave ham receivers, transmitters and accessories. Treger, W9IVJ, 2023 N. Harlem Ave., Chicago 35, Ill. Tel. TUxedo 9-6429.

WANTED: Trades new and used: New KWS; 1, \$1250.00; KWM-2, \$1095.00; KWM-1, \$695.00; 755-1, \$495.00; 75A-2, \$325.00; 75A-4, \$549.00; 32S-1, \$590.00; 32V-2, \$450.00; 32V-3, \$395.00; HQ-100, \$129.00; HQ-129, \$149.00; HQ-145, \$269.00; HQ-160, \$379.00; HQ-170, \$359.00; Johnson Ranger, \$279.00; Johnson Mobile, \$75.00; Thunderbolt, \$58.50; Valiant \$439.50; Johnson Citizens Messenger \$139.75; Courier, \$289.50; SX-71, \$149.00; SX-101 Mark III, \$395.00; Viking II, \$199.00; SX-100, \$295.00; SX-100 \$199.00; HT-32A, \$479.00; SX-110, \$159.95; NC-98, \$99.00; NC-183D-\$309.00; NC-125, \$125.00; NC-173, \$129.50; NC-57, \$59.00; Globe CB-100-Citizens Band \$129.95; Globe King 300A, \$425.00; 90 Chief \$39.00; 90A, \$49.95; 680, \$79.95; DSBI100, \$103.95; VFO-755, \$59.95; NC-300, \$279.00; CE Slicer, \$37.50; 100V-\$695.00; Heath DX-35, \$55.00; DX-40, \$65.00; SP Super Pro, \$199.50. Ken-Elis Radio Supply Co., 428 Central Ave., Ft. Dodge, Iowa.

SSBERS! Keep up with SSB news and views! Join the Single Sideband Amateur Radio Association, dedicated to furthering good SSB operating; promoting advancement of SSB equipment; and disseminating SSB technical information. Read "The Sidebander", official publication of the SSBARA. Dues \$3.00 yearly. Write membership application, sample "Sidebander", to SBARA, 12 Elm St., Lyndbrook, N. Y.

SELL: NC-120 Navy receiver, built 1944. General coverage 45-30 Mc. 11 tubes, xtal filter, a.n.l., BFO, recently aligned. \$85 or bid. Rev. Phillip Essex, 278 W. Rittenhouse St., Philadelphia 44.

MUST Sacrifice Collins 75A-4 Scr. #2531 with vernier dial, excellent condition: \$465. Collins 32V2 with extra tubes and Airdux balun \$250.00. 32RA-7 four-channel 150-watt xmr (needs TVI protection treatment for ham use) \$50.00; K8PUN, 3600 White Oak Road, S.E., Cedar Rapids, Iowa.

CLEANING House: receivers, manuals, tubes, parts, etc., New list for stamp. M. Marshall, 455 Washington Ave., Dumont, N. J.

RECEIVERS: Repaired and aligned by competent engineers using factory standard instruments. Authorized factory service station for Collins, Hallicraters, Hammarlund, National, Harvey-Wells. Our twenty-fourth year. Douglas Instrument Laboratory, 176 Norfolk Ave., Boston 19, Mass.

CINCINNATI Area: Sale: Globe Chief 90 transmitter, \$30. KRCEI, 3950 North Fordham, Silverton, Cincinnati, O.

TRADE: DX-35, xtals for rifle or pistol. W5U7I, 1351 Sage Loop, Los Alamos, New Mexico.

SELL: 75A4, \$650; 32S1 with AC power supply, \$580; Eldico SS3-100K Kw, \$200; MM2 with adaptor, \$95; Heath Condenser checker, \$10; 84V grid dip meter, \$35; WRL speech booster, \$12; B-3 66" rack and extras \$40. All guaranteed like new 6V mobile power supply, \$20. Lamb, W3VDE, 1219 Yardley Road, Morrisville, Penna.

FOR Sale: HQ-110 without clock, in like-new condition, \$175. J. Logue, 52 Boardman Rd., Poughkeepsie, N. Y.

HAM Licenses, resident courses. Novice and General classes, 3 evenings weekly. Delchanty Institute, 117 East 11th St., New York City 3, N.Y. Tel. GR 3-6900.

DX-35 key, xtals, new final, \$55; RME69 in exc. condx. \$45; BC-348 15 mtr. converter, \$101; 100 kc. calibrator, S meter, spkr, best offer; BC453, GFI; BC645, \$15. Albert Long, RD 2, Ononda, N. Y.

SELL: KW Matchbox, \$75; HT-17 transmitter, \$15; 300 and 500 W. mod. with speech amp (\$45.00) each 6M, 4-lb. Deluxe Gonset beam, \$12; 1250V 300 mil. pwr. supply, \$18. Metcalf, \$1.50. All perfect. KZTEX.

FOR Sale: Complete station, Viking II, Hallicraters S-20R rcvr; Heath VFO, Heath "Q" mult, All for \$250. Steve Hacku, 10 Colonial Lane, Wallingford, Conn. W1PXA.

SWLS . . . TV and FM DX fans. Brand new. For you! A monthly magazine edited by Bob Cooper, K6EDX, with the largest short wave DX'ing column in print, written by Ken Hoord, Morgantown, W. Va. Write for free copy or send \$4.00 for year's subscription. DX'ing Horizons Magazine, P.O. Box 3150, Modesto, Calif.

90 w/xtals for \$40.00. Globe Chief 90A, in gud wkg. condx on all bands. K9PQG, 225 Lorraine, Glen Ellyn, Ill.

COMPLETE station used three months: Viking Ranger, HQ-110 with matching speaker, mike, Dow relay, Heath SWR, Johnson low-pass: \$410. Les Shapiro, 129 Miles Ave., White Plains, N. Y.

GRAND Rapids, 13th Annual Hamvention, April 9, 1960 at Manger Hotel.

HQ-140X with bandswitching Presclector, \$150; Viking II with VFO, \$175; all in gud condx. Paul Meier, K2EEP, 175 E. 151st St., Bronx 51, N. Y. Tel. MO 9-0642.

LOWEST Prices: Latest amateur equipment. Factory fresh sealed cartons. Self-addressed stamped envelope for lowest quotation on your needs. HDH Sales Co., 919 High Ridge Rd., Stamford, Conn.

VALIANT for sale, factory-wired, late serial, used little, in perfect condx, \$349. Purchased Collins S line. Will make stock anytime on 20 meter, mike, Dow relay, Heath SWR, Johnson Palm Springs, California.

SELL: SX-100, new condx, in original carton, with R-46B spkr, \$195. Anthony Magistro, WA2CZJ, 1629 81st St., Brooklyn 14, N. Y.

FOR Sale: Complete station, used only 30 hours. Globe Scout 680A, Matcher, Sr., HQ-100, clock, spkr, 3 xtals: \$270. W2VGKO, 165 Waverly Ave., Lyndbrook, N. Y.

SELL: BC348P, \$85; BC-312M, \$100; NC498, \$110; HQ-129X, \$160. All like-new in looks and performance. W2ZHU, 16 Denalo St., Pulaski, N. Y.

DX100, keyer, mike, bug, baluns; NC98. Make offer. W1FII, 405 Lloyd Ave., Providence 6, R. I.

SELL: New, never used, HT-32A xmr, in original carton. Will ship. Need money for college: \$600.00 or your best offer. W7VTI, Kent Angell, 425 Thornwood Drive, American Fork, Utah.

WANTED: Hallicraters Sky Buddy 1937 model ST. In working condx. Am not interested in condx of cabinet. John Ottinger, 814-62nd St., Brooklyn, N. Y.

FOR Sale: "Eddystone" 750 receiver, \$160. K6KHB, 620 So. Main, Sioux Center, Iowa.

MAR. 220 Mc. complete L.N., BC-1100 xmr, 1000 Kc to 10,000 Kc, new. Five 340TH new, sell or trade. Wanted: 29 4X250 and sockets and gud rcvr. Gordon W. Roper, 2937 Barth St., Flint 4, Mich. Phone CE 9-0581.

SELL: 600V 240 Ma Ps, \$30; AR-3, \$18; WRL 6M conv. factory-wired, \$15; Heath VOX, \$15; 2E26 2M rig, \$15; Hy-Gain 6-2 meter vertical, \$8; 10-watt modulator, \$9; 14-30 Mc. Presclector, \$9. James Miller, W2ROS, 166 Woodcrest Blvd., Kenmore 23, N. Y.

SELL: DX-20 Globe screen modulator, coax, xtals, relay, key, mike, antenna and xtal switch boxes. Used less than 200 QSOs. \$50.00. You to pay shipping. Paul Powell, W7JCY, Box 292, Babbitt, Nevada.

HEATH MP-1 mobile power supply, \$30; Hallicraters R106 (6M rcvr), \$20.00. D. W. Kransteuber, 5869 Brecksville Rd., Independence 31, Ohio.

TELETYPE: Cleaning house, model 12 2 BFD converter, scope tuning indicator, complete sets RTTY, NCARTS; paper; tech data, etc. Best offer over \$125.00. W2MB.

WANTED: Wireless and radio equipment, tubes, books, magazines, etc. \$7.00 or older. Please describe fully and price. Bob Husted, W3QGX, 105 N. Chester Pike, Glenolden, Penna.

KWM - with AC power supply in excellent condx. Free delivery within 200 miles! \$650.00. Gerald Tietbohl, K2VFR, 55 Rouge Rd., Rochester 23, N. Y. HI-5-0212R.

COMPLETE Six-volt mobile station for sale: Gonset and Motorola combination, \$175. Also complete 50 watt fixed station for sale, \$175. Send address for specs and information. Donald Nissley, 711 Pleasure Rd., Lancaster, Penna.

JOHNSON Viking 500 Clean, original owner. In A-1 condx: \$700 or best offer. P. Loutzker, 7715 18th Ave., Bklyn 14, N. Y. or phone CL 9-1414.

KITS Wired. Write for price. J. C. Anderson, Jr., K3GCM.

FOR Sale: Super Pro rcvr ASP794 in mint condx, 1250 Kc to 40 Mc, with original pwr supply \$135.00. Gonset Tri-band mobile converter 10-15-20-75 meters, 12 or 6 volt, \$25.00. Ross Macaluso, 41 Birchwood Dr., North Arlington, N. J.

FOR Sale: RME69 rcvr, in gud condx, \$45.00, with big spkr, \$55.00. Call Charley, Lambert 3-3857 between 6 & 7 pm or write: W2KNG, 408 E. 30th St., Paterson, N. J. Sry, no trades!

CAPACITORS, 120 ufd 3000V, G-E Pyronol, used, top condx, \$35, crating. \$3.00. W8LTF, 831 Antoinette, Wyandotte, Mich.

SELL: Collins 32V3, \$375; extra set of tubes (new), \$25; Eldico E2E keyer, \$25.00; other accessories. W0WTM, 9808 Allendale Dr., St. Louis 23, Mo.

PACEMAKER, latest factory modifications, new condx, shipped express prepaid USA. \$350.00. WIDKR, R #3, Providence 17, R. I.

SELL: Two meter Kw converter, antenna, tower, rotator, SP44 Panadapter, El-Key, plus all spares and parts. Will not ship. Write for particulars. \$300.00. Andy Sallet, K1I2N, 433 South St., Reading, Mass.

MINIFON Model P55-S recorder, in new condx, with accessories. Best offer over \$200 or will swap for 14 ft. aluminum boat. Burgess W6VGSF, 757 Dunsmuir, Calif.

NEW Eimac 4CX300A. Never fired up! \$30.00 or best offer. R. Huber, Jr., K0JER-2, 232 8th St., Troy, N. Y.

SX28A with matching speaker, v. gud; \$135.00. Viking Ranger FW&T, \$199; DX-40, factory-tested and adjusted, with Heath VFO, \$89.50. C. Gerst, 2674 W. 25th St., Cleveland 13, Ohio.

FOR Sale: Viking Ranger, bought from Henry Radio, new Dec. 12, 1959. Used for about six contacts. Same as new. Selling out. First m.o. for \$225 takes. Will ship C.O.D. Express in same carton with instruction book. Bob Randall, W0RNR, Ashland, Kans.

SALE: Globe Scout 680A, 755A VFO, both factory wired. K0MMI.

SELL: Gonsset Communicator IIB, best offer over \$155. In exc. condx. W3DEG, 125 Edgehill Rd., Bala-Cynwyd, Penna.

FOR Sale: SX-99 with speaker. Heathkit electronic voice control. Heathkit reflected power and SWR bridge, Heathkit Conelrad alarm. Will accept best offer. R. Grayden, Box 184, Watson, Minn.

WE-416Bs, Three of 'em. \$12.00 each. Jared Wolf, K3ATX, Concordville, Penna.

SELL: Heathkit SB10. Works perfectly. Wired by best engr. \$75.00. Call Ray Furr, PL 3-7628, 349 East 49th St., New York 17, N. Y.

FOR Sale: GSB-100, 20 hrs., \$395; RME 4350A, in mint condx. Companion Slicer and speaker, \$200.00; 6M Communicator III, like new condx., \$230.00. All F.o.b. Galesburg, Ill. Tuner, 331 dyn. mike, 2 Hy-Gain 5 cl. 6M beams, 1 6M Halo, 500W mod. xfmr. Make offer. First card and/or best offer W9QMM, 42 Park Plaza, Galesburg, Ill.

FOR Sale: Heath MT-1 transmitter with UT-1. Both factory checked. Also Heath VFO, AT-1 with built-in grid modulator and antenna tuner and B-1 baluns. All excellent. Also AK-2 and QF-1. Make offer for any or all. James Lichter, Box 443, Loras College, Dubuque, Iowa.

\$15.00 for complete Instructograph, International Morse tapes. Also 1 watt receiver. Doerr, #62, Wheatland, Penna.

FOR Sale: Gonsset III for 6 meters. Bought in July 1959. \$235 F.o.b. Joliet, Ill. Bruce Damerell, 567 Dover St., Joliet, Ill.

HT-32, \$525; HRO-60T with xtal calibrator, NBFM adaptor, skr. seven coils, \$525.00; brand new unused Hy-Gain KW Tribander, \$75. Model B Sideband Slicer, \$45.00. All are in exc. condx and F.o.b. Lynnfield, Mass. W. Fiscus, WIPBQ, One Maiden Lane, Lynnfield, Mass.

SELL 2KW Amertran, 115V primary, 3100-0-3100 out at 700 mhz, \$49.95; Pacemaker, like new, produces beautiful SSB signal, only \$299.95; Kc. filter for 75A1, \$34.95. Old Bounton microvoluter, needs work, but all there, \$49.95. Dumont, 208B scope with hood, \$34.95. Gene Hubbell, W9ERU, Box 273, RR 4, Rockford, Ill.

SX99, \$100.00. Globe Scout 65, factory-wired, \$50. Both excellent. W9ZFW, Fred Steimle, 1390 Locust, Pontiac, Ill.

SELL: DX-35 and VF-1, \$55.00. K9IKL, 1009 Cornell, Kokomo, Ind.

CRYSTALS for 2.80 meters. 25 cents each. Send for frequency list. Power transformer, Stancor PC-8414, 1200 VCT with filament windings, \$4.75 each. W6IMC, White, 210 Alden Rd., Hayward, Calif.

SELL: Elmac AF-67, 125 w. transistor mobile power supply, RME VHF-152A, Equipment excellent condx. Max Berendzen, K5HYR, 213 Sandra Dr., Irving, Texas.

EXPERIMENTERS: I'm giving up experimenting for book-learning. HV Mica and oil cap. tubes. Send stamp for complete list. R. C. Erwood, K9AAU, 2823 West Lyndale, Chicago 47, Ill.

NOVICE: SX99, \$90; Johnson Adventurer, \$40; both \$120. Peter von Raits, 420 Riverside Dr., New York 25, N. Y. Tel. MO 2-8627.

WANTED: Elmac PMR-7 receiver in gud condx. state price. W2CM.

SAVE On Electronic, Radio and Communications components and equipment for Hams and Commercial use. See thousands of parts in stock. Many more coming in daily, all at unusual savings. If you live in or near Philadelphia, visit our new warehouse at 31st & Grays Ferry, or send for free catalog. Selectronics, 1206 South Napa St., Philadelphia 46, Penna., or phone HOward 8-4645.

MOBILE Heathkit ham station 75 watts 10, 15, 20, 40 and 80 meters. Includes: Receiver, transmitter with p.t. mic, f.s. meter, transistor pwr supply, spkr. mount, and 115V. 60 cps power supply, all wired for 12V operation, \$300 or your best offer. Paul Kieslink, W1SYC, 14 Brookdale Rd., Arlington 74, Mass.

MOBILE Transmitter/receiver, 50 watts output; 152-172 Mcs. Easily converted to 144 Mcs. Complete with all cables, control box, etc. \$45.00. AC pwr supply for BC603, \$8.95; 30-40 Mc 2-way and monitor receivers, \$25; Collins ART-13 80-100 meters 150 watts, \$150; Lampkin 103 freq. meter \$75; Signal Generator, 30-50 Mcs., \$65; tube tester, \$25. Dynamotors, 600v \$5.00. Higley, 82 Lower Main St., Masstown, N. J.

TRADE Two BC645s and one PE101C for BC342, 348 or 312. Ryan, 1202 Grand Ave., Laramie, Wyoming.

LISTEN to the Radiotriumph Digest; Southern California every Friday 6 PM. 860 Kc. W6IQJ.

CINE Special I: Professional 16 mm Eastman, f 1.9 and 3" telephoto lens in turret. Masks. Leather case. Original cost approximately \$1200.00. Exc. condx. Will trade for Collins S line or equivalent. Also want direct reading RF bridge. K8INA, Box 1452, Beckley, W. Va.

NEED Money for school: 6 meter Gonsset Communicator II, 12VDC, first offer over \$150; NC-173, \$140 with speaker; HF-106, best offer over \$160; complete Me. sner 1500, \$100 worth, 80-10 modified for crystal mike, #221 Eico VIVM, #425 new Eico scope; Brush Sound Mirror tape recorder; HC-620. What am I offered to separate sales? George Gibson, Myles Standish Hall, 30 Bay State Rd., Boston 15, Mass. Tel. CO 7-4247.

FOR Sale: HQ-110 without clock, like-new condx, \$175. J. Loguc, 52 Boardman Rd., Poughkeepsie, N. Y.

RANGER, \$170. F.o.b. Peekskill, N. Y. Dick Walker, Adams Rush St., R3.

FOR Sale: Collins 32V1 transmitter RME 4350 revr plus accessories. In exc. condx. Cash \$725.00. N. Evanoff, Resolute Bay Aeradio Strn. NWT, Via Ft. Churchill, Manitoba, Canada.

WORLD'S Finest reconditioned equipment at lower prices. (on trial terms. Write for best terms financed by us. S-38 \$29; S-53A, \$59; SX-99, \$819.00; SX-96, \$159.00; SX-100, \$199.00; SX-101, \$59; SX-99, \$119.00; SX-96, \$159.00; SX-100, \$199.00; \$59.00; NC-183D, \$225.00; NC-300, \$249.00; Globe Scout, \$59.00; DX-100, \$179.00; Viking II, \$179.00; 75A-4, \$549.00; KWM-1, \$395.00; KWS-1, \$1195.00. Hundreds of other items. Write for list. Special discount for all cash. Henry Radio, Butler, Mo.

SELL OSTS years 1950 to 1959 inclusive. Vy gud condx. W0DIB, Mitchellville, Iowa.

FOR Sale: 1 KW 20M linear ampt., (304TH), power supply, rack-mounted, \$100.00 or will swap for tape recorder. A. L. Halpern, W2GDS, 450 Brighton Ave., Long Branch, N. J.

COLLINS 800 cycle filter, new, \$29.50; Collins xtal plug-in calibrator, \$15.00 for 75A35. Paul Friedel, K3AHN, 2117 Jeffrey Rd., Baltimore 7, Md.

DX-100, all new tubes, modifications include hinge top cabinet, single variable loading capacitor in final, and clean T9 keying at all frequencies; \$185 F.o.b. K3GZK, 211 Cration Rd., Bel Air, Md.

FOR Sale: 75A-4, like new, used but little, serial 5791, three mesh filters, \$625.2V in exc. condx, \$255.00; 310B in gud condx, \$105.00. Local deal only; sr. will not ship. William Blum, 552 Hardin Ave., Jacksonville, Ill.

COMPLETE Mobile: Gonsset G77/G66B. Best offer. Call or write "Hank," K2TXU, 133-40 Roosevelt Ave., Flushing 54, L. I., N. Y. Tel. HI 5-7809.

HAM Magazines: Write W6LJK, Tatum, 1451 Raymond Ave., Glendale, Calif.

SELL: Apache, \$200; SX-99, \$100; R-46B, \$9.00; QF-1, \$8.00; QF-1 power supply, \$2.00; Heath VF-1, \$15.00; VF-1 power supply, \$4.00. Hy-Gain 15-meter beam, \$20.00; rotating equipment, \$25.00. All in excellent shape. Irvin Tucker, K4SLA, 303 Brook Drive, Raleigh, N. C.

VIKING II, Heath VFO, LP filter relay, \$225.00. W2KWB.

SELL: four 4-65As, used only a few hours, \$4.00 each. 1 Collins mech. fil., 45 Kc. (new), \$25.00. Jim Stafford, K3DOT, 478 Orford Ave., Philadelphia 28, Penna.

SELL Complete SSB station exc. condx, \$185; W2EWL trans. 100 watts; Sner-Pac, \$53.00; Heath SWR Bridge; antenna tuner and many other items. Too much to ship. Joe Levine, K2JEV, 1535 University Ave., Bronx, N. Y.

FOR Sale: BC-348Q, exc. condx. like new, 110 volts AC, \$60.00; BC-348L, also exc. condx. like new, 110 volts AC, \$55.00 with manuals. Will ship. Garnet W. Frank, Route 1, Potsdam, N. Y.

PORTABLE Mobile SSB transmitter, MM-1 RF analyzer, telescope, QSTS CQs, shack air conditioner; list of items in shack clean-up for stamp. W4API, 1420 South Randolph, Arlington 4, Va.

FOR Sale: Viking Ranger, \$145.00; HO-170, like new condx, \$275.00; Jones MicroMatch, \$25.00; DB23, \$27.50; Bud low-pass filter, \$8.00. All are in perfect operating condx. G. E. Michael, 226 E. Repplier Rd., Banning, Calif.

FOR Sale: SX-99 (less than a year old), \$100; RME DB-23 Preselector, \$35.00; ReGENCY transistorized amateur band converter, ATC-1, never used, in original carton, \$60.00; Johnson xtal calibrator, \$10; Johnson Matchbox, \$35.00. Will ship. K9KTD, 1201 Linden, Oak Park, Ill.

FOR Sale: 75A4, \$500.00 and Eidico 100F, \$500.00. W4CPO, 1351 Bolling Ave., Norfolk, Va.

GOT A good commercial xmtr doing nothing? Swap model airplane equipment slide projector, hi-fi phonograph, fishing gear (no junk). List, stamp, Jos. McKerr, Jr., 47 Prospect St., Taunton, Mass.

SELL: FB DX-20, \$30; B-1 baluns, \$7.00. Both \$35.00 or best offer. Spieler, K3BTI, Bowmansville, Penna.

SELL: Heathkit DFI transistor radio direction finder. Built by broadcast engineer. \$40.00. W2RLG, 325 Morgan Ave., Old Bridge, N. J.

WANTED: Collins 3.1 Kc. mech. filter, Millen 90751 tone modulator; sell: Handmaster Sr. with E-V 208 mike, \$55.00; pair of converted PE101Cs, mounted single chassis, \$15.00; Heath VFO, \$15.00; Heath GD1A, \$15.00; Heath 1154 tone \$35.00; Bud va. calibrator, \$10; 34 hour clock, \$10. All best. W8JWJ, 106 So. Sandow Rd., Midland, Mich.

CANADIANS! Heathkit Grid Dip, \$20.50; balun coil, never used, \$10.50; impedance bridge, \$12.50; Dow-key coaxial relay with external switch (AC 110V), \$14.50; all units are in like new condx. New tubes 829B, \$15; 813, \$11; original metal cabinets for RCA AR88, new, \$12.00; Surplus 1154 transmitter with spare tubes, perfect shape (less pwr. supply) \$20 plus transportation; tube tester Stark 9-55 operational, as is, \$10.00; surplus Vibrator power supply, 6V, \$2.50; 12V, \$2.50; oil capacitors 4ufd, 2000V, 2ufd, \$2.75 each. Write C. Guitman, 7526 Mountbatten Rd., Cote St. Luc, Montreal 2, Que. P., Canada.

WANTED: Unused BC-610, BC-191 with RA-34, BC-342, PE-95F, PE-75 with accessories. State price, quantity, condition. Larry Pon, 2849 E. Colorado St., Pasadena, Calif.

WRL 6 Meter converter, \$19, also WRL PB-1 power booster, \$14. Both are factory-wired, perf. condx, \$31.00 for both. Will ship prepaid. K3ICX, 5909 Greenlawn Drive, Bethesda 14, Maryland.

IN Exc. condx. 60 ft. Donner crank-up heavy-duty tower, \$85; 3-cl. 20M DX beam, \$45; prop pitch motor and seiscyns, \$40.00. W6KBC, 19626 Victory Blvd., Reseda, Calif.

FOR Sale: Hallicrafters S-53A revr, 15 months old, best offer. Write to Bob Noonan, KN9UGF, 210 E. Ash St., Lombard, Ill.

NATIONAL 183D. Best offer. Knight stereo preamp, \$65; Pictoradio, 344 Main, Medford, Mass. Tel. EXport 6-6172.
MOBILE for sale, complete: Harvey-Wells 1-90 Bandmaster; 12 volt dynamotor and Vibrapak; Gonsset Triband 12 volt converter and TNS noise limiter; 10-meter whip and Johnson Whipload 6 with tender mount; \$225 or your best offer. All replies will be answered. J. Crowley, K2HEG, 802 E. Front St., Apt. D3, Plainfield, N. J.

IRE Proceedings: \$40.00 for 1947 through 1959. Shipped collect. D. Beck, 4527 258. Great Neck, L. I., N. Y.

VALIANT, professionally wired, used approximately sixty (60) hours. \$365.00, SX100, in exc. condx. \$185.00. Am going mobile. W1HY, Allen Street, Marion, Mass.

JOHNSON Valiant, factory-wired, 1 yr. old. In mint condx; \$325.00. F. H. Mitchell, W1DNJ, 38 Whitney Ave., Southington, Conn.

WANTED: SSB bear: HT32, SSB100F, HT37 or the equivalent, also 400-500 W linear. SSB: Heath SB10 expertly wired, aligned, ready to operate: \$95.00. K6QQI.

HELP! Must sell pair of Gonsset 9-11 Communicators, one 115V AC, one 12V DC for car. Used total of three (3) hours. Matching frequency with directions @ \$75 per. Also Gonsset Super 12 converter. Brian Fernandez, 333 Joline Hall, Princeton University, Princeton, N. J.

SELLING My new, used, surplus tubes, meters, speakers, xmtr, xfrms, to finance a new Tri-Bander beam. Send for free list. K1KON, A. Gallonio, 3 Beechwood Rd., Norwalk, Conn.

SELL Seneca, best offer over \$160.00; DX-20, \$35; Tecraft 6 and 2 meter converters, \$35 each; Telrex 6 meter 5 c.i. beam, \$25.00; HQ-129X best offer over \$120; Gonsset Super 5 mobile converter, best offer over \$33.00; Mobile whip, springs, mount and co-ax, \$15.00. Stromberg-Carlson transoceanic all-wave portable receiver, a really hot one! Originally \$220.00, in exc. condx, best offer over \$100.00; J1-20 micro-phonics with adjustable stand, \$12.00; Johnson semi-automatic key, \$10.00; 115V 4 PDI uncased relays, \$5.00; parts, relays, motors and other equipment. "Jon", WAZAXC, 32 Virginia St., South River, N. J. Phone Clifford 7-2905.

HAMMARLUND SP400, in gud condx, \$129.50; "Geloso Twins," perfect, complete station, 75 watts and SSB rcvr, \$299.50. W6QR, Hemet, Calif.

FOR Sale: DSB-100 with VOX, \$110; HQ-110 with spkr, \$200.00; all in new condx. \$300.00 for all or you make other. W6WEB, Box 594, Sonora, Calif.

SALE: CE20A, CE deluxe VFO, factory-wired, late production model, like new condx, both for \$200.00; Collins 32S1, perfect, with new A.C. power supply; \$595; Astatic 10-C mike with G-stand, \$23.00; Heath Antenna impedance meter, \$12. Dr. J. R. Perciful, 1169 Eastern Pkwy., Louisville 17, Ky. Tel. GLendale 2-2116.

GONSET G66B rcvr: Universal pwr pack, 6-12 VDC, 110VAC, \$175. Johnnie Witkoski, W8FZW, McDonald, Ohio, 338 Hayes Ave.

FOR Sale: Communicator III 2M, \$235.00; Knight rcvr with S-meter, \$110.00. W6AIDE, 2648 Crescent, Anaheim, Calif.

SELL: HT32A, like new, \$575.00; also Gonsset 11 fixed frequency C.D. Communicator 223 Mes., 12V DC, 110V AC. Cost \$475. Bargain at \$325.00. Like new, complete. Howard Langerman, W2LBJ, Harbor Acres, Port Washington, N.Y.

THUNDERBOLT factory wired, \$485. Ranger, factory wired, \$195. Will sell together or separately. Thunderbolt must be picked up in your car because it's too heavy to ship. L. A. Morrow, W1VG, 99 Bentwood Road, West Hartford 7, Conn. Phone Adams 2-2073.

LOW Cost transistors, transformers, circuit boards. Free list. Semiconductors 'N' Stuff, Box 288, Alta Loma, Calif.

DX100, perfect, \$165. Clifford Bond, Elberton, Georgia. K4SBH.

SPECIAL! W2EWL SSB transformers. New, 95¢ (3 for \$2.50, 10 for \$7.50); T-17 mike, brand new, sealed package. Only \$4.95; Brochure available. Ling Closed-Circuit TV camera, brochure (45c line), \$2.99 per. hand and feet. Geloso large recorder, \$119.95, available. Complete tube inventory, best quality and sensible prices. 2C51 \$1.70; 3B28, \$3.00; 4X150A, \$7.00; 805, \$5.00; 807, \$1.15; 807W, \$1.25; 813, \$8.50; 829B, \$8.00; 837, \$1.00; 866A, \$1.50; 872A, \$2.00. Write for free tube price lists. Green sheet catalog on equipment and parts. 25¢. Wanted: Unused transmitting and receiving tubes. Send list for cash offer. Distributors for B&W Elmac, Hammarlund, Johnson, Westinghouse and others. Barry Electronics Corp., 512 Broadway, New York City 12, N. Y. Tel. Walker 5-7000.

A Highly effective review that can place you in a position to pass FCC commercial phone exams. Free literature. Write, Cook's Electronics Instruction, Box 10634, Jackson 9, Miss.

FICO #460 oscilloscope, in excellent condx, first check for \$95.00. Takes it. Richard Rudnick, WAZJH, 1772 Schenectady Ave., Brooklyn, N. Y.

FOR Sale: 2 BC-611 hand-tiebacks, best offer; MB-150 tank condx, \$10; 4-5 up, 4X150As, pair sockets, \$25 Ray Feeley, 44 Stone St., Danbury, Conn.

FOR Sale: NC173 rcvr, \$130; matching spkr, \$10; Elmac PMR-7 rcvr, PSR6-12, PSR117 power supplies, \$170; Halli-craters R45A spkr \$10; Intl. Xtal 6 meter converter (B.C.I.F) and transmitter, \$20.00; Robert Bradley, K4CLR, Box 126, Chatsworth, Ga.

2640 Volt C.T. @ 400 Ma., plate xtrmr. \$8.00; Electronic key and keyer with bug, \$25.00; 6 volt Elmac PMR6-A with 6 V. power supply, \$2.99. AR-22 rotor, \$22.00. K8DDU, 20498 Basil, Detroit 35, Mich.

SELL: TBS-50C trans, 30 watt multi-match mod. tr., Drake OXcr; 20 watt amp. with 15" spkr. Pole xtrmr for 2200 V. @ 800 Ma., MD-7 mod., B&W tr. sw. Many meters and older rcvr. tubes. Misc. capt. Wt: 4-250 or 4-400 tubes. Free list. W0ZOB, Hansen, Box 273, Coleraine, Me.

TRADE used RCA TV Eye camera chain, video output, less monitor for gud SSB receiver. Will consider cash offer. WAZECA, 278 Sunrise Blvd., Williamsville 21, N.Y.

COMPLETE Station Valiant, SX96, CDR rotor, Mosley Triband, 40 ft. crank-up, mike, relay, cables, etc. Approximately \$600.00. Write for details. W7HWL.

HARVEY-WELLS TBS-50 transmitter, 50 watt, bandswitching 80 through 2 meters. In excellent condx. No modifications. Manual. \$50.00. Addis, K4UAR, 2688 Winding Lane, NE, Atlanta, Ga.

FOR Sale: Globe Chief 90A, like new condx, no scratches! Only six months old. \$50.00. David Standard, K4HPI, 250 Pine Valley Dr., Athens, Ga.

SELL: DX100 with voice-converter, \$175.00; SX-42 rcvr, \$125.00; Heath G-Q-mul., \$7.50. W3FJY, 501 Cambria St., Punxsutawney, Penna.

ALUMINUM or every Ham need! Writing to Dick's, 62 Cherry Ave., Tiffin, Ohio, for list of tubing, angle, channel, castings, plain and perforated sheet, and complete beam kits.

COLLINS 75A4, like new, \$475.00; Tapetone 6-meter converter for Collins, \$40.00. M. Simon, K8AOL, Dodd Road, Willoughby, Ohio.

FOR Sale: SX-101, MK III, perfect condx, \$285.00. K0MPO, St. Louis, Mo.

TEST Equipment: Simpson Mod 355 Micrometer (Multimeter), \$15.00; Heath antenna impedance meter, \$3.50; Dumont 3" scope, 30 Kc sweep, \$42.50; new surplus 2 meter field strength meter, 200 microamp meter, self-contained antenna, manuals and wooden case with kit of tools, \$12.50. BC1000 Pack sets, exc. pair, \$35. K6EYB, 9 Ocho Rios Place, Danville, Calif.

RECONDITIONED! Terms! Trials! Full guarantee! Scout 40A's \$39.00; 65 \$65.00; 65A \$67.50; 65B \$75.00; 66 \$89.50; 68A \$79.50; 680A \$89.50; Chief 90A \$49.95; LA-1 \$89.95; DSB-100 \$104.50; 755 VFO \$44.50; VOX-10 \$17.50; Champ 150 \$149.00; 300-A's \$389.00; Kings 400B \$275.00; 400C \$299.00; 500 \$415.00; 500-A \$449.00; 500-B \$299.00; AT-3 \$11.00; 6M Converter \$19.95; FCL-1 \$14.95; CB-100 \$89.95; Johnson Rangers \$219.00; Viking II \$219.00; 122 VFO \$29.95; 500 \$225.00; 6N2 \$129.00; Navigator \$149.00; Challenger \$119.00; Pacemaker \$375.00; Receivers—S53A \$69.95; SX-96 \$189.00; SX-101 \$319.00; SX-88 \$419.00; NC-98 \$114.00; NC-100 \$139.00; NC-183D \$299.50; NC-300 \$269.00. Leo, W0GFQ, Box 511, Council Bluffs, Iowa, World Radio Laboratories.

ELMAC AF-67 xmtr, perfect operating condx, latest factory modifications, \$115.00; Elmac receiver PMR-6A (12 volt) with matching Elmac 12 volt Vibrator supply and PSR-116S 115 volt AC supply (includes "S" meter) and "O" multiplier, \$115.00; SSB 500 watt (+G. linear, Single 813 Pi-net, 10-1500 meters, with separate power supply, 115V A.C. in output 1750 or 1500 at 300 mhz. Both rack and panel, new spare tube, \$60.00. All I.O.B. Highlands, N.J. W2MPA, Box 222.

SELL: DX-100, \$150; Apache, \$235.00; both professionally wired. I prefer local deal, pick-up or deliver. W2AWU, John Gullfans, 117 Hughes Lane, Watchung, Plainfield, N. J. Tel. PLainfield 4-4210.

FOR Sale: HT-32 and 75A-4 in like-new condition, in original shipping crates, \$1050. W5IAO, 1501 Stafford St., Gretna, La.

ETCHED Circuit boards for amateur equipment. Send for free list. "Pappy", W5UB, P. O. Box 9222, San Antonio 4, Texas.

SELL: SX-100, perfect. Best offer over \$180.00. Van Newkirk, 654 Freeman St., Orange, N. J.

GPR90, \$290.00, in gud condx. First check. Srv. won't ship. WAZGKA, Frank Rod, Rodio, 450-51st St., Brooklyn, N. Y.

SELL: T-20, tape keyer; 8 tubes, desk cabinet, excellent, \$10; Dow DKC-1E 115 VAC 60hz relay, 100 rectifier unit, 115 V AC input, output: 110 V DC at 10 amps. Uses 2 Argon rectifiers, full-wave xtrmr, \$15; Heath VFO, \$10. W2PVO, 845 Walton Ave., Bronx, N. Y. CY 2-2554.

6 Meter 829B xmtr, 70 watts, antenna relay, push-to-talk, pwr supply built-in, converted surplus, gud condx, \$60. Steve Schopp, Waterloo, N. Y.

MUST Sell: HR050FI, A,B,C,D,E coils, spkr, in top condx, \$240.00; HQ129X, spkr, \$120; Viking II, VFO, Filter, mic, \$70, all working now. I prefer local sale but will be willing to crate carefully. Also Command 160M VFO, \$4.00. W0UBU, Harmon, 5019 Gramar, Wichita, Kans.

FOR Sale: Central Electronics 600-L amplifier, Cesso CM-52 SWR meter, 1956-57 QST 1956-57 CO. A. Martinka, 3723, Magnolia Ave., Chicago 13, Ill.

TOWER 30 ft. three-section KTV with hinged base, \$30.00. K3DCP, Box 2641, Baltimore 15, Md.

HT-32, like new condx: \$425.00. F.o.b. F. Price, 4620 Magnolia, Chicago 40, Ill.

REGENCY Mobile converter, in rud condx, with manual. First reasonable offer. Mike Weisberg, W2TUI, 153-27 73rd Ave., Flushing 67, L. I., N. Y.

FOR Sale: Hammarlund HQ-170 receiver with clock. Like new. \$290.00 net. Ernest Jaros, 36 East 36th St., New York City 16, N. Y.

B&W S1SB, just factory checked, \$130; CE 20A, deluxe VFO, GT-1, \$210; Heathkit Chosenone, UT-1 supply, \$120; 400 watt linear like 400L, \$75. W4LWY, Box 257, McLean, Va.

BOOK Matches with your call. 50 for \$2.50. A & B Services, Box 147C, Kittery, Maine.

SELL: Excellent HQ-129X, \$115; Apache, \$235.00; SB10 FB all bands, \$89.00. Keith Savtner, W0KBO/5, 1561 B. Carehart, Blytheville AFB, Ark.

LIKE New SX101A and Viking Valiant, \$300 each, both to go. W4FSF, Plant City, Fla. RFD #1.

VALIANT, Factory-wired, like new condx. Make an offer over \$299.95. Jenkins, IIR Goff Rd., Corning, N. Y.

4X250B Amperecx, with air socket, \$35.00; Audio oscillator, in exc. condx, \$30.00. K00XA/VO2, 408 2nd CAMS, APO 677, New York, N. Y.

SALE: NC-109 w/spkr, in exc. condx, \$125.00; 65B, \$50.00. Wanj: S-2OR, WA2FBK, 120 Fairview, Great Neck, L. I., N. Y.

SWAP New 16mm Bolex reflex movie camera w/Switar 25mm f4.5, Switar 16mm f4.5, Yashica 12.8, trigger and case, value \$800.00 for HT32A. Must be new or new condition. Prefer NYC or Miami area. K2ZZH, 425-41st St., Brooklyn 32, N. Y.

CRYSTALS Airmailed: SSB, MARS, Novice, Commercial, Net, etc. F1-243 .01% any kilocycle 3500 to 8600 \$1.49 (10 or more 99¢), all novice 99¢, 1700 to 30,000 \$1.95. All frequencies 60¢ additional for HC-6 hermetic holders. Build-up crystal packages November. OST "Phasing Sideband" \$9.95. November CO "Crystal Synthesizer", 31 crystals \$39.95, June 1958 OST "SSB Package", five mixer crystals, F1-243 \$9.95, hermetics \$12.95, matched filter \$6.90. Collins hermetics, etc. If you don't see it be specific, write, Airmailing 9¢ per crystal. Crystals since 1933. C-W Crystals, Box 2065Q, El Monte, Calif.

SELL: SX-99 F/W Ranger, K6TVZ, Box 144, Calistoga, Calif. COLLINS KWS-1. Very fine condx. \$1195. No shipping. New York City area. W2AEB.

WANTED: Two 800 cycle mechanical filters, type F455B08 for 75A3 receivers. Cash. W2FXA, 72 So. Pierce St., Buffalo, N. Y.

SELL: Collins MBF transceiver converted to 10 meters, in exc. condx. Vern Thompson, W9JWW, 1403 South Fourth St., Effingham, Ill.

VOLKSWAGON Owners: Judson Supercharger for trade. Interested in ham receiver, Bill Dorantzi, W3RBR, 1714 Woodce-Lynne, Linwood, N. J.

ALL The makings of a complete TV system. Surplus air-tournd TV system. Includes two cameras (iconoscope and image orthicon), airborne monitor, 300-400 Mc transmitter, receiver, all dynamotors and interconnecting cables. All tubes. Circuit diagrams. Details on request. Best offer. R.D. #4, Box 717, Lancaster, Penna.

CALL Letters of Polystyrene, Size 3/4 in. Color red, self-sticking, 20¢ each letter. Postpaid, Hopkins Enterprises, 504 West Elm, Marion, Ky.

75A-4, \$500.00. Supreme AF-100 xmtr, \$100. C. Sprague, 2905 14th Ave., Marlon, Iowa.

SELL! 20-A, in like new condx. QT-1 schematic and BC-458A, CE standard VFO, \$200.00 or you make offer! Laurence S. Jones, Box 127, Seneca, Nebraska.

SELL: HT-32, \$495.00 or your best offer. 75A-4 serial #4592, 2-1-31 filters and spkr, \$575.00. Want: 75-S1, 32S-1 and 312B-4 console. Thomas E. Conley, K2HWP, 100 No. Davis St., East Syracuse, N. Y.

HO-129X, \$115.00. Millen final with 829B 3-6-10M coils, \$30.00. Gonset converters, 2M, \$25.00; 10M, \$15.00; W3LYP, 20M, shortbeam, \$25.00. ARC 27T25 3M transmitter, \$20. W2KOG, Blasucci, Scotch Plains, N. J.

VIKING Valiant, factory-wired, \$325.00; Gonset mobile G66B receiver, 3-way power supply and G77 transmitter with 12 volt supply and modulator. Exc. condx, \$350.00. K2LCU, Robert Akin, 28 Evergreen Way, No. Tarrytown, N. Y.

SELL: Collins 75A-4, \$550.00; HT-32, \$550.00; equipment a little over one year old and slightly used. Estate of George Hawley K6HP, Myra Hawley, 1712 Los Flores Dr., Glendale, Calif.

FOR SALE: NC-300, \$250.00; HRO-50T1, \$310.00; NC-173, \$125.00; HRO-7 (A,B,C,D,A,C coils), \$169.50; SX-101, \$250.00; SX-71, \$139.50; RME 4350 with spkr. (excellent), \$195.00; Globe Champ 300A, \$349.50; Gonset G-77, \$185.00; Globe Scout 60A, \$85.00; Lyvco-F2 CW Xmtr., \$49.95; Eimac PMR-6A (new) with new PSR-12 pwr. sup., \$150.00; R. H. LA-40, \$144.00; Mobile Xmtr. Model 150, \$150.00; Adventure, \$45.00; Viking Challenger, \$115.95; Heathkit DX-20, \$26.50; Heathkit AT-1, \$25.00; Morrow Conrad Monitor, \$29.00; Millen SSB Rec. Adapter, \$30.00; Meissner Signal Shifter, \$26.50; 12 Volt Dynamotor 400 V. @ 180 ma. out, \$7.00; B & W SSB Rec. Adapt. \$90.00. Write Art Brown, W9HJZ, Brown Electronics Inc., 1032 Broadway, Fort Wayne, Ind.

1 KW AM phone, with Ranger Exciter, \$600; 75A4, \$350; 75A2, \$350; Ham M rotator, \$75; small port pitch motor, \$25; all in perfect condx. WIOFE, 10 Mansfield Pl., Darien, Conn. OL 5-4570.

QSTS! From 1933 through 1950. \$2.00 per year. National NPW near box with 6 band capacitor and special dial, \$2.90; new rotary inductor, handles 200 watts, \$1.75. Weston Model 741 0-50 amps, \$4.50; new Gen-E-Motor 6V in 35V/140 Ma. output, or 12V imp. 6R0V/210 Ma outp., \$6.00. All are F.o.b. Plainstown, N.H. Joe Harms, W1GFT, No. Main St.

NATIONAL NC-98, spkr. O multiplier, xtal calibrator, \$135.00; DB-23 Pre-selector, \$38.00; Apache, \$255.00; SB-10, \$95. Write for details. All are in like new condx. R. D. Kosner, K2KHR, 843 E. 48th St., Brooklyn 3, N. Y.

CLEANING Shack! Best offer! Receivers HO129X or HO150. Also Nations, IFB, old time tubes, equipment, magazines, Lavery, 118 N. Wycombe, Lansdowne, Penna.

SFL: W3BES built "California Kilowatt" push-pull 4-250A final 810 modulators. Beautifully constructed all-band transmitter in 6 ft. cabinet. Complete TVI suppressed. Coasts along at 1 kw. Best offer over \$500. Has to be seen to be appreciated. W3HRW, 919 E. Phil-Ellena St., Philadelphia 50, Penna.

VFO permeability tuned, similar to Collins, commercially built, extremely stable, output on 80 meters, very compact, with regulated power supply, \$35.00; Handbox frequency multiplier set ARRL Handbox for use with above for output on 80, 40, 15 or 10 meters, \$20.00. Beautiful construction. Perfect condition. C. Bronner, P.O. Box 261, Morton, Ill.

FOR Sale: Factory-wired and tested Globe Scout 680 and Knight VFO, in good condx. \$85 or best offer. Check or c.o.d. K11GJ, Stuart Gregg, RR 1, Ridgefield, Conn.

75A4 and matching speaker, \$550; HT33A linear with net PL72, \$550; KWM-M like new, with factory installed noise-blanker and latest improvements including lock key, \$700; 516F-1 AC power supply, \$95; 516E-1 DC power supply, \$180; 312B-2 console, \$125.00. W2ZMG.

75A-4 perfect, late serial, \$529; Collins 32S-1 transmitter, \$479; SS-1 receiver, in 11' box used, Collins 30S-1 linear, used, 67 hours, perfect, \$1250; 100-Vs, old price, \$695; used Johnson Pacemaker, \$279; Gonset SSB exciter, GSB-100, \$409; HT-32, like new, \$479; used KWM-2 \$985, perfect. Money back guarantee. Ed Moory Wholesale Radio, Box 506, DeWitt, Arkansas. Tel. WH 6-2820.

SELL Globe 6 & 2 meter VFO, factory-wired. Used 2 months, \$44.95. Dan Munro, W4CHW, 2835 Forest, Ashland, Ky.

FREE Bargain List, Box 575, New York 8, N. Y.

WORLD'S Largest Ham Convention, New England Division ARRL to be held at The New Ocean House Hotel right on the beautiful Atlantic Ocean, Swampscott, Mass. on Sunday, May 1st. See exhibits of the latest equipment by the manufacturers themselves and their distributors. Talk over your problems with their representatives! Hear about the latest in ham radio from the country's most outstanding speakers. Ask the fellow who attended Swampscott last year! Early Bird registration by mail, \$3.00. Banquet, \$5.00, extra. Make check or money-order payable to FEMA RA and mail to Box 88, Swampscott, Mass. before April 20th.

SELL Sideband rig Model A Slicer, \$40.00; Eldico exciter, \$40.00. Both for \$75.00. Eimac 5A4H wired for 12 volt filaments, \$75. Will ship. Write for details. K2DN, MacGill, 738 Marcellus Drive, Westfield, N.J.

SELL: Jennings vacuum variable UCS-200, \$25.00; two 4-1000A, \$35.00 each; three new 4-400A, \$25.00 each; two used at \$20.00 each; 3.1 Kc mechanical filter F455-Z1, \$35.00; Slim Jim mobile antenna, \$12.95; Johnson SWR bridge, \$6.00; 6 volt 100 amp. Leuce-Neville alternator, rectifier, regulator, with two 6-V-2N transformers good for 117 volts 250 watts, \$45. K6ESE, Hilton T-0582.

FOR Sale: SX-100 w/spkr, BW-5100, wired for SSB, 14AV ant., \$575; also HC-221/AN w/pwr supply, \$75; 300w. port. gen., \$45; set RC-610 coils, \$10.00. C. E. Jeffries, 103 Jacobs Lane, Warner Robins, Ga.

FREE 1960 Surplus Flver, Command sets, handie-talkies, receivers, transmitters, test sets, tech manuals, code machines, transformers, capacitors, receiving and transmitter tubes, meters, VHF-UHF sets, pluss, parts. Write today. Bill Step Co., Drawer 178, Ellenton, Fla.

"COMMUNICATIONS Unlimited" offers Bay Area hams specialized service on amateur receivers and transmitters. Equipped to service VHF to UHF. Panalyzer or SSB service. Experienced Communications service men to restore performance to original standards. Authorized factory service center; Globe Electronics, Hallicrafters and Hammarlund. Every job guaranteed. Joe Kramer, W6HSR, KE 3-4491, 2610 MacArthur Blvd., Oakland 2, Calif.

FOR Sale: 32S-1, 75S-1 plus plywood carrying case, new, perfect condx, used 20 hours, \$950; 4-4D33 tubes, \$10.00 each; 2-DM35 dynamotors, \$10 each; K-W modulation xmtr, \$25. W5MUG, 2469 Paden, Jackson, Miss.

MUST Sell: DX100B, \$165; HO129X, w/cal., \$125.00; 2-el. w/riband beam and rotator, \$50.00. Bob, K4TDX, 617 Hightower, Atlanta 18, Ga.

SALE: 2 mtr. Tecraft xmtr and convrtv used little, with beam and pwr sup., all for \$50.00 will swap. Harold Tate, W4NTS, Box 388, Southern Pines, N.C.

BC610D, 10-80 mtrs, with HT18 VFO, \$195. Sry, cannot ship. Knigh-R-100 Communications recvr, 8-meter, \$75.00; American 6200 volts C.T., 750 Ma., tapped 115 volt primary, \$45.00; Thordarson T21M65 500 watt Multi-Match modulation transformer, new, \$45.00; powerstat O-135 volts 15 amps, \$20; filter chokes, Inca 20 henry, 4500 volt, 150 ma., \$17.50; Stancor C-1415 6 henry, 500 ma., 7500 volt, \$15; Thordarson 19C45, 12 henry, 500 Ma., 5000 volt, \$15; HC64A unmodulated, excellent, \$14. Tubes 810, \$8.00; 100TH, \$7.50, 3 6fd, 2000 volt condensers, \$1.50; E. L. Sielke, W3IYO, Box 600, Torresdale, Phila. 14, Penna.

FOR Sale: Diversity radio receiver, Navy model ADM, made by R.C.A. using three AR-88 rcvrs. Complete, less interconnecting cables. Best offer. Jerry DeSimone, 80 Windsor Rd., S. Medford, Mass.

TRADE: 701-A transmitting tetodes, brand new and xmtr tested. Need 250THs. Used 4-65 or 4X500 given with each trade. Byron E. Fortner, W9FYM, RFD #10, Box 486, Indianapolis 19, Ind.

CANADIANS: Collins equipment, excellent condx. KWS-1, directional wattmeter, low pass filter, 75A4, three filters, noise blaker, spkr, also Panoramic PR-1 Panadaptor, would like to sell complete but would consider selling separately. For details write: Martin Rosenthal, VE3MR, P.O. Box 508, Station "P", Toronto 5, Ont., Canada.

SELL: Dow-Key coaxial electronic switch DKC-TRP used one week, \$20.00; B&W air inductor F C-15 for GG linear with filament type tubes, \$5.00; antenna change-over relay type A-300, \$3.00; Guardian 6-16 volt A-C keying relay, 1500 watt contacts, \$3.00; two 6V DC DPST relays, 50 amp. contacts, \$1.00 ea. Fred Bailey, 10 Midwood St., Brooklyn, N.Y.

SSB Central Electronics BC458, Central Electronics, 10B, parts for K-W linear and power supply including 4 cabinet, frame, tower and 20-meter beam, all for \$200.00. W2WWS, Frank Darke, 61 Laurel Road, Princeton, N.J.

MONTREALERS! No space, selling Collins 75A3, late ser. number, Collins 32V TVI suppressed to 32V3 standard, Collins low pass filter. Best offer takes the lot. Immaculate condition. C. L. Skelding, 37 Swallow Ave., Dorval, Que. P., Canada.

FOR Sale: Unusually fine custom kilowatt commercially built in 1951 at cost of \$2,500; 4-250As AM, CW (SSB with slight modifications), \$795 or will trade for KWM-1 with power supply or give liberal allowance on other amateur recvr. W1ASA.

KWS-1 perfect. Serial 1326. Latest revisions at Collins factory. Original parts, \$1195 cash f.o.b. Colorado Springs, James D. Russell, W9AVP.

WANTED: DX-100 or similar xmtr. Have \$300.00 worth of Lionel 027 trains to trade, Carl, WV2IMG, 32 Sky View Dr., Cohoes, N.Y.

SELL: Telrex size TB7E Triband beam, little used, \$100. Cost \$158. Reason: moving. WA2FUB, 111 Garfield Ave., Merchantville, N.J.

FOR Sale: T91/VRC4. transmitter, \$35; BC329, \$40 F.o.b. Several TP6A dial phones, \$4.50 postpaid. Abner Swartzentruber, Lowellville, N.Y.

NFW SX-101 Mark III in factory sealed carton, \$298; DX-35, V-1 and xtal mike, \$65.00; SX-24, \$39.50; Gonset Triband converter, 6v with "S" meter, \$22.50; Espey AM-FM, 11 tube tuner, \$22.50; E-V SP12B spkr, \$19.50. Want: VTFM, scope, F-100 generator, tube tester, heavy magnet 15 in. woofer. Connie Malinowski, 238 Leonard St., Azawam, Mass.

COLLINS 75A-1, \$249; 75A4, \$545; 51J2, \$495; 51J-3, \$575; R-90A/URK, 325-1 AC supply, spkr, 755-1, \$975; 325-1, \$25; 5161-2, \$89; KWS-1, \$1095, filters, \$49; Hldco 100F, \$495; SX-99, \$109; SX-101, \$225; SX-101A, \$295; NC-183-1, \$239; HT-32A, \$519, Gonset III 6 meters, \$219, GSB-100, \$399; Technical Materiel PMO oscillator, counter dial, \$245; Teletype Printers, #14, #15, #19, #26, #28, T-1, #14, #14 Reperf. converters, Write Tom, W1AEN, Alltronic-Howard Co., Box 19, Boston 1, Mass. (Richmond 2-0048).

FOR Sale: Collins 75A4 with Vernier dial and 3.2 filter, \$595; Hallcrafters HT32, \$495; Gonset Bantam 20 meter beam, \$20. All beautiful condition. F.o.b. Maplewood, N. J. H. C. Vance, Sr., K2FF, 33 Oakview Ave., Maplewood, N. J. 75A-4, new condition, all modifications, 2 filters, speaker, \$595. WRWGA.

NC-183 receiver, \$225; 250 watt phone xmtr, complete, \$180. Thomas D. Morgan, 979 Eleventh, Idaho Falls, Idaho

WANTED: NRI Communications course. Norris McKamey, RR #1, Bettendorf, Iowa.

FOR Sale: PE-75, \$125. Generator perfect, motor worn, but runs fine. Kent, K4ESX, Dozier, Ala.

NEW 50 amp. Leuce-Neville rectifiers \$5.00; 110V solyns \$3.00; 50V \$1.00, 5 large 5000V Westinghouse oil condensers 3 ufd at \$4.00 Western Electric broadcast condenser mike, \$30.00. R. J. Kucera, W8CKR, 10615 So. Highland Ave., Garfield Heights 25, Ohio.

\$50.00 REWARD for information leading to the recovery of my Collins 75A3, #515. Stolen New Year's Eve. Power takeoff on back. Ivory enamel traces on cabinet. K4COB, Chuck, 1354 Raven St., San Fernando, Calif. Tel. EM 7-7425.

GONSET Communicator III, 6-meters. Little used, looks and works like new, \$195 with crystals and mic. Gonset II linear amp. for 6, \$85. Both for \$250. Complete 6 meter station. Gordon D. Teall, W0LQP, 407 N. 2nd, Hiawatha, Kans.

HAMFEST June 5. Starved Rock Radio Club. George Keith, W9MKS. Secy. RFD 1, Olesby, Ill.

KWS-1, #981, 75A4, #4895 speaker and MicroMatch. Guaranteed new condition in every respect. \$1950 firm. Frank Lindsay, Holdrege, Nebraska.

SELL: 75S-1, new condition, 3 months use, best offer over \$400.00. W9IQW, Port Edwards, Wis.

SX-99: Not a scratch or inner defect. Never tampered with. Only \$105.00. Contact Jeff, W2BAC, 4 Bayard St., Larchmont, N. Y. Tel. TE-4-2640.

1000 Watt P.E.P. PR 4-125A, SSB able top linear, \$150; 10-A with B FO and 400 watt linear, \$250.00. Harvey-Wolis TB5-50C w/ driver sup \$60.00. Meissner ex-signal shifter w/NBFM modulator \$35.00; excellent; MM-Z, scope, \$100; Super Pro rcvr in rack, \$40; I want 75A4 for \$450. KWM1 for \$450 w/pwr supp.; 75S1 for \$350. Must be in exc. condx. K6KYB, Bill Ridings, 2903 Yearling St., Lakewood, Calif.

SELL: 32V2, \$350; 75A1, \$225, both \$550, both clean, have no TVI, have gone SSB. Will be willing to crate and ship prepaid for first check received. Mike Rosenberg, W2FNF, 35 Strawberry Lane, Koslyn Heights, L. I., N. Y.

POLYSTYRENE feeder line spreaders, 8" x 1/2" x 6", 5¢ ea. Sparks, Box 476, Gainesville, Texas.

B&W 510UB and 515B-B, \$450; NC-30, \$250, both factory conditioned within past year. In gud oprtg condx. K2ZLR, Bob Weill, RD #1, Port Jarvis, N. Y.

COLLINS KWS-1, \$1,250.00; 75A-4, \$595; speaker, \$12.00. Two extra filters, \$25.00 each. Will take all cash or older Collins equipment in trade. Petty, RFD 1, Box 166A, Monclova, Ohio

SELL Or trade: PRI geiger counter, cost new, \$149.50; PRI radiation scintillator, cost new \$595.00; suitable for auto or airborne uranium prospecting. Need receiving and transmitting equipment or cash offer. Hockett, 28 La Sonoma Court, Aloma, Calif.

GST and CO, back issues, 1955 through 1959; Radio & Electronics, 1951 through 1959. Best offer. L. W. Goon, General Delivery, Lompac, Calif.

WANTED: Collins 51J receiver, state condx and V5AMK. Best price for cash or trade. W5AMK.

SELL: BC348Q, Eimac A54, both for \$85.00. W8WBG, Detroit, Mich. Phone UL 2-4668.

SELLING Hallcrafters SX-42 in gud to exc. condx. Your best offer within 30 days. David L. Nilsen, 637-71 St., Brooklyn 9, N. Y.

WANTED: Collins 75A-2 or 75A-3 receiver. State condition and price. Does not have to be clean or in gud condx. Robert Nagel, W4JPE, U. S. Naval Ordnance Unit, Key West, Fla.

SELL: 10 meter walkie-talkie, batteries included, \$39.00. K3EVI, Hornstein, 2211 Arden Rd., Baltimore 9, Md.

SELL: TCS-6 trans-rcvr complete with AC supply, 12v dynamotor, control box, spare parts, all cables and mounting hardware. Modified for ORC BC-221A-A with calibration books. SX-28 rcvr, Scott Marine rcvr, Kleinmichmidt tape perf., std. keyboard; 300 w. final amp. PPR183 w/ driver; 1800 V 300 ma. P.S.; 250 V/-105 V P. S., with Variac control; Finch Facsimile oper. console with VU meter, ideal for ham console; 75 ft. 52 pair 26GA telephone cable, misc. xtals, tubes, meters. First reasonable offer all or any item. W2LBI, 10 Glen Road, West Hempstead, L. I., N. Y.

WANTED: CDR, Ham-M rotor, also gud Tri-Band beam. Quote price F.o.b. here. K6QQI, Col. Sears, 4725 Bridle Trail, Santa Rosa, Calif.

FOR Sale: \$175.00; 2-meter Station Gonset Communicator II, Viking 2-meter V.F.O. with Icraft power supply; 10-element Hy-Gain 2-meter beam, Astatic JT30 xtal mike. Ben, W2IRX, 425-52nd St., Brooklyn 20, N. Y. Tel. GE-9-4504.

WANTED: SX-100, state age, use, condx, spkr, etc. Lowest express prepaid price in your first letter. K0AEK, 4390 W. 17th, Denver, Colo.

CANADIANS: SX-71 with Heath O-multiplier, \$200.00. You make cash offer. Will be willing to ship prepaid. Write to M2ZAKF, Andre Lafontaine, Abbotford, Quebec P., Cana.

SELL: Morrow MB 560A xmtr, MBR5 rcvr. James power supply Master matcher with manuals. Like new condx, \$400.00. K0SEH, Dick Swanson, 5632 10th Ave. So., Minneapolis, Minn. Tel. JA 4-7262.

NEW Prop-tch motor xmtrs, 35 volts 4 ampers, 8 pounds, \$2.50 plus postage, or will trade for anything in United States stamps. William Hall, Widener, Arkansas.

DRAKE 1A SSB receiver, in top condx, xtal calibrator and WWV built in; 6 months old, no modifications. Asking \$220. What's your offer? K4KIN, 730 So. 41st, Louisville, Ky.

SELL: Viking Ranger, \$150 and Gonset Super Six converter with noise limiter, \$30.00 both in exc. condx with original manuals. Am going SSB. W2FRM, 4 Nassau Rd., RR #40, Poughkeepsie, N. Y.

SELL: NC173, in exc shape with matching spkr, O-mult, xtal calibrator, \$100.00, Q135; 1932 less August issue; 1934 less Jan. issue, 1935, 1936 comp. run, \$4.00 yr.; \$25.00 for all. W6LCU, 3889 Massachusetts, La Mesa, Calif.

SELL Or trade: HQ-100, DX-40, DB-23, VF-1, 3 element Tri-Bander, TR-4, RG-8/U, surplus xmtrs, and other miscellaneous parts. Key Dismukes, Dahlonega, Georgia

SELL: Heath Apache, new last fall, used very little; \$235.00, W8AQB, R. Shafer, Greenwich, Ohio.

FREE: \$110 worth of National accessories, including xtal calibrator six and two meter converters, to the first bargain hunter sending check for \$235.00 for top notch NC-300, complete deluxe 12 volt mobile power supply, including 100 ampere Leuce-Neville system, alternating reactor, regulator, brackets, cables, relays, manuals; DM-35 dynamotor, \$40.00. Instruction graph, all tapes, \$120.00; BC342 receiver, less AC pwr supply, \$19.00. Dr. Alan York, East Hampton, L. I., N. Y. Tel. EA 4-1024

KNIGHT Transmitter an dVFO. Best offer over \$60.00. Box 143, King College, Bristol, Tenn.

TRADE: Guns, NRA, excellent, for ham gear. Remington .270 Model 721 rifle, iron sights—45 Auto Col pistol, micro sights; Pachmayr accuracy job—6.5 mm Mannlicher model carbine with 4 power scope, w/ FB, 12 ga. Pump shotgun, etc. Can use HQ-100, RME 4300 or equal; Edico electronic keyer. Gonset 2meter transceiver, 10-20 meter c.w. xmtr. No junk, please! W5SPS, 4111 Woody Lane, Bryan, Texas.

FOR Sale: DX100, perf. condx. \$180; NC-98, perf. condx, \$110 or will trade both for Collins 75A3 or 75A4, W3BCP, Morgantza, Md

75A4, KWS1, 3L Tri-Band beam, 20 M. Telrex, full size beam, prop-pitch rotator, control box, cables; 30 ft. aluminum 12" Tri-Lower; D104 mike, 61 ft. steel Vesto tower with top safety rail and platform. Brand new, never assembled. Still crated. Spare tubes etc. This complete SSB-AM station ready in operation on all bands. Will trade for building lots, water-front preferred, bungalow or house. Will add cash if necessary to make deal. All letters will be answered. L. I. or Florida area. Albert J. Bertolisi, 505 Co. Line Road, Amityville, L. I., N. Y.

W5M-1, AC & DC supplies, mobile mount and cable Perfect condition. \$995. Robert H. Rothman, 72 Clifford St., Providence, R. I.

SELL Globe Sideband, D5B-100, factory wired, operated only 5 hours, your best offer. W2NBI, 337 Covered Bridge Rd., Haddonfield, N. J. Tel. HA 9-4853.

CLOSED Shop. Sell: Precision 98 VTFM (cost \$122); Eico 315 Signal Generator (cost \$60.00); Eico 666 tube tester and CRT adaptor (cost \$115); new equipment, perfect condx. Will trade. Need: DX-100, VOM, signal generator, or ??? Steve Pinion, K4JRE, Rte. 2, Bedford, Va.

FOR Sale: Collins 75A3 with 8R1 xtal calibrator, 880 cycle filter, \$375.00 and matching Collins 32V3 xmtr, \$425.00. Will deliver within 300 miles. C. M. Nelson, K9MHZ, 1417 Belknap St., Superior, Wis.

SWAP Or sell: Heath SB-10 sideband adaptor; used very little, in exc. condx, complete with manual and cables, \$79.00 cash. F.o.b. Albuquerque, New Mexico, or swap for your Elmac PMR-6A or other mobile gear Barry Copeland, 120 Bucrna Vista S. E., Albuquerque, N. M.

SELL: Apache \$225; HQ110, \$160; 90A, \$45.00; 2 meter beam, \$10.00. All items guaranteed like-new. John Moffit, K0RTT, Mechanicsville, Iowa.

R. F. Industrial Westinghouse 2 KW pre-heater (power supply can be used for 1 KW rig). Reasonable. Bendix brand new surplus MP-28BA dynamotor modulator for type TA-12 service transmitter, 75 watts output, Vincent P. Mele, W2MAY, 233 Summerhill Rd., Spotswood, N. J.

SELL: Model A slicer with API, \$35.00; GCI compression amplifier, 10.00; Collins vernier dial, \$20.00. Harold Franta, K0GCP, Wabasso, Minn.

DX-100, \$165; SX-99, \$100. Clifford Bond, K4SBH, Elberton, Ga.

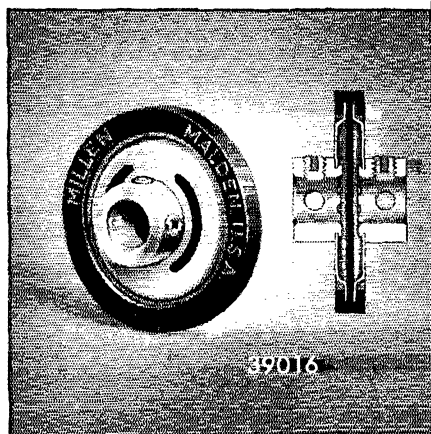
JEEP, 1958 Model DJ3A winter cab and heater, equipped for six and two meter operation, \$1295, also 75 ft. tubular steel antenna tower, \$85. W7NLR, 2433 East Cameron Vista, Tucson, Ariz.

NEW Kaar 2-meter, 60-watt crystal-controlled FM Station transmitter, with tubes, \$129.00 f.o.b. West Coast. P. D'Elia, 3497 Notre Dame Drive, Santa Clara, Calif.

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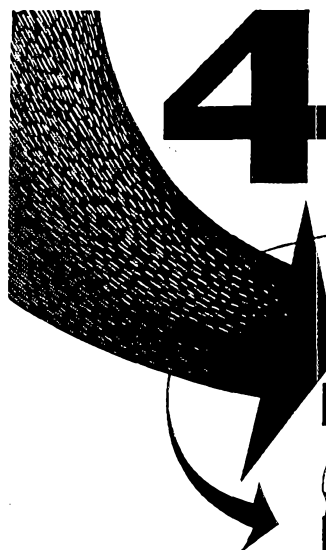
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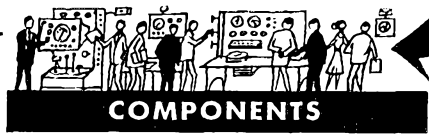
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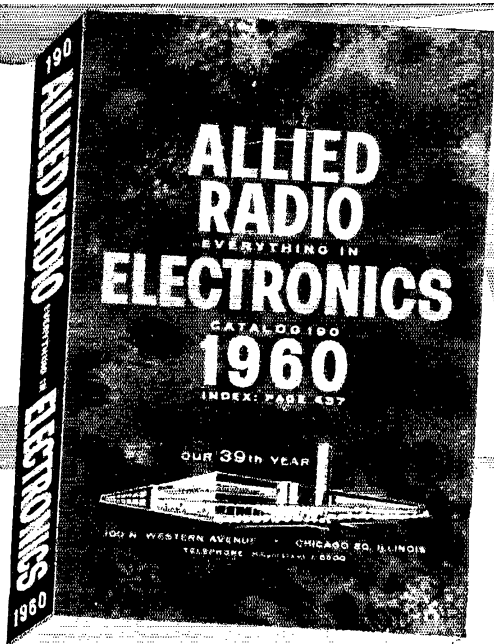
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serving the Amateur for 39 years

National's New Ham Band Receiver...NC-303



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NEW

exclusive WWV converter provision. No interference with dial calibration or frequency coverage. Accessory calibrator provides one microvolt sensitivity on 10 mc WWV frequency.

NEW

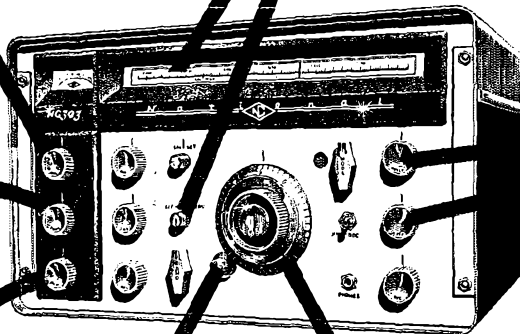
front panel SSB selector with exclusive, new "IF SHIFT" for instant sideband choice . . . eliminates retuning or detuning.

NEW

tone switch provides for attenuation of highs, lows, or both for maximum readability.

NEW

"Q" Multiplier provides razor-sharp rejection notch (more than 60 db deep). May be tuned continuously across entire receiver pass-band. Separate notch frequency and notch depth controls.



NEW

fine tuning vernier dial drive provides super-precision for CW and SSB tuning.

NEW

new 20-tune frequency display

ONLY

\$44.99*

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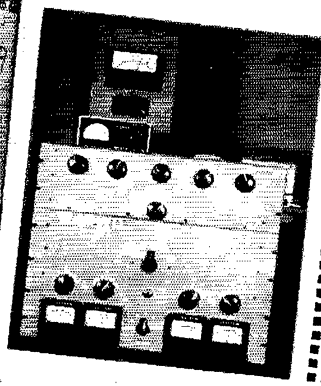
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"Kilowatt" in QST uses 4 RCA-811-A's...



thing four 811A's in parallel, this amplifier runs a kilowatt peak-envelope power output on 1.6, and up to a kilowatt average plate network tank design is the use of a completely separate band change for each band, making panel 100% by 15 inches in the main amplifier chassis, which also contains the 14- and 28-Mc. tanks. The other three tanks are behind the upper panel, 5 1/4 by 19 inches.

The author argues himself—and maybe you, too—into a "kilowatt" that is comparatively inexpensive to build. The band-switching scheme, although possibly not entirely new, has had little application in amateur gear; it provides the convenience of separate finals in much less space and at lower cost.

The "Medium Power" Kilowatt A Fresh Approach to the High-Power Question

BY B. R. BLACKBURN, W4DWU

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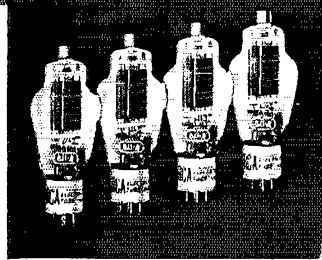
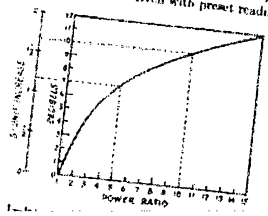
There are a good many articles floating about these days on r.f. power amplifiers, little bit of jargon, and otherwise. Most of them give a design was evolved, as to how the particular ion on how to put the thing together and get it operating. There is also plenty of discussion of high versus low power, but there seems to have been a disproportionately small amount of agita- tion for the medium-power class of operation. No doubt others are mulling the "ideal rig" problem over, and perhaps some of them would like to know that they have company.

Let's assume to start with that you have a home-grown or commercial r.f. power amplifier, 10 meters with an "all-band" job covering 80 through 10 watts (input 100 to 150 watts). Such a rig is quite adequate for ever-ready ham-station use, as the needs of satisfied operators of transmitters in this power class will confirm. Sooner or later, though, comes the urge for higher — or even HIGH —

I think it generally will be agreed that if we are presently running around 100 watts final input power we should go to at least 500 watts input to make the change really worthwhile. As may be seen from Fig. 1, this should lift the other fellow's Attache, American Embassy, APO 928, San Francisco, Calif.

5 under an additional 7 db., or about 1 1/2 points if 500 watts are better than 100 watts, then 1000 watts. We'll see. We'll see. We'll see. We'll see.

As long as we are cooking up a new final, it might as well be the *de plus ultra*. Quite possibly you have gotten tired of twinking all the knobs on that all-band exciter of yours when climbing an equal number of knobs on an all-band high-cost vacuum capacitor, loading switch, and controls, and the like. Even with preset readings



W4DWU's low-cost "kilowatt" final uses 4 parallel-connected RCA-811A's in grounded-grid.

Designed and built by W4DWU—and described in QST, December 1959—this grounded-grid final does a "gallon" job using four low-cost RCA-811-A triodes in parallel.

Here's why the RCA-811-A power triode continues to be a favorite among the transmitter men who prefer to build their own. (1) High-perveance design—an RCA development—enables you to deliver rated power at moderate plate voltages. (2) High amplification factor permits zero-bias operation in class B SSB. (3) Grounded-grid operation is especially easy. RCA-811-A's are now available through your RCA Industrial Tube Distributor. For a technical bulletin on this type, drop a QSL to RCA, Commercial Engineering, Section C-37-M, Harrison, N. J.



Power Triodes—another RCA contribution to radio communications
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Electron Tube Division
Harrison, N. J.