This standardized group of filters covers most popular filter applications and frequencies. Units are in compact, drawn, magnetic shielding cases... PM-4000 U4I900.

**EMI-90**

This standardized group of filters covers most popular filter applications and frequencies. Units are in compact, drawn, magnetic shielding cases... PM-4000 U4I900.

**EMI-90**

There are six basic types:

- **BMI** band pass units are 10K input, output to grid, 2:1 gain. Attenuation is approximately 2 db at 3% from center frequency, then 40 db per octave.
- **HMI** high pass units are 10K in and ouit. Attenuation is less than 6 db at cut-off frequency and 35 db at 67 cut-off frequency.
- **LMI** low pass units are 10K in and out. Attenuation is less than 6 db at cut-off frequency and 35 db at 1.5 cut-off frequency.
- **HML** high pass filters are same as HMI but 500/600 ohms in and out.
- **LML** low pass filters are same as LMI but 500/600 ohms in and out.
- **BML** band pass units are same as BMI but 500/600 ohms input, output to grid, 9:2 gain.

**STOCK TYPES**

- **BMI** band pass units are 10K input, output to grid, 2:1 gain. Attenuation is approximately 2 db at 3% from center frequency, then 40 db per octave.
- **HMI** high pass units are 10K in and ouit. Attenuation is less than 6 db at cut-off frequency and 35 db at 67 cut-off frequency.
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- **HML** high pass filters are same as HMI but 500/600 ohms in and out.
- **LML** low pass filters are same as LMI but 500/600 ohms in and out.
- **BML** band pass units are same as BMI but 500/600 ohms input, output to grid, 9:2 gain.

UTC standard telemetering filters provide extreme miniaturization with maximum stability, a complete set of 18 filters taking 19 cubic inches. They are 10K in and out and have an insertion loss of less than 6 db, 4 pin header for small Winchester socket.

**TMN** units are within 3 db at ± 7.5% of center frequency... down more than 18 db at ± 25%... more than 40 db beyond 1.75 and .58 center frequency.

**TMW** are within 3 db at ± 15% of center frequency... down more than 20 db at ± 50%... more than 40 db beyond 2.5 and .4 center frequency.

**BGM** band pass filters for multiplex transmittmg and receiving provide maximum stability in miniature sizes. Both receiving and transmitting types are 600 ohms in and out, and employ 7 terminal header for sub-miniature 7 pin socket.

**TGR** receiving filters are within 3 db at ± 42.5 cycles from center frequency... down more than 30 db at ± 170 cycles... down more than 15 db at adjacent channel cross-over.

**TGT** transmitting filters are within 3 db at ± 42.5 cycles from center frequency... down more than 16 db at ± 170 cycles... down more than 7.5 db at adjacent channel cross-over.

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The single conversion superheterodyne is probably the most used piece of electronic equipment in the world today as the basis of almost every broadcast receiver. On the broadcast band, it does an excellent job of receiving where stations are separated by huge voids of empty spectrum (by amateur standards) so selectivity is not a serious problem. The frequency is low enough that low drift or good stability is not much of a requirement. This low frequency also allows adequate image and spurious rejection with very simple tuned circuits.

But try to use a single conversion receiver on the higher frequency ham bands and its deficiencies are greatly magnified. You first notice that you have your choice of two ten meter bands — one (the image) is a little weaker than the other, but still strong enough to create a problem when the band is crowded. You also notice that a slight jar of the table causes signals to disappear like magic. Warm-up drift becomes quite objectionable when the set is used on higher frequency bands, caused by the local oscillator which must operate near the high frequency signal in this type of circuit.

What can be done to cure these inherent faults of the single super? Assuming the same number of front end circuits, the only way to secure better image rejection is to use a higher IF frequency. But since a high IF frequency and good selectivity are not compatible, it is necessary to again convert this high IF to a lower frequency for selectivity purposes. This is double conversion. Frequently this 2nd conversion is done with a crystal oscillator, but the main source of drift, the tuneable oscillator, is still required to operate at a high frequency. (See Block Diagram #1.)

We have now cured one of the faults, poor image rejection. If carried no further — which often happens — the double conversion superheterodyne still drifts and its signals still warble.

At Collins, we believe there is only one right way to build a double conversion super. That is to first convert the high frequency signal to a lower frequency signal by means of a stable crystal oscillator, providing good image rejection without introducing drift. We then tune this low frequency signal with a very stable linear oscillator, and since this oscillator is operating at a much lower frequency than the original signal, its drift and mechanical instability become almost negligible. A Mechanical Filter is then used for securing the best possible selectivity. This is the easiest and least expensive way to build a receiver, but we have found it the only effective method of producing maximum performance. So look at the block diagram before you buy. Is it done the easy way or the right way?

Eugene C. Lentz
W0ROW
Design Engineer
Amateur Section

Collins
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INDEXED BY

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Library of Congress Catalog Card No.: 21-9421

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

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**Section Communications Managers of the ARRL Communications Department**

**Reports Invited.** All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) directly to members in each Section. Radio club reports are also desired by SCMs for inclusion in QST. ARRL Field Organization station appointments are available in the areas shown to qualified League members. These include OBS, OBS, OPS, OO and OBS. SCMs also desire reports for SEC, EC, EC, and FAP where vacancies exist. All amateurs in the United States and Canada are invited to join the Amateur Radio Emergency Corps (ask for Form 7).

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*Official appointed to act temporarily in the absence of a regular official.*
Meet NICK CARTER.

No relation to the famous detective, but he has to be a detective of sorts.—Nick heads up our Field Engineering group.

You see, TMC ships communications equipment to some forty odd countries and somebody has to see that it gets installed right and keeps on working, and our field group supplies the necessary qualified supervisory personnel.

So whether it's Salt Lake or Timbuktu TMC makes it work.

The TECHNICAL MATERIEL CORPORATION
IN CANADA TMC Canada Ltd., Ottawa, Ontario
Main Office: MAMARONECK NEW YORK
THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

It is an incorporated association without capital stock, chartered
under the laws of Connecticut. Its affairs are governed by a Board
of Directors, elected every two years by the general membership.
The officers are elected or appointed by the Directors. The League
is noncommercial and no one commercially engaged in the manufac-
ture, 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; owner-
ship 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 adminis-
trative headquarters at West Hartford, Connecticut.

Past Presidents
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38 La Salle Road, West Hartford, Connecticut

General Counsel ......................... PAUL M. SEGAL
816 Connecticut Ave., Washington 6, D. C.
"It Seems to Us..."

KUDOS

It is—and we say this in all modesty—nothing particularly new for amateur radio to receive praise for outstanding performance in the public interest, convenience and necessity. But during the National Convention in Washington a rather impressive assemblage of high "brass" paid some mighty forceful compliments to hams and ham radio, and we think it appropriate that the nation's 180,000 amateurs stand momentarily at attention while we, in a reportorial capacity, decorate them with a few quotations.

Vice-President Richard M. Nixon, at the final convention banquet, won the hearts of his audience immediately with a good-natured recounting of the occasion when, while staying overnight with his good friend William P. Rogers (now U. S. Attorney General), he was kept awake much of the night by assorted noises from an upstairs room—which he later found were caused by young Tony Rogers, W3BFW, participating in the W/VE contest. Mr. Nixon, in praise of amateurs for their contributions to the public welfare, particularly in the field of civil defense preparation, told of two more incidents in his own personal experiences. During his 1957 trip through Africa, on one occasion regular communications broke down—but a Liberian amateur got an emergency message through to Washington ordering a new engine for the Air Force plane in the nick of time to make repairs and keep the trip on schedule. Mr. Nixon also thanked amateurs for communications assistance during his South American travels earlier this year; ham channels carried the first word to the U. S. from our Embassy in Caracas concerning the stoning incident and riots. The Vice President said that if he ever gets some spare time, "I think I'll take up ham operations myself."

A statement from Neil McElroy, Secretary of Defense, was read to the banqueting members by Attorney General Rogers. A framed copy was presented to ARRL President Dosland; we reproduce the text elsewhere on this page.

Leo A. Hoegh, Director of the Office of Civil and Defense Mobilization, outlined some of the problems of defense preparedness. Speaking particularly of communications, Mr. Hoegh said, "This is where many of you can be of the utmost importance to the survival of this nation. You could be the communications link that we need. Many of you are members of RACES... I wish that more of you could see the merit in joining the RACES program. Should this nation ever be attacked, or for any reason should the President ever find it necessary to declare a civil defense emergency, only RACES stations could remain on the air. I am mindful of the facts that amateur operators under great pressures have remained on the air to give us invaluable help in many kinds of natural disasters, and particularly in the wake of hurricanes and floods, and RACES amateurs have made excellent contributions to the success of Operations Alert. For both of these activities we can only say, 'well done', and give you my personal thanks. We earnestly hope that services such as these are all that will ever demand your attention and your work. I would like to think, though, that we are fully prepared to deal with much greater emergencies, should they ever develop."

During the military session of the convention, held at the Pentagon, Lieut. General James D. O'Connell, Chief Signal Officer of the Army, said, in part, "I have for several

(Continued on page 188)
ONTARIO PROVINCE CONVENTION
Hamilton, Ontario — October 18

The Hamilton Amateur Radio Club, Inc., invites all amateurs to attend the ARRL Ontario Province Convention to be held at the Royal Connaught Hotel, 112 King St. East, on Saturday, October 18: registration will begin at 10:00 A.M. The one-day affair will include technical addresses, two mobile transmitter hunts, special afternoon features for the ladies, and a party. The banquet at 7:00 p.m. will be followed by a guest speaker and entertainment. The initiation of candidates into the Royal Order of the Wouff Hong will terminate the convention festivities.

Requests for registration should be mailed to Bob Parry, VE3DJE, 65 Sunning Hill Avenue, Hamilton, Ont. The fee for registration is $5.00 and should be included with your registration request. Hotel and motel rates in the Hamilton area range from $5.00 and up per day. Please come and bring your XYL.

COMING A.R.R.L. CONVENTIONS

October 4-5 — Midwest Division, Des Moines, Iowa
October 10-12 — Southwestern Division, San Diego, Calif.
October 11 — Hudson Division, Albany, N. Y.
October 18 — Ontario Province, Hamilton, Ontario

ARRL SOUTHWESTERN DIVISION CONVENTION
San Diego, Calif. — October 10-12

Follow hams: San Diego invites you to attend the 1958 Southwestern Division Convention sponsored by the San Diego Council of Amateur Radio Organizations in beautiful Balboa Park. Pre-convention activities consisting of early-bird registration, informal reception, raffle and ham-gear exhibits will take place Friday evening at the Lafayette Hotel, convention headquarters. Activities Saturday take place in Balboa Park with registration starting at 8 A.M. in the conference building where ham exhibits and demonstrations will be featured all day. Ample parking available. Contests and mobile events are scheduled for Saturday morning, including transmitter hunts on 6, 10 and 75 meters, and judging for best mobile installation, with prizes. Saturday afternoon’s program includes technical talks on s.s.b., transistors, interference problems, Novices, etc., followed by an open forum. Saturday evening is the main banquet, dancing, and a Wouff-Hong initiation at midnight.

Sunday morning breakfast groups start the day at 9 A.M., with more ham activities following and then a wind-up luncheon. Throughout the convention, programs for the licensed and non-ham ladies will be provided.

Registration of $6 includes banquet. Make checks payable to the San Diego Council and mail (by October 3 to qualify for pre-registration) to Hal Helms, K6JCX, 3705 Coconino Court, San Diego.

25th ARRL Sweepstakes —
Nov. 8-9 and 15-16

How many ARRL Sections and how many stations in these sections can you work in two weekends? If you are located anywhere in the League’s field-organization territory (see page i), you are cordially invited to take part in this popular annual operating activity. Any amateur bands, phone or c.w., may be used. The total operating time allowed each contestant is 40 hours. Phone entries are compared only with other phone entries — c.w. scores only with other c.w. scores — in your particular section, in the competition for awards. Special Novice certificates are also issued. The weekend periods starting Saturday afternoon (1500 PST or 1800 EST) on the 8th and 15th of November mark the open season for SS contacts.

A complete announcement of the contest, including the rules governing participation, will appear in November QST. The rules will be the same as those of the 1957 SS. Amateurs in remote ARRL Sections who do not receive the next issue before the Sweepstakes may refer to November, 1957, QST for contest details.

Contest reporting forms will be sent to all amateurs who request them by mail or radiogram. It is not necessary to use these forms if the report form prescribed in November 1957 or in the next issue of QST is followed.

OUR COVER

When we visited W3HH in his Navy BuShips offices a few months ago he took time off from his duties as Deputy Director for Electronics to show us a little rig he had just completed. It looked as though it would be a cute one for QST, and when we suggested this he reached in a desk drawer and whipped out a manuscript, all written and ready to go. (The Navy is always ready!) We brought the rig back to West Hartford and gave it a try, and had it photographed. You'll want to refer to the cover photo for some of the front panel details as you read the article.
Pygmy Powerhouse
Model II

75 Watts—1/7 Cubic Foot

BY G. L. COUNTRYMAN,* W3HH

Several years ago the author designed a little transmitter christened the "Pygmy Powerhouse" which supposedly was to end the author's building in the low-power-transmitter department. The rig was put to good use for a couple of years and then turned over to W3ENK who is now operating it in Germany. Certain minor deficiencies became apparent with use and these are tabulated below:

1) The 40 watts input was a little too low for consistent fixed-station communications.

2) Even though the rig weighed only 26 lbs., it got pretty heavy after a two-block walk. Divided into two packages, a few pounds carried in each hand is a cinch, and use of aluminum instead of steel for the cabinet reduces the weight appreciably.

3) There was no provision for voice modulation which is sometimes desirable, particularly in portable operation.

Modifications

The Pygmy Powerhouse Model II has been designed to eliminate these deficiencies. The power has been increased to 75 watts and the transmitter proper is one unit only 6 inches wide by 6 inches deep by 7 inches high, completely enclosed. The power supply, including bias, is in a separate unit connected by a plug-in cable. Provision is made so that a Gardner modulator can be plugged into the rear of the transmitter for voice operation.

The two band switches used in the original model are combined, so that only one switch is necessary. The use of 5763 tubes in lieu of 6AG7s assists in the overall miniaturization.

Circuit

The photographs give a clear idea of the assembly and, as in the first edition, careful layout of components is necessary. Fig. 1 shows that except for the v.f.o., the circuit used is almost identical with the original model. It was decided to retain the 807W, rather than go to the 6146, as no space was saved by using the newer tube. The 6146 costs about $5.00 while the 807W, a

---

*Captain, U. S. Navy, Assistant Chief of Bureau of Ships for Electromics, Navy Department, Washington 25, D. C.
Fig. 1—Circuit of Pygmy powerhouse Model II. Unless otherwise indicated, capacitances are in μf., and resistors are ½ watt, and values are in ohms. Capacitors not listed below are disk ceramic.

C1—50-μf. midget variable (Hammarlund MC-50-S).
C9, C10, C11—Zero temperature coefficient mica or ceramic.

C2—Negative temperature coefficient (N750) ceramic.
C3, C4, C5, C6, C7—Mica.
C12—250-μf. midget variable (Bud CE-2007 or similar).
C13—1200-μf. variable (3-gang b.c. replacement type, 400 μf. per section, sections connected in parallel).

J1—Closed-circuit jack.
J2—Coaxial receptacle (SO-239).
J3—Open-circuit jack.
J4—Chassis-mounting octal plug.

L1—24½ turns No. 20, 3/4 inch diam., ½ inch long, tapped at 3½ turns from ground end, ceramic form recommended.
L2—Approx. 80 μh, 3/4-inch slug form (CTC LS3-5 Mc. coil with 15 turns removed).

The following coils are scramble-wound with No. 26 enamelled on 3/4-inch iron-slug forms (CTC LS3 form).
L3—9 turns, approx. 0.8 μh.
L4—15 turns, approx. 4 μh.
L5—20 turns, approx. 5 μh.
L6—29 turns, approx. 10 μh.
L7—9 turns No. 22, wound around associated 150-ohm resistor.
L8—5 turns No. 20, 3/4 inch diam., ½ inch long (B & W 3007 or Air Dux 516).

L9—48 turns No. 20, 1 inch diam., 3 inches long, tapped at 4, 9 and 18 turns from input (plate) end (B & W 3015 or Air Dux 516).
M1—0–1 d.c. milliammeter (see text).
RFC1, RFC4, RFC5, RFC6—2.5-mh, 50-ma. r.f. choke (National R-50 or similar).
RFC7—2.5-mh, 125-ma. r.f. choke (National R-100 or similar).
S1—Miniature 3-gang, 5-position ceramic rotary switch (Centralab P-301 index assembly with PA-1 wafers for S1a and S1b and PA-12 wafer for S1c, 5 positions used).
S2—S.p.s.t. toggle switch.
S3—D.p.d.t. toggle switch.
Bottom view of the Pygmy Powerhouse. L2 and L behind it, are mounted on a small L bracket above the band switch. Ls is near the center. Ls and L are in the lower right-hand corner. The separate 10-meter amplifier coil Ls is in the upper right-hand corner.

On the panel, the 1-inch milliammeter is behind the v.f.o. dial, and the meter switch and output loading-capacitor control to the extreme left. The v.f.o. stand-by switch is in front of the v.f.o. dial and the band switch above. The remaining knob is for the final tank capacitor.

... ruggedized, miniaturized 807, can be purchased for $1.50, will take an input of 75 watts and is not as critical as to screen and grid currents as the 6L146. Actually, the author has operated the rig at 750 volts and 125 ma., or some 94 watts input, with no ill effects to date. There was some trepidation about the miniature band switch, which is made from a 4-inch Centrabox assembly and three wafers, but with an input of 95 watts there has been no tendency to break down or arc over between terminals. The manufacturer guarantees the switch to stand 25,000 operations. This figures out to 20 years of operation, even if all bands are used each day, and should satisfy the most ardent ham!

It was decided to use the high-C Hartley oscillator shown in the wiring diagram as it was impracticable to design a grid coil with a value of Q acceptable for a Clapp oscillator within the limited space available. With the values as shown, the following frequency ranges are available:

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<td>0-100</td>
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<td>0-75</td>
<td>7000-7300</td>
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<td>0-60</td>
<td>14,000-14,350</td>
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<td>0-50</td>
<td>21,000-21,900</td>
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<td>0-50</td>
<td>28,000-29,700</td>
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These can be modified, of course, to suit individual requirements. The small resistors in series with the control grids of the 807W and the 5763 buffer-multiplier eliminate any possibility of the amplifier going into self-oscillation. The 807W runs straight through on all bands, and there is ample drive throughout the frequency range.

The miniaturized meter is a new item recently put on the market by International Instruments, Inc., and mounts in a one-inch panel hole. The basic movement is 0 to 1 ma, and the internal resistance of the meter is 100 ohms. The two shunts shown extend the range to 10 ma. for the amplifier grid current and to 200 ma. for the amplifier plate current. Due to the fact that the v.f.o. plate and screen, and the buffer screen are regulated at 150 volts, no metering was considered necessary in these circuits.

The pi-network output capacitor is a t.r.f.-replacement three-section unit with a total capacitance of about 30 to 1200 μf, with the sections connected in parallel. The trimmer capacitor attached to each section was removed. The capacitance is sufficient to feed a matched 50-ohm coax line on 80 meters.

**Keying**

The v.f.o. runs continuously while the buffer and final are keyed by the blocked-grid method. S2 cuts the v.f.o. for stand-by periods. A biasing voltage of —90 volts is required to cut off plate current to the 5763 and 807W with the key open.

**Power Supply**

All power-supply components, including the VR tubes and the selenium-rectified grid-bias supply, are in a separate unit, since this eliminates one source of heat and also provides two packages of approximately the same cube for ease in carrying. If a Grammer "Economy" rectifier circuit is used, the weight of a 750-volt power supply can be reduced considerably. His circuit requires that the rectifier filament be turned on before the high voltage and, to insure a foolproof circuit, two double-pole single-throw switches may be inserted in the 115-volt side. This circuit is shown in Fig. 2 and, no matter which switch is thrown first, only the filament will be turned on. The high-voltage transformer is then energized by throwing the other switch. The ARRL

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10 October 1958
Fig. 2—Suggested control system for the "Economy" power supply mentioned in the text. Filament power comes on first regardless of which switch is closed. Switches are d.p.s.t. toggles.

Handbook and GE Ham News, Vol. 12, No. 4 (July-August, 1957), describe conventional power supplies which can be adapted for use with the transmitter.

The Gardner modulator, including the small choke, can be assembled in a package smaller than the transmitter, plugging into the jack in the cathode lead of the 807W when phone operation is desired. R.f. output is via a coaxial connector and either a coax line to a beam or dipole, or one end of a random-length antenna can be fed. The wide range of the pi-network capacitors enables almost any antenna to be loaded on any band.

The aluminum open-end chassis is a standard 5½ x 3½ x 1½-inch size and is installed one half inch above the bottom of the panel. The rear lip of the chassis rests on the edge of a piece of ½-inch angle stock bolted to the bottom plate. The 6 x 7 x ½-inch aluminum front panel, ¼-inch angles, and perforated aluminum back, sides, top and bottom may all be purchased from Dick’s (WSIJI), although Reynolds stock could be used. The six-conductor cable connecting the power supply with the rig is a stock surplus item (29¼) from Hurstein-Applebee, and a small seven-prong socket and male plug connect at the power supply and transmitter ends, respectively. The 8-to-1 ratio planetary-drive dial is an import from Japan, available from Burstein-Applebee and WRI, for $1.50, and makes a smooth miniaturized bandspread frequency control for the v.f.o., with no backlash.

The amplifier output pi network was designed for a Q of 12 and a voltage of 600, but it operates very satisfactorily anywhere in the 400- to 750-volt range. The tank coil stands up well with 75 watts input to the final and does not overheat.

Construction

Shielding is adequate. The aluminum sheet supporting the pi-network output capacitor is made from a standard 11¾ x 3½ x 1½-inch open-end aluminum chassis with all but one bend straightened out and the top cut down enough so it will fit in the enclosure. This sheet makes contact with both the 807 tube shield and the front panel, and effectively isolates the v.f.o. portion of the circuit from the final amplifier. The tube shields and the chassis itself provide shielding between v.f.o. and buffer circuits.

The case and panel were sprayed with grey Krypton varnish and Teckni-labels were applied after the components were mounted on the front panel. The convenient carrying handle is a stock Bud item.

This little rig is suitable for low-power fixed-station use or for driving a triode kilowatt. Along with its power supply it can be incorporated into one section of a rack-and-panel job. It will fit nicely in a traveling bag along with a small voltage-quadrupling selenium-rectifier power supply, and a bank of indoor-antenna wire, for low-power portable communications. It is equally adaptable to a mobile installation, with a vibra-tor or dynamotor power supply.

WØBMW suggests that anyone desiring to print his own QSL cards should investigate the silk screen process. Briefly, silk screening is accomplished by putting a stencil of a design over a silk “screen” that is stretched on a wooden frame. Colors are then forced through the stencil onto the paper or other surface on which the design is desired. Matching stencils and colors may be used to produce a multicolored product.

Silk screening is a hobby which, like ham radio, may be as much or as little “do-it-yourself” as the individual desires. Stencils and frames may be bought ready-made, or you can produce them yourself. Stencils may be made from paper, or from the more versatile and durable film method. We won’t try to give you a complete course in the process, for we have found that the local library has a considerable amount of material on the subject, done in considerably more detail and completeness than we can devote here. It does look fairly simple, however, and you should be able to come up with some attractive cards. WØBMW sent us some samples of his work, and they are very handsome. For information and supplies, check in your local library and in the Yellow Pages of the classified phone directory.

The October schedule for the Air Force MARS Eastern Technical Net (Sundays 2-4 p.m., EST, 5740 and 15,715 kc.) is as follows:

Oct. 5 — Transistor fundamentals.
Oct. 12 — Transistor fundamentals.
Oct. 19 — Information theory.
Oct. 26 — Satellite tracking at Yale.
Nov. 2 — Radio traffic control.

QST for
A TV remote-tuning motor is used to tune the grid-dip meter. The motor is housed in the black box to the left of the g.d.o.; the wire is rolled up below the box, and the control switch is at the extreme left. The remote milliammeter is at the right.

The shaft of the motor connects to a shaft carrying a small gear that meshes with the finger drive of the Millen g.d.o. A further extension of the shaft carries a knob for manual tuning. The wooden box that supports the shaft and provides a carrying case for the g.d.o. is so proportioned that when the g.d.o. is in place the gear meshes with the finger drive.

Remote Control of a Grid-Dip Meter

Checking Resonance at A Distance

BY WILLIAM F. BURKS,* W8HNX

In this article W8HNX tells of the need he had for a remotely tuned g.d.o. and how he solved the problem. The method is simple and might be applied to anything from a remotely tuned transmitter to an antenna element or matching section.

DURING THE course of my few years as an amateur the problem of finding the resonant frequency of a driven antenna element in its operating position seemed to have no simple solution. All the beam authorities agree that the resonant frequency of the driven element must be known before the other tuning techniques can be properly used. After much thought on the problem I decided to build a remotely controlled grid-dip meter. This would permit placing the g.d.o. up at the antenna element, and a two-wire line could be used to pipe the meter current back to the shack. A reversible motor could turn the g.d.o. tuning capacitor.

At a surplus house in the city some new remote controls for TV sets were found selling for $5.95 each. Testing the counter sample it was amazing to find how much torque the motor had, and it was apparent that it would easily manipulate the grip-dip meter if it was properly attached to it. This particular remote control was made for the Alliance Company; it is powered by three 1 1/2-volt flashlight cells housed in the control box. The control box comes with 20 feet of wire between it and the motor. The batteries are supposed to last about one year when used with a television set. The ones used in these experiments have been in use for months and show no signs of weakening.

The photograph shows how this apparatus was connected to a grid dipper, a Millen.

For use with this particular setup 40 feet of 150-ohm Twin-Lead was added to the 20 feet already with the control unit. This addition caused no noticeable difference in the speed of the motor. The knob on the quarter-inch shaft permits manual use of the g.d.o. when the motor is disengaged, and the smaller drive gear produces a reduction action. Formica or Lucite may be used in place of the wooden box if desired.

The meter used in the remote position is a 0-1 milliammeter. It is connected to the posts of the other meter by soldering the ends of a 60-foot length of 150-ohm Twin-Lead to the posts. Going through the phone jack eliminated the necessity of drilling a hole in the grid-dip meter case. The remote milliammeter and the control box can be placed right in the shack, and for the frequency readings the various dips can be checked by listening on an accurately-calibrated receiver.

There is no backlash in this apparatus. It is very simple to operate—push the forward control until the meter dips and then back it up with the reverse control and then forward again until the maximum dip occurs. An average taken of ten readings should give the exact resonant frequency.

This method of combining the two units is by no means considered to be the ultimate. With a little mechanical know-how and some ingenuity perhaps many better ways can be found to construct the apparatus in a manner that will be simpler and work equally well.

This control can be used to turn the variable capacitors in the T match and the Omega match while they are in the operating position. Disconnect the motor from the grid-dip meter and attach it to the variable capacitor shaft, and the proper capacitor setting can be quickly determined.

* 3546 Lilac Ave., Cincinnati 8, Ohio.
A Versatile 50-Mc. Transmitter

Ten to Fifty Watts Input with Two Tubes

BY EDWARD P. TILTON,* WIHDQ

Please send me information on a low-cost 6-meter rig that is easy to build and adjust."

The two-tube transmitter shown herewith was intended to answer this very common request. It is straightforward in design, inexpensive and easy to build, and flexible as to power level. Depending on the power supplies available and the tube used in the final stage, this 50-Mc. r.f. unit can be run at any power level from under 10 to over 50 watts input. It may be keyed for c.w., or modulated for voice operation. Requiring only a single 300-volt power supply, it is well adapted to mobile service.

How Simple?

You can build a simpler rig for 50 Mc. than we have here, but too much simplicity may not be the best approach. Going to 50-Mc. crystals, for example, would simplify the circuit slightly, but changing frequency then becomes a costly matter. This transmitter uses low-cost 8-Mc. crystals, providing a degree of stability superior to that obtainable with higher-frequency crystals. The crystal oscillates on its third overtone (25 to 27 Mc.) so only a single multiplier stage is needed. This feature eliminates TVI due to multiples of the crystal frequency appearing in various low-band channels, a condition that may develop when an 8-Mc. crystal is used at its fundamental frequency.

The flexibility of the transmitter is worth considering. With a 2E26 in the final stage this rig may be run at 10 watts input or less. It will serve as an exciter for a higher-powered amplifier, or as a low-powered transmitter. The total power drain at 300 volts is well within the capabilities of economical 100-milliampere power supplies commonly used in mobile service. Changing to a 0146...
final tube and increasing the plate voltage to 450 or so allows an input of 50 watts for voice operation, or up to 65 watts on c.w. This may well be all the power you'll ever want to run on 6, but if you decide to go to the kilowatt level someday you'll have an exiter quite capable of supplying the drive requirements.

Circuit Details

The crystal oscillator is the triode portion of a 6U8 triode-pentode. Crystals between 8.34 and 9 Mc, or 25 to 27 Mc, are used. Those in the 8-Mc. range can be purchased at very low prices from surplus houses, or they can be ordered to your desired frequency from any crystal manufacturer. Crystals in the 25-Mc. range are actually 8-Mc. crystals, so cut as to encourage operation on the third overtone. They are somewhat more expensive than 8-Mc. crystals, and are likely to be less stable. When 8-Mc. crystals are used the resultant frequencies should be checked carefully, as they may not be exactly 3 times those marked on the crystal holders. This is important only when using frequencies that come out near a band edge.

The pentode portion of the 6U8 is a frequency doubler, giving 50-Mc. output to drive the final amplifier. The doubler plate circuit is both capacitively and inductively coupled to the amplifier grid. The grid coil, La, is resonated by the input capacitance of the amplifier tube. The coupling capacitance is a small value (5 μf.) so the coupling at 25 Mc. is low. This prevents 25-Mc. energy from being passed on to the amplifier to a large extent, and is helpful in reducing possible TVI in Channels 7, 8 or 9 that might result from multiples of the oscillator frequency appearing in the transmitter output.

The amplifier tube may be a 2E26 or a 6146, depending on the power level desired. Jacks are provided for measuring the grid and cathode currents. The cathode jack may also be used for keying the transmitter for c.w. operation. Output is coupled out through a link at the bottom of the plate coil, to a coaxial fitting on the back of the amplifier shield compartment. A variable capacitor in series with the grounded side of the link serves as a loading adjustment. The amplifier is neutralized by the capacitive-bridge method, in which a small amount of energy from the plate circuit is fed back to the low end of the grid coil.

Construction

The transmitter is built on a standard aluminum chassis, 5 by 10 by 3 inches in size. The shield enclosing the amplifier tube and output circuit is 4 inches high and 5 inches square. The shield contributes nothing to the efficiency of operation, but it may be useful in the prevention of TVI, and it is a desirable safety measure.

Controls on the front wall of the chassis are the oscillator and doubler plate tuning capacitors. Grid and cathode caps are also on the front wall. The plate tuning capacitor of the amplifier is mounted on the front of the shield enclosure. The loading capacitor and coaxial output fitting are on the back. A 4-terminal strip on the back of the chassis provides for connection of filament and plate power. Terminals are for one side of the heater circuit, which is also the negative high-

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**Figure 1**—Schematic diagram and parts information for the 50-Mc. transmitter. A 6146 may be substituted for the 2E26, for higher power input. Capacitors are ceramic unless specified. Values under .001 are in μf. Resistors 1/2 watt unless specified.

| C1, C2—50-μf. variable (Johnson 157-4). |
| C3—25-μf. variable (Johnson 157-3). |
| C4—0.5 to 3 μf. ceramic trimmer (Erie 3139D). |
| C5—25-μf. variable (Johnson 167-2). |
| J1—Coaxial chassis fitting. |
| J2, J3—Closed-circuit jacks. |
| L1—14 t. No. 20 tinned, 1/2-inch diam., 3/4 inch long, tapped at 41/2 t. from crystal end (B & W No. 3003). |
| RFC1—Single-layer v.h.f. choke, 2 to 7 μh. (Ohmite Z-50 or National R-60). |

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voltage, the other heater lead, and two for the plate supplies. One of these feeds the oscillator and buffer plate circuits and the other the platescreen circuit of the final. This allows separate supplies to be used for these functions, and makes provision for modulation, as explained later.

Layout of parts is not particularly critical, but for those interested in building an exact duplicate a layout drawing is shown in Fig. 2. The hole for the final plate tuning capacitor is 2 inches in from the top and right edges of the front plate. The four holes in the front wall of the chassis are 2 inches apart, centered on the front surface. The back wall of the shield enclosure has the loading capacitor 2 1/4 inches in from the left edge, and the coaxial fitting 1 1/2 inches from the right edge. Both are 2 3/4 inches down from the top edge.

The front and back plates of the shield enclosure are cut from sheet aluminum, with 1/2 inch extra length for fastening to the front and back walls of the chassis, making them 4 1/2 by 5 inches in size. Sides and top are cut from Reynolds perforated aluminum sheet, available in many hardware stores. The side fastened to the end of the chassis is 5 by 6 inches in size before bending, the other being 4 1/2 by 6 inches. Both have 1/2-inch surfaces bent over on the top and sides. The top piece is 5 by 6 inches, with half-inch lips bent over for slipping over the top of the assembly. The entire shield box is held together with self-tapping screws. The large holes in the perforated stock will just pass these screws. The smaller holes can be enlarged with about a No. 26 drill to pass the thread on the self-tapping screws. Do not attempt to pull these up too tightly, as the thin stock will strip out readily. Perforated stock can be bent easily between wood or steel blocks, or in a vise, using the rows of holes for aligning the bends.

To give a finish that will resist finger-marking the aluminum can be cleaned in a lye solution and then sprayed with clear lacquer, or it may also be rubbed down with steel wool and then sprayed.

Leads carrying d.c. and heater power were put in with shielded wire, grounded to the chassis at intervals. This lends a neat appearance, and helps to keep power leads from picking up and radiating r.f., a possible cause of TVI. Tie-point strips are used to support resistors and other parts, where they will contribute to mechanical stability. The position of these terminal strips is indicated on the layout drawing, Fig. 2. The 5-lug strips have two mounting feet, so two of the five terminals are actually grounded. The 4-lug strip mentioned is a 5-lug strip with one end terminal cut off.

It should be pointed out that hole sizes for the tube sockets will vary with different makes of octal sockets. It would be well to check your sockets for dimensions before going ahead with drilling of the chassis. Most miniature sockets have a metal ring in the center which acts as a shield. With this type of socket, all the terminals that are to be grounded (Pins 4, 7 and 8 on the 6U8) are bent up against the ring and soldered to it. A lug under one of the socket mounting screws is then soldered to the combination.

In the experimental model of this transmitter considerable trouble was experienced with oscillation in the amplifier stage. Many stabilization tricks were tried, without too much success. The trouble was traced eventually to the tube socket used. It was a molded brown bakelite type having a metal ring with four lugs that are intended to serve as ground points. This approach may be all right for broadcast receivers, but it is no good for amateur transmitters, v.h.f. or otherwise. After about three days of struggling, the socket was changed to a ceramic type having no grounding ring, and all our troubles faded away. Moral: bypass to the chassis, not to grounding lugs that don't make direct contact with the chassis.

All bypassing should be done with the shortest possible leads, otherwise it may be ineffective. Where resistors are used for decoupling purposes, as in the power leads to tuned circuits, the lead from the resistor to the r.f. circuit should be as short as possible. Note the positions of the coils, as these are important, particularly the doubler plate and amplifier grid coils. They should be mounted about one coil diameter apart, with the axis of each coil perpendicular to the chassis top. The bottoms of the coils, as drawn in the diagram, face toward the chassis.

The neutralizing capacitor, C4, is the type intended for mounting with one side grounded to the chassis. Obviously, this is impossible in this application, so another mounting provision must be made. A small tab of sheet copper 3/8 inch wide and about 1 inch long is used to support the capacitor, the far end of the tab being soldered

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Fig. 2—Layout drawing of the chassis top, for those who wish to make an exact duplicate of the original transmitter. Precise duplication is not important, though the general parts layout should be followed. Hole sizes may vary with different types of sockets.
Looking down inside the amplifier shield. The plate tuning capacitor, $C_1$, is on the front wall, with the loading adjustment, $C_5$, on the rear wall. Parasitic suppressor and plate coil connect to top stator bar of $C_4$. Black lead, lower left, runs through a rubber grommet to the neutralizing capacitor, below the chassis.

to the lug on the 3-lug tie-point strip nearest the tube socket. The 150-$\mu$F bypass at the low end of $L_4$ connects from that point to the ground lug at the middle of the terminal strip. The lead from the sleeve of the neutralizing capacitor is a stiff wire that passes through a $3/8$-inch hole in the chassis to the lower stator terminal of the plate tuning capacitor, $C_4$. The latter is mounted with its stator terminals one above the other.

The parasitic choke, $L_4$, is wound on a 100-ohm resistor, the leads of which are used to make the connections to the top stator terminal and the plate cap of the amplifier tube. The choke is made by notching the ends of the resistor with a file, using these notches as the starting and ending points of the winding.

Adjustment and Operation

For initial tests a power supply capable of delivering 200 to 300 volts d.c. at about 100 ma., and 6.3 volts a.c. or d.c. at 1.7 amperes may be used. (Only 1.25 amp. will be needed if a 2E26 is used.) The negative side of the plate supply and one side of the heater supply are connected together. The oscillator is tested first. This is done by feeding plate power to the 4700-ohm resistor in the oscillator plate lead only, disconnecting the doubler plate-screen lead temporarily.

"Apply heater voltage only, and allow the tubes to warm up for 30 seconds or more. Connect a 100-milliampere meter in the lead to the plate supply, and apply power. Swing the oscillator tuning capacitor, $C_1$, through its range. There will be a sharp dip in current to about 10 ma. as the crystal starts oscillating.

Check the frequency of oscillation with a grid-dip meter or wavemeter. If you have a receiver that tunes the 25- or 50-Mc. region, listen for the oscillator to determine if it is crystal controlled. The frequency will change only slightly, if at all, when the circuit is tuned through resonance. Listen to the note with the receiver beat oscillator on, and place a screwdriver or other metal object near the tuned circuit. There should be very little change in frequency. Should the frequency change more than a few hundred cycles under these tests the oscillator may not be controlled by the crystal.

Self-oscillation is the result of too much feedback. This can be corrected by moving the tap lower on the coil. Too little feedback may prevent the oscillator from working at all, or it may drop out of oscillation when loaded appreciably by the following stage. The cure is to raise the tap position on the coil.

When the oscillator is working correctly, remove the milliammeter from its power lead and connect it between the high-voltage source and the junction of the screen resistor and 1000-ohm resistor at the low end of the plate coil. Plug a low-range milliammeter, preferably 5 or 10 ma., into the grid current jack, $J_2$, of the amplifier. Apply plate voltage to the first two stages and tune the doubler plate circuit for maximum grid current, as read on the meter in $J_2$. This should be at least 2 ma., with a 250-volt plate supply. Try varying the separation between $L_4$ and $L_3$, leaving spacing at the point that yields greatest grid current. Retune the doubler plate circuit as the spacing is changed.

Next comes neutralization of the amplifier. With drive on, but no plate or screen voltage, tune the amplifier plate circuit through its range, watching the grid current meter. There may be a downward dip in grid current when the plate circuit is resonated. Adjust the neutralizing capacitor, $C_3$, a turn or two and check the grid current dip again. If there is less change than before, the adjustment was in the right direction. Continue in this way until no downward movement can be seen in the grid current as the plate circuit is tuned through resonance.

If neutralization cannot be achieved, a different value of bypass will be required at the low end of $L_4$. If the neutralizing capacitor is at minimum setting when neutralization is approached, a larger value of bypass will be needed. Try 220 $\mu$F as a next step.

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1 Wavemeters and their uses are discussed in July, 1958, QST and in the ARRL Handbook.
Power may now be applied to the final amplifier. This can be from the same source as has been used for the earlier tests, for the time being. The meter may be removed from the doubler power lead and connected between the junction of the r.f. choke, RFC1, and screen resistor and the terminal on the back of the transmitter. This will measure the combined plate and screen current drawn by the amplifier. The meter may also be plugged into the cathode jack, where it will read combined plate, screen and grid current.

A light bulb of about 25 watts or more can be connected to a coaxial fitting and used as a dummy load in place of an antenna. This will not represent a 50-ohm load, so the tuning of the stage will not be the same as when a matched antenna system is used, but it will do for initial tests, and it will give a rough indication of power output.

Apply plate-screen power to all stages, and tune the plate circuit of the amplifier to the point where plate current dips the lowest. Now adjust the series capacitor, retuning the plate capacitor, until maximum brilliance is seen in the load lamp. Check carefully for any sign of oscillation in the amplifier. Remove the crystal from its socket briefly, while watching the amplifier grid current. This current and the amplifier output should drop to zero, and remain there regardless of the tuning of any of the transmitter circuits. Should grid current appear with the oscillator inoperative, recheck neutralization. The grid-current dip may be only an approximate indication of neutralization, so the adjustment may have to be touched up after power is applied to the amplifier. Turn off power as a safety measure when this is done. With perfect neutralization, maximum grid current, minimum plate current and maximum output will all occur at the same setting of the amplifier plate circuit tuning. Perfection in this respect may not be possible, but there should be no sign of oscillation (grid current in the amplifier when the drive is removed) at any setting of the tuning controls.

When the rig is operated with a properly designed antenna, the settings of the amplifier plate and antenna loading adjustments may be somewhat different from those obtained with a lamp load. Both should be adjusted for maximum power delivered to the antenna. This can be recorded on a field-strength meter, giving a relative indication of the power radiated by the antenna. Better than this is a power-indicating standing-wave bridge, which may be left connected in the line to the antenna at all times.

Power Supplies and Modulators

Equipment described in QST and the Handbook does not often include built-in power supplies, meters or modulators. These should be treated as accessories, useful with other items of the station equipment. Properly designed, they are permanent equipment, to be used in essentially the same form for years. Separate power supplies and modulators are versatile items that can be used in many ways. If you decide to change the transmitter design, only the r.f. unit need then be altered: the accessories remain intact, ready for use with any new equipment.

You can put this rig on the air with nothing more in the way of power equipment than a low-cost supply built from receiver-replacement parts. It could be as low as 250 volts output, at about 100 ma. When you get ready to increase power, this supply can be used on the oscillator and doubler stages, and possibly on the speech amplifier in your modulator. A separate supply delivering up to 500 volts or so can be built for the final amplifier, and be used for the output stage of the modulator as well, if you like.

The audio power output of the modulator should be at least half the d.c. input to the final amplifier. If the transmitter is to be used with a 2L26 at about 10 watts input, a single pentode or tetrode modulator may be used. There is nothing wrong with using a larger modulator, if you have one. Merely hold down the gain to the point where adequate audio power is available to modulate the transmitter properly. If you use a 6140, running up to 50 watts input on phone, a modulator delivering 25 watts audio power will be needed. Any edition of the Handbook has modulators that will suit these requirements.

The same is true of power supplies. Design details in the Handbook will enable you to build a power supply system to meet your needs. The current for the final amplifier of the transmitter is run through the secondary of the modulation transformer, as shown in Fig. 3. Connection of a single supply for both modulator and final amplifier is shown, but separate power supplies can be used. Separate supplies may, in fact, represent an economy in the end. Several small power supplies may cost no more than a single large one.

For mobile operation with a 6-volt battery the heater circuit is wired as shown. If the car has a 12-volt battery a 5-ohm 5-watt resistor connected in series with the heater lead will drop the voltage sufficiently, when a 2L26 is used in the output stage. Twelve-volt versions of the 6V8 and 2L26 are also available. Any mobile power that delivers 250 volts or more can be used for the plate supply. Most mobile enthusiasts will be content (Continued on page 164)
Simple Low-Pass Filter Design

Easy Calculation of Values in a High-Performance Circuit

BY JAMES V. O'HERN,* W2WZR

Any amateur can construct excellent low-pass filters of the Chebychev type if the following things are known:
1) Terminating resistance.
2) Cut-off frequency.
3) Minimum desired attenuation in the stop band.

Fig. 1 gives the circuit of such a filter having a reasonably sharp rate of cut-off. The lower drawing of this figure shows where the cut-off frequency is in relation to the end of the pass band and the beginning of the stop band. The numerical relationships between these frequencies, for various amounts of stop-band attenuation, are given in Table I, together with values of $L$ and $C$ normalized to an impedance of 1 ohm and one cycle per second.

Chebychev filters have amplitude ripples in both the pass band and stop band. By proper design the amplitude of the ripple in the pass band can be held to any desired value. However, 1.0-db. ripple is adequate tolerance for amateur work and Table I is calculated on this basis.1

How To Use the Table

The table lists values for $C_1$, $C_2$, $L_2$, $C_3$, $C_4$, $L_4$ and $C_5$ as a function of the minimum desired stop-band attenuation. Capacitance values given are in farads and inductance values are in henrys. Since the values are normalized they must be converted to the appropriate frequency and impedance levels. For the frequency transformation all the $L$ and $C$ values given on the selected db. attenuation line must be divided by $f_0$, the cut-off frequency chosen. For the impedance

$*\ 103\ W.\ Roswell\ Ave.,\ Nedrow,\ N.\ Y.$


<table>
<thead>
<tr>
<th>Minimum Stop-Band Attenuation</th>
<th>Pass-Band Limit ($f_1$)</th>
<th>Stop-Band Limit ($f_2$)</th>
<th>Capacitance in Farads</th>
<th>Inductance in Henrys</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$C_1$</td>
<td>$C_2$</td>
<td>$C_3$</td>
<td>$C_4$</td>
</tr>
<tr>
<td>35 db.</td>
<td>.935</td>
<td>1.107</td>
<td>.3935</td>
<td>.0907</td>
</tr>
<tr>
<td>40 db.</td>
<td>.907</td>
<td>1.103</td>
<td>.3296</td>
<td>.0593</td>
</tr>
<tr>
<td>45 db.</td>
<td>.896</td>
<td>1.116</td>
<td>.3416</td>
<td>.0530</td>
</tr>
<tr>
<td>50 db.</td>
<td>.843</td>
<td>1.186</td>
<td>.3650</td>
<td>.0422</td>
</tr>
<tr>
<td>55 db.</td>
<td>.809</td>
<td>1.236</td>
<td>.3888</td>
<td>.0350</td>
</tr>
<tr>
<td>60 db.</td>
<td>.773</td>
<td>1.394</td>
<td>.4132</td>
<td>.0291</td>
</tr>
<tr>
<td>65 db.</td>
<td>.737</td>
<td>1.537</td>
<td>.4398</td>
<td>.0244</td>
</tr>
<tr>
<td>70 db.</td>
<td>.701</td>
<td>1.427</td>
<td>.4698</td>
<td>.0202</td>
</tr>
</tbody>
</table>

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TABLE I

Filter Design Data for 1.0-db. Pass-band Ripple
transformation divide the capacitance values by the chosen value of terminating impedance (this should be purely resistive) and multiply the inductance values by the chosen value of terminating impedance. The two operations (frequency and impedance transformation) can be combined as follows:

\[ C = \frac{1}{j \omega R} \times \text{value given by Table I} \]

\[ L = \frac{L}{j \omega} \times \text{value given by Table I} \]

To find the pass-band and stop-band limits, multiply the cut-off frequency by the normalized values for these limits, for the stop-band attenuation selected, as given by Table I.

**An Example**

Say we want to work at an impedance level of 1000 ohms and we want the cut-off frequency to be 2500 cycles per second. We also want a minimum of 60 db. attenuation in the stop band.

From Table I we can immediately find the start of cut-off by looking in the 50-db. set of values, finding 0.773 as the factor for the pass-band limit. Then

\[ f_1 = 2500 \times 0.773 = 1933 \text{ c.p.s.} \]

The stop-band limit, from the Table, will be 2500 times 1.204, or

\[ f_2 = 2500 \times 1.204 = 3235 \text{ c.p.s.} \]

The attenuation characteristics of the filter can now be estimated as shown in Fig. 2.

![Fig. 2—General shape of attenuation characteristic of the filter calculated in the example.](image)

The L and C values are calculated as follows:

\[ C_1 = \frac{0.132}{2500 \times 1000} \text{ farads or } \frac{0.132}{2500 \times 1000} \mu \text{f.} = 0.17 \mu \text{f.} \]

\[ C_2 = \frac{0.291 \times 10^6}{2500 \times 1000} = 0.012 \mu \text{f} \]

\[ C_3 = \frac{0.304 \times 10^6}{2500 \times 1000} = 0.22 \mu \text{f.} \]

\[ C_4 = \frac{0.783 \times 10^6}{2500 \times 1000} = 0.031 \mu \text{f.} \]

\[ C_5 = \frac{0.321 \times 10^6}{2500 \times 1000} = 0.15 \mu \text{f.} \]

As a short cut, the value of the expression

\[ \frac{10^6}{j \omega R} = \frac{10^6}{2500 \times 1000} = 0.4 \]

may be calculated first, and then multiplying the C values given in the Table by this factor will give the values of the various capacitors directly. A similar short cut,

\[ \frac{R}{f_0} = \frac{1000}{2500} = 0.4 \]

may be used for finding the L values:

\[ L_2 = 0.4 \times 2006 = 0.82 \text{ henrys (82 mh.)} \]

\[ L_4 = 0.4 \times 1775 = 0.71 \text{ henrys (71 mh.)} \]

These values are all we need, and the complete filter is shown in Fig. 3.

**Components**

For best results the actual filter should use component values as close as possible to the calculated values. If possible, the capacitances and inductances should be measured on a bridge.

![Fig. 3—Circuit constants of the filter calculated in the example.](image)

The theoretical design is based on loss-free components, but capacitors and inductors with a Q of 50 or better will give excellent results. Mica capacitors are preferred; however, good-quality paper units may be used for the larger values.

The most critical component is L₄, which is in a parallel-tuned circuit producing an attenuation notch nearest the pass band. This coil therefore should have as high a Q as possible. Powdered-iron toroidal cores are best. Suitable cores can be obtained from the Arnold Engineering Company, Marengo, Ill., and the following types are recommended:

- B-061157-3
- A-080157-2
- E-115157-4
- D-471157-3
- W-008157-3

Coils wound on any of the above cores have a nominal inductance of 157 millihenrys for 1000 turns of wire. Since inductance varies as the square of the number of turns, any desired value can be quickly approximated — e.g., 500 turns would give about one-fourth of 157 mh. or 39.2 mh.

Hand winding is not too difficult if a bobbin with slots in the ends is made up of brass or aluminum rod, as shown in Fig. 4, and passed through the center of the toroid after first having been wound full of wire of a size appropriate for the inductance required and the winding space available on the toroid core.

**Choice of Impedance Level**

In order to achieve the theoretical performance

\[ QST \text{ for } \]

2 It is merely a coincidence that the short-cut factors happen to be the same for both C and L in this example.
of the filter the proper terminations must be used; that is, the signal source feeding into the filter should have the chosen value of internal resistance, and the output side of the filter similarly should work into the same value of resistance.

Any convenient value of impedance can be selected, but occasionally a choice is made that will require impracticable values of $L$ and $C$—e.g., very high values of $R$ will lead to extremely large values of inductance and very low values of $R$ will lead to very large values of capacitance. If the design turns out to be poor on this account, it will be necessary to reconsider your choice of impedance. In general, an impedance value of the order of 600 ohms is a good choice for speech work as the component values are reasonable. However, there is considerable latitude.

If the output of the filter is applied to the grid circuit of an amplifier tube—usually this will be the case—the termination on the output side can be a simple resistor having a value equal to $R$. On the input side the filter can be coupled to the preceding tube by means of a transformer having the proper impedance ratio for the tube and filter, unless $R$ happens to be, or is deliberately chosen to be, equal to the internal output impedance of the driving amplifier. A cathode follower makes a good driver since its internal output impedance will be in the neighborhood of a few hundred ohms, a good value from the standpoint of values of components used in the filter.

Fig. 5 shows the circuit of an amplifier built by the author using the values computed above. In this case the input side of the filter is coupled to a 12AU7 section through a step-down transformer to match the plate resistance of the tube to the 1000-ohm impedance of the filter. The second half of the 12AU7 drives a 6AQ5 output amplifier with the writer's "secret weapon" for combating line noise—a series-resonant circuit tuned to 60 c.p.s.—in its grid circuit. In v.h.f. reception the low-pass filter, by eliminating unnecessary high-frequency response, has practically eliminated the strain of listening to a dead band; and with the "secret weapon," a large amount of line noise can be tolerated. The filter is particularly effective for scatter communication, and it is surprising how little distortion of voice signals is apparent even though cut-off starts at about 1500 c.p.s.

![Fig. 5—The author's amplifier, incorporating a filter as designed in the text and the "secret weapon"—a series-resonant trap in the grid circuit of the output tube—for reducing line noise.](image)

Alabama — The Valley ARC and the API RC will hold their annual ham picnic on October 5 at Chewacla State Park, just south of Auburn on U.S. Highway 28, Donations of 50¢, swap shop, auction, contests. Picnic lunch, so bring the whole family. For reservations contact Al Stancl, W4PHX, 1411 N. 7th Ave., Lanett.

New York — The annual Syracuse v.h.f. roundup will be held on October 11 at the Three Rivers Inn, just north of Syracuse on Route 57, Thruway exit 38. Talk-in rooms on 50.1 and 144.1 Mc. Tickets at $3.50 per person include banquet, speakers, dancing, floor show. You must register in advance. Contact Bob Mele, W2EWM, 18 Homeland Drive, North Syracuse.

New York — The Auburn ARA will hold its second annual hamfest on September 27 at Springfield Inn, Auburn, with activities starting at 1500 and dinner at 1900. Advance tickets $4.50, at the door $5.00. For further info contact Don Smith, K2ZQJ, 32 Florence Street, Auburn.

Ohio — The Cleveland Area Council of Amateur Radio Clubs will sponsor a convention on October 18, beginning at 0800, at the Masonic Auditorium at 226th and Euclid. Pre-registration cost is $2.00 per person, $3.50 per couple, prior to Oct. 15. Tickets to the sideland dinner are $4.50 per person in advance, or $5.00 at the door. A special ladies luncheon and style show is $2.50 in advance, or $3.00 at the door. Speakers for v.h.f. enthusiasts and for MARS members; and Technical speakers, equipment displays, entertainment. See page 108 of September QST for details on the operating contest held in connection with this convention. Contact the Cleveland Amateur Radio Convention, P. O. Box 5167, Cleveland 1, Ohio.

(More on page 187)
Many newcomers to the amateur v.h.f. field feel well able to build and wire their own converters. Most designs are simple enough, mechanically and electrically, but adjustment for peak performance is quite another matter. This article describes test procedures that can be carried through with only the simpler items of test equipment. The material presented is sufficiently general to be applicable to most v.h.f. converters described today.

Anyone who intends to build or even repair and adjust his own gear should have some test equipment. The items recommended here are not of the complex or expensive variety. They should be a part of the station equipment; as necessary as the transmitter, receiver or antenna system. First we need some form of test meter, either vacuum-tube voltmeter or volt-ohmmeter. The v.t.v.m. is preferable, as it is more versatile, but the latter will do if its meter is the sensitive 20,000 ohms-per-volt type. A grid-dip meter (g.d.o.) is a must for determining the resonant frequency of tuned circuits. A noise generator is a necessity for receiver work. The crystal-diode variety is so simple and inexpensive that it is foolhardy to try to do without one. Let's see how these tools are used.

Local Oscillator Adjustments

If you have not already done so, it will facilitate converter adjustment procedure if you install a "looker point" in the grid circuit of the mixer stage. This can be a 1-megohm resistor connected between the mixer grid and a test jack or feed-through pin, as shown in Fig. 1. This point should be accessible from the top of the chassis. The d.c. voltage read here will be useful for setting the oscillator injection level and for alignment of the r.f. stages. Following initial alignment, subsequent checks can be made conveniently at this point without removing the converter bottom plate or other shielding.

![Fig. 1 — A test point for measuring injection bias is a great convenience in making converter adjustments. D.c. voltage may be read with vacuum-tube voltmeter or sensitive volt-ohmmeter.](image)

Before proceeding with actual alignment it is a good idea to adjust all tuned circuits approximately to the desired resonant frequencies with the grid-dip meter. This can be done with the converter inoperative, but with the heaters on.

The next step should be to get the oscillator working properly. If it is a tunable oscillator its frequency range should be checked and the dial calibrated roughly. If it is a crystal oscillator be sure that the frequency is right, and that it is controlled by the crystal. This can be done by listening to the oscillator note in a communications receiver. The frequency should vary only slightly, if at all, when the oscillator is tuned, or when a metallic object is placed near the tuned circuit. If the crystal frequency is out of range of the receiver this check will have to wait until the MIXER is put into operation. Then a locally generated signal can be tuned in for the stability check. This signal could be from the transmitter exciter or other stable source. Some grid-dip oscillators are sufficiently stable for this purpose.

If the converter oscillator is not stable it is usually because of too much feedback. If no oscillation develops the feedback is too low, assuming, of course, that the crystal is in working condition. Most converter oscillators use overtone crystals or oscillator circuits that are intended to make the crystal work on one of its overtones. Overtone oscillator feedback adjustments have been discussed thoroughly in QST.

If the converter has one or more multiplier stages following the crystal oscillator, these should now be checked to see that they are on the desired frequencies. Use the g.d.o. as a wave-meter for this. The circuits may also be peaked for maximum output with the g.d.o. as an indicator, though the d.c. voltage at the mixer test point is the best indication, once it is determined that the stages are on the desired frequencies. Coupling from the oscillator is usually adjusted to give about minus 2 to 3 volts injection bias at the mixer grid, as measured with a v.t.v.m.

R.F. Amplifier Response

Once the injection level is set, the response of the r.f. stage or stages can be set up using the alignment of the r.f. stages. Following initial alignment, subsequent checks can be made conveniently at this point without removing the converter bottom plate or other shielding.

Hints on Attaining Optimum Performance with Simple Test Equipment

Adjustment Procedures for V.H.F. Converters

BY EUGENE C. FRYE, K6DJP

*2735 11th Ave., Marion, Iowa.

g.d.o. as a signal generator and the mixer test point as a signal detector. The g.d.o. can be connected to the antenna input terminal through a piece of transmission line about a half wavelength long. This can be coax or Twin-Lead, depending on the converter input circuit design. At the g.d.o. end of the line there should be a small pick-up loop, loaded with a half-watt carbon resistor of approximately the value of the line impedance. The loop can be made from the resistor leads, in fact.

Set the g.d.o. at approximately the middle of the desired converter operating range. Remove plate voltage from the converter oscillator and multiplier stages, so that only the voltage developed at the mixer grid by the amplified signal from the g.d.o. will be read. Couple the loop to the g.d.o. coil and adjust its position so that minus 1 to 2 volts is read at the test point. Tune the r.f. circuits for the desired pass-band characteristics.

R. F. Oscillation Checks

Before making final adjustments, check for oscillation in the r.f. stages. A simple test is to remove plate voltage from the oscillator and from the r.f. tube immediately preceding the mixer. Read the negative contact potential at the test point. Now apply the plate voltage to the r.f. stage again, but leave the oscillator disabled and the g.d.o. off. If the reading goes more negative when the r.f. stages are working, oscillation is present in the r.f. portion of the converter.

Elimination of r.f. oscillation can sometimes be quite a problem. If the r.f. amplifier is a cascode, it must first be determined which part of the amplifier is oscillating. A quick check on this is to read the amplifier plate current, and note if it changes as any circuit is tuned, or touched with a metallic object or the fingers. Usually oscillation in a cascode amplifier can be corrected by adjustment of the neutralizing coil, but there can be oscillation in the grounded-grid or second half of the stage. The latter is almost certainly due to improper grounding. Make ground connections separately, and never bypass to the center ring of the socket. Do not tie in ground connections from several points through a common wire to a single chassis point.

If the r.f. amplifier is a pentode, isolation of the grid and plate circuits may be important. This can be accomplished by a shield across the tube socket, but proper orientation of the coils may make this unnecessary. Mount the plate and grid coils as far as possible from each other, and in perpendicular planes to prevent inductive coupling between them. Observation of the d.c. voltage at the mixer test point (with oscillator off) will show whether corrective steps taken are in the right direction. Reduction and eventual elimination of voltage developed by r.f. oscillation is the condition to work for.

Adjusting Double-Tuned Circuits

R.f. bandpass adjustments may now be made. For this, be sure to set the signal level below the saturation point, as observed at the test point.

Many current converter designs use double-tuned circuits, as they provide better attenuation of signals from outside the desired pass-band than single-tuned circuits. Unfortunately, they are notoriously difficult to align properly, unless a sweep generator and oscilloscope are available. The procedures outlined below will give satisfactory results without these expensive tools.

The simplest way of using an ordinary signal generator (or your g.d.o.) is the damping method. Set the signal generator or g.d.o. at the middle of the desired pass-band. Lead one of the double-tuned circuits by connecting a carbon resistor of about 1000 ohms directly across it. The voltage read at the test point will drop considerably, and it may be necessary to increase the coupling to the signal source to provide a usable indication. Tune the other circuit for maximum indication at the test point. Remove the damping resistor from the first circuit and connect it across the second. Tune the first circuit for maximum indication. Remove the damping resistor and check the shape of the response curve by varying the signal generator across the converter tuning range and noting the voltage at the test point. It should resemble the curve of Fig. 2.

![Fig. 2—Typical response curve of a converter using double-tuned circuits. Essentially flat top and steep sides are desirable characteristics.](image)

The chances are that the desired pass-band shape and band width will not be realized with the first adjustment. In general, increasing the coupling while maintaining constant circuit Q will increase the band width and also make the "horns" at the edges of the pass-band sharper. Increasing the loaded Q of one or both of the tuned circuits will increase the sharpness and height of the horns without materially affecting their frequencies. The loaded Q of the tuned circuits can be changed by varying the L/C ratio at the desired frequency. With constant loading, decreasing the capacitance and increasing the inductance will result in lower loaded Q, and vice versa. Damping resistors can be used across the coils, if the minimum usable circuit capacitance results in too high a loaded Q (too narrow a passband).

Because changes in coupling or loading will often change the tuning of the circuits, it is a good idea to retune them after every adjustment of the coupling. It will also be found that coupling and Q adjustments are interacting. Should the pass-band shape tend to be tilted badly after adjustment by the damping method, it is an indication
either that regeneration is present or that there is undesired coupling between the two tuned circuits. If the ratio of bandwidth to center frequency is over 10 per cent, one of the stages will probably have to be detuned slightly to eliminate tilt in the slope of the passband.

An alternative procedure for aligning double-tuned circuits is to detune one circuit considerably, tune the second to maximum response, dump the second, and tune the first to maximum. Remove the damping resistor when this is completed.

After the r.f. circuits are aligned the local oscillator injection should be rechecked, as adjustment of the tuned circuits, particularly those in the mixer grid, will usually change the amount of injection bias observed at the test point.

**I.F. Circuits**

If necessary, the i.f. circuits of the converter can be adjusted without connecting the converter to a communications receiver. To do this, terminate the converter output with a resistance equal in the mixer grid, will usually change the adjustment of the tuned circuits, particularly those in the mixer grid, will usually change the amount of injection bias observed at the test point.

It cannot be too strongly emphasized that the simplest, easiest and most accurate method of realizing the ultimate sensitivity of a v.h.f. converter is the use of a noise generator. If you do not already have one of these handy devices, it will pay you to stop at this point and build one. Several excellent noise generator designs have appeared in *QST*, and even the simplest - the crystal diode type - is a highly useful tool.¹

An accessory to the noise generator is a good audio voltmeter. The a.c. scales of a v.t.v.m. can be used, but these are generally peak indicating devices, and because of the character of the receiver noise the needle will bounce in an annoying fashion. Ideally, a true square-law or r.m.s. detector is required. However, a satisfactory device for this service is an average type detector, with some smoothing. Such a detector, suitable for connection to a phone jack or across the speaker terminals, is shown in Fig. 3. The transformer used in the detector is not critical. The one used had a 400-ohm primary and a 2000-ohm secondary. Some of the small transistor audio transformers on the market work very well. Popular types of volt-ohmmeters have average-type rectifiers for use on their audio output scales. These are satisfactory for use as audio indicators in noise generator work.

In making noise generator tests it is important that the a.v.c. be disabled, and that both the audio and r.f. gain controls be set so that there is no tendency to saturate. Generally speaking, the audio gain should be run at a fairly high setting, and the r.f. gain should be turned up only to the point that will give a usable indication on the output indicator. The b.f.o. may be on or off, but all tests should be made with it in the position in which the work was started. The same may be said of the noise limiter. If you are working in a completely quiet location the limiter should be left off, but more reliable results can be obtained in noisy locations if the limiter is used. A moderate amount of noise limiting will have no effect on the accuracy of noise generator measurements, provided that the setting of the limiter is not changed during the work.

With the noise generator connected, but turned off, set the audio and r.f. gain controls as described above to give any convenient reference reading on the output indicator. Now turn on the noise generator and adjust its output to give a 3-db. increase in the output indication. Unless you have a db. scale, this will require an increase of 1.414 times. Adjustments should now be made on the converter to see if the 3-db. increase in noise indication can be obtained at a lower setting of the noise generator. Any adjustment that works in this direction has improved (lowered) the receiver noise figure.

In converters having one or more r.f. stages, adjustment of the mixer should have no effect on the noise figure, except in the case of very large changes in settings. The gain and output may vary considerably as circuits are adjusted, or the injection level is changed, but the noise figure should remain the same. If small changes in mixer adjustment do affect the noise figure, it is proof that the r.f. portion of the converter is not working as it should.

Except in the case of the plate circuit of a first grounded-grid r.f. amplifier, adjustment of circuits other than the input circuit and the neutralization of the first stage will have little or no effect on the noise figure. This holds so long as the gain of the first stage is sufficient to suppress noise contributions of succeeding stages. The neutralization of the first stage and the adjustment of the input circuit will have little effect on the over-all response of the converter, so the passband adjustments outlined earlier can be done first. They will require only minor touching up, if anything at all, when the noise figure has been adjusted to optimum. Do not be surprised if lowest noise figure is obtained at settings of the

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¹ For more information on noise generation and detectors, refer to *QST* for related articles.
first circuits that result in somewhat less than maximum gain. This effect is to be expected in circuits using neutralized triodes, particularly. In these, the loading and tuning of the input circuit for best noise figure will not coincide with maximum gain setting of this circuit.

In some cases it may be noticed that the r.f. stages tend to oscillate when the converter input is not loaded properly. This is usually an indication of imperfect neutralization of the first stage, but if the antenna circuit is properly matched to its transmission line, and the coupling to the input circuit is adjusted for best noise figure, oscillation with the antenna removed may not be harmful. If the antenna system has a high standing-wave ratio, however, more careful neutralization may be necessary to achieve satisfactory performance and freedom from oscillation. If extensive work is to be done using a poorly matched antenna system, it may be advisable to adjust the converter input circuit for that antenna. This can only be done by listening to a signal, with the antenna connected, in the manner recently outlined by W8WXV.

The importance of fairly high r.f. skirt selectivity in achieving accurate noise figure readings is not generally appreciated. If the converter pass band includes portions of the image frequencies (which may easily happen when a low i.f. is used), the indicated noise figure will be lower than the true noise figure of the converter and actual receiver performance will be degraded. Thus, particularly where double-tuned circuits are used, it is desirable to make at least preliminary adjustment of the converter pass band, as already described, before attempting noise figure work.

As a final step, the r.f. and i.f. pass-band adjustments can be gone over, as minor changes will have no effect on the noise figure, so long as the first stage circuits are not altered. If the converter has an i.f. gain control it should be set so that the converter adds 10 to 20 db. of noise to the receiver output over that with the converter turned off.

The work on the converter will then be completed, and the experimenter can rest assured that he has made his handiwork perform to the fullest extent of its capabilities. It is hoped that the measures detailed here will help many workers in the v.h.f. field to achieve better over-all receiving results, and more important, to develop a better feel for the adjustment of their equipment.


4 Weeks, "Image Ratio and Noise Figure," (Technical Correspondence), QST, February, 1955, p. 132.

— Strays —

A Pan-Pacific Boy Scout Jamboree will be held in Auckland, New Zealand, January 3 through 10, 1959. The New Zealand Association of Radio Transmitters will operate ZL1PPJ on all bands 80 through 2 meters daily from 2100 to 0900 GMT. Amateurs are invited to set up schedules with ZL1PPJ by contacting any of the Auckland stations or by writing NZART, P. O. Box 9138, Auckland S.E. 1, New Zealand. Club stations might give local Scout groups a chance to visit during some of these skeds.

Among the amateurs in El Paso, Texas, are W5HRS W5KOK WSKMM Y5GQF W5HRS W5KOK W5MXY W5GQF

W5HRS W5KOK W5MXY W5GQF

W5A,W, CBS outlet in Philadelphia, has 32 hams included in its total technical staff of 43, and there are three more hams on the executive staff. Any other radio/TV station have a greater number of hams employed?

K6JCZ is looking for information concerning W6VJH, who died in 1949. Write to K6JCZ if you have any information concerning his uncle.

The October schedule of the Army MARS side-band technical net (Wednesdays at 2100, 4030 ke.) is as follows:

Oct. 1 — Engineering the White Alice network.
Oct. 8 — Characteristics of S.S.B. power amplifier circuits.
Oct. 22 — Application of transistors to power supply equipment.
Oct. 29 — Maser amplifiers and oscillators.

The two gentlemen pictured at the right are W5RLU (left) and W3WDF (right) recently assigned chiefs of Air Force and Army MARS, respectively.

October 1958
An All-Electronic Key and Keyer

Combined Circuits Solve Keying Problems

BY JACK LIVINGSTON,* K2POO

Being a normal tinkerer and also not being endowed with a tape-machine fist, the writer became interested in the construction of a fully automatic key.

Several suggested designs were built with the usual "home-brew" variations. The results were a cut below mediocre until one outlined by W3FQB was followed. This proved to be the sought-for answer and it performed up to all expectations with only one small trouble. (There's always one!) When keying a low-level stage such as in the DX-100, everything was FB. However, when the keyer was applied to a transmitter such as the DX-20, where everything is keyed, it was found that sticking of the soft-silver relay contacts really "goofed up" the works. This was remedied by replacing the offending contacts with tungsten and all was dandy until . . .

Key clicks!!! One morning, having called some rare DX mightily but in vain as usual, my call was answered by a nearby friend who informed me that although my signal was SQ my clicks were running a close second. Not too bad, he allowed, but worth looking into. Out came the books, QSTs and similar ammunition, and after careful searching the article by W3III illustrating a vacuum-tube keyer for the DX-100 was found. It looked like a good bet. Several hours and pounds of solder later we were in business. All the key-click checks outlined in the Handbook were passed with flying colors, and on-the-air comments were favorable. After the usual back-patting and head-swelling we figured

This electronic key and keyer can be built on a 2 × 4 × 6-inch chassis. The big tube is the 6AS7 keyer tube, which ends the sticking-relay problem.

* 88 Martine Ave. N., Fanwood, N. J.

This electronic key and keyer can be built on a 2 × 4 × 6-inch chassis. The big tube is the 6AS7 keyer tube, which ends the sticking-relay problem.

Fig. 1—Circuit of the electronic key and keyer. Unless otherwise indicated, capacitances are in μf., resistances are in ohms, resistors are 1/2 watt. Potentiometers have linear taper.

CR1—Selenium rectifier, 65 ma., 130 volts.
L1—125 v. at 50 ma. 6.3 v. at 2 amp. (Stancor PA-8421).
Cr—10-watt universal output transformer (Stancor A3849).
Secondary not used.
we had it made. Now for some real operating! All went fine until about the second CQ, when the final dash lingered a little too long (about five minutes too long!). The - - 1 x ? - - relay had welded itself shut again! This was it! Bird watching or stamp collecting were about to sign up a new devotee.

After a short period for temperature and pressure reduction it was decided that the tungsten contacts that had worked successfully on the DX-20 key would solve the DX-100 problem. As I drew my trusty soldering iron it dawned on me that it was silly to electronically key a tube to actuate a relay to key a tube to key the transmitter, particularly when the existing relay was inadequate in its present state. With this startling brain wave still oscillating in my other head, a letter was sent posthaste to W3FQB, the father of the original key. An answer was received pronto. The completed circuit ultimately decided on by the writer is shown in Fig. 1. For a detailed description of the key action, references may be made to the original article by W3FQB or portions of the article by W5I1QV.

Construction of the complete unit proved no problem, as all the components fit quite well on and in a 2 x 4 x 6-inch chassis. Tubes, power and audio transformers are mounted on top, with the other components inside as space and preference permit. Some will no doubt note that the heater load on the power transformer is about 50 per cent above the manufacturer's rating, but this has caused no trouble to date. There is ample air circulation around this exposed unit, and the heating experienced even with long periods of operation has not been excessive.

No doubt there are simpler versions of this keying system available, such as tying directly into the transmitter for grid-block keying of existing tubes, but for a "no-digging-just-plug-in" unit this really fills the bill. All due credit should be given to Mr. Montgomery, W3FQB, for his kind assistance, as it is his theory and the writer's soldering iron that produced this keyer. It might be well to add in closing that there is one component that is extremely important for ideal operation, and that is the nut that holds the key lever. Does anyone have any help to offer?

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**Silent Keys**

It is with deep regret that we record the passing of these amateurs:

| K1HYC, Jennie S. Martin, Bridgeport, Conn. |
| W1CRW, Clifton R. Wilkinson, Salem Depot, N. H. |
| W1LFD, Dominick J. Ford, South Boston, Mass. |
| W1QLU, Ronald W. Heikbert, Medford, Mass. |
| W1PXJ, Francis J. Oresteen, Oak Park, N. H. |
| W2EIS, James L. Murray, Hanover, N. J. |
| K2KWF, Kenneth M. Riker, Rochester, N. Y. |
| W2MY, Edward C. Graf, Tonawanda, N. Y. |
| W2UPW, Ralph A. Wickam, St. James, N. Y. |
| W3SSB, George T. Stump, Uniontown, Pa. |
| K4BOU, Frederick Wierck, Jacksonville, Fla. |
| W4CIE, Milton B. Drennen, jr., Miami, Fla. |
| K4ED, Charles Edwards, sr., Winter Park, Fla. |
| W4SNO, Basil Pinzdek, St. Petersburg, Fla. |
| W4TEE, George Roberts, Orlando, Fla. |
| W4UXK, Alfred W. Baird, Macon, Ga. |
| W5I1QV, Paul C. Watson, jr., Houston, Texas |
| W5NEX, Charles B. Staley, Lubbock, Texas |
| K6AYK, John M. Clason, Redwood City, Calif. |
| W6GJL, Thomas D. Herriman, Stockton, Calif. |
| W7NPC, William A. Young, Twin Falls, Idaho |
| W8IWX, Bertram J. Bell, Detroit, Mich. |
| W8OAMZ, Charles W. Bicker, Detroit, Mich. |
| W8SYNC, Oliver C. Stocker, Litchfield, Ohio |
| W9LIV, Robert E. Lathrop, Waukesha, Wis. |
| W9LYB, Charles F. Baker, Nashville, Tenn. |
| W9LYJ, Frank R. Killburn, Chicago, Ill. |
| W9MGC, Victor R. Edes, Bethesda, Mo. |
| K1LE6M, Quentin C. Leeman, Mountain Lake, Minn. |
| VE3SJ, R. E. Ormsby, Toronto, Ont. |
| VE7XF, Andrew J. Keayner, Victoria, B. C. |
| ZL4AF, Andrew Aitken, Dunedin, N. Z. |

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**Strays**

FCC has added to its rules for the experimental radio service a section providing for the granting of authorizations, to students of seventh grade or higher level, for the use of radio in school experiments and demonstrations. Applications must contain detailed information (specified in the new rules) on the proposed set-up, a log must be kept, and the district engineer must be notified in advance of each scheduled operation. Power limitation is normally 5 watts, and frequencies near 27 Me., 400 Me. and 2450 Mo. are available for these temporary authorizations. Interested parties may obtain a copy of Part 5 of the FCC rules from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents (no stamps).

All amateurs participating in the 1958 ARRL Sweepstakes are invited to compete for the Raymond R. Rosenberg, W3NCJ, Memorial Award, honoring the memory of the late SCM of the Western Pennsylvania Section. A 21 3/4-inch trophy will be awarded to the highest scoring station (whether phone or c.w.). W3GJY, the donor, has eliminated himself from competing for the trophy. Logs need not be furnished. Final Sweepstakes tabulations as published in QST will determine the winner.

Not all hams speak the same language, nor do they all abbreviate the same. One afternoon the W1AW operator wanted to raise Pittsburgh, and so called "CQ PGH" several times. Each time he got an answer from a K2 in Poughkeepsie.
Helical Element
Ground Plane

20–15–10 Antenna with 10-Meter Dimensions

BY RALPH ROSENBAUM,* N5ECP

Helices of the long, thin type have been used as antennas off and on for a long period, particularly in mobile installations. This, however, is the first time we have heard of their being used for ground-plane radials—and for multiband operation using traps.

A new antenna was needed desperately for 20 meters. Locals on this c.w. band were putting me to shame when they showed me their latest logs. A vertical or ground-plane antenna with its low-angle radiation should solve the DX problem, but complications arose. Problems of obtaining a good ground system and situating the antenna away from a maze of elm trees eliminated a conventional vertical from consideration, and a full-size ground plane was out of the question because this QTH has a tiled slanted roof. However, a ground plane with 10-meter dimensions would solve any difficulties.

Last summer W5AIG introduced a new antenna concept to me, the helical monopole. He mentioned that research indicated that a normal-mode helix compared closely in efficiency with a straight vertical element. I decided to investigate a ground plane with helical radials.

What started as a wild idea has now evolved as a tri-band miniature ground plane. Excellent results have been obtained on 10 and 20 meters. Stateside response and reports on 20-meter c.w. compare very closely to a regular ground plane, and DX has been good. The ground plane has opened a “new” 10-meter band with its ground wave. DX contacts on 10 meters show that the ground plane is never more than two “S” units below a three-element beam. Unfortunately, results on 15 meters have only been fair; occasionally this band does favor the ground plane, but usually my dipole pulls ahead with stronger signal reports. The ground plane also is grand for band scanning during contests and DX openings.

Band-changing operations are kept to a mini-

1 I.e., maximum radiation in the plane perpendicular to the axis of the helix (corresponding to the radiation from a straight-conductor dipole or monopole) as contrasted with the helical antenna of Kraus. The characteristics of this type of antenna have been analyzed in a paper by Kandoian and Siehak, “Wide-Frequency-Range Tuned Helical Antennas and Circuits,” Convention Record of the I.R.E., Part 2, 1953 National Convention.—Ed.
minimum since only one feed line having a fairly constant input impedance at the transmitter is used. The antenna is fun to construct, and the total cost is about thirty dollars.

**Principles**

Each element is wound in the form of a spiral. Turns of the helix can be thought of as forming an imaginary cylindrical surface. The length from end to end of this imaginary cylinder at resonance will be shorter than the length of a straight wire in space resonant at the same frequency. The inductive and capacitive reactances cancel at resonance, leaving the cylinder resistive. The total length of wire in a quarter-wave helix is greater than a quarter wavelength; for example, the wire length in a typical 14-Mc. quarter-wave helix is not sixteen feet but twenty-six feet. When the helix is compressed the resonant frequency rises (provided the turn spacing remains large compared to the wire diameter), and if no turns are added to the compressed helix it will be reactive at the original frequency but resistive only at some higher frequency. Tuning a helix is simple, since the resonant frequency may be raised by compressing it or lowered by stretching.

By changing the diameter and turns per inch, helixes may be made resistive at a given frequency although their length may vary greatly. One unfortunate thing happens, though, as a helix is shortened. The radiation resistance, which is a principal factor in determining the efficiency of a short antenna, is largely dependent on the length of the element. A conventional ground plane at resonance will have a radiation resistance around 32 ohms. If the length of a radiating element is cut down to, say, an eighth wave, it will have a lower radiation resistance whether it shows reactance or not. I found a helical ground plane of these dimensions to have an input resistance of 21 ohms on 14 Me.

For multiband operation the radiating element is broken up into resonant sections separated by parallel-resonant traps as shown in Fig. 1. At the frequency to which it is resonated each trap shows an extremely high impedance and separates the remaining sections of the helix from the resonant section. A high C to L ratio is used in the traps to reduce resistive losses and to increase the band width.

Impedance measurements for the three bands were first taken with individually resonated helixes and then with the traps installed. The results are shown in the table below:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Helix without traps</th>
<th>Helix with traps</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.6 Me.</td>
<td>150 ohms</td>
<td>145 ohms</td>
</tr>
<tr>
<td>21.3 Me.</td>
<td>75 ohms</td>
<td>100 ohms</td>
</tr>
<tr>
<td>14.1 Me.</td>
<td>21 ohms</td>
<td>17 ohms</td>
</tr>
</tbody>
</table>

The radiation resistance should be and can be increased. Although I used a nine-foot dowel for the driven element, I suggest that you buy a thirteen-foot section; at longer lengths, the dowels begin to bend. Instead of using a helix for the 20-meter section, run a straight wire from the top of the pole and extend the wire into a three-turn coil before soldering it to the 15-meter trap.

Two quarter-wave transformers in series are used to obtain good impedance matches at the transmitter, as shown in Fig. 2. A quarter-wave transformer of RG-8/U is used on 20 meters to stop up the 17 ohm impedance at the antenna to approximately 100 ohms at its input. This gives a good match (less than 2:1 s.w.r.) with the main feed line, the 93 ohm RG-62/U. If the input resistance of the antenna is raised to 20 ohms on 20 meters, a perfect match will result. On 10 meters the 14-Mc. quarter-wave transformer becomes a half-wave and repeats the 145-ohm impedance seen at the ground plane. The RG-62/U coax is an odd quarter-wave section on 10 meters and drops this 145 ohms down to 60 ohms at the transmitter. On 15 meters the impedance bridge connected to the input end of the 14-Mc. coaxial section gave the same 100-ohm impedance reading as did the antenna itself. The mismatch between this value and the RG-62/U is slight.

**Construction**

Before tackling this antenna, bottom grid-dip, impedance, and s.w.r. meters if you don’t have them already. This equipment is essential for tuning the ground plane; it is also an excellent investment for any ham shack.
A search for a mounting unit led me to K2GISO’s “Happy Accident” ground plane to which I added several modifications. To give a greater clamping area, a 30-inch length of angle iron was used instead of the prescribed 16-inch length. Two pairs of radial supports were welded, one set at the 30-degree angle and the other set perpendicular to the angle iron. (The latter set is used in the present antenna.) The supports were made of a thicker diameter, 1 1/2-inch black iron water pipe. This mounting unit was extremely heavy and awkward to work with; I urge the builder to use only one set of radial supports and to construct the unit out of aluminum.

The parts needed, most of which can be bought at electrical and lumber stores at the approximate prices listed, are as follows:

- “Happy Accident” mounting unit $5.00
- 150 feet of No. 12 copper wire 3.75
- 12 feet of RG-8/U 7.50
- .50 (surplus)
- 5 wooden dowels, 1 1/2-inch diam.
  - four 9-foot dowels 3.60
  - one 13-foot dowel 1.30
- One straight adapter, four male coax connectors 2.00 (surplus)
- Four aircraft-type stainless hose clamps 1.60
- Two 5-kv. 50-muf. capacitors,
  - Centralab 8505, high-voltage ceramics 3.50
- Glue, glyptal, varnish, tape 2.50
- $31.25

First, choose five straight lengths of wooden dowels. Since the water pipe used for the radial supports is smaller in diameter, cut down the diameter of the first six inches of each of the four 9-foot dowels to fit. The four dowels should be drilled for the bolts which hold them in the radial supports. Give them two coats of varnish.

The coil of No. 12 wire should be cut into five 28-foot sections which are then close-wound on a 2 1/2-inch form. Wind all the coils in the same directions. Tin one end of each coil and solder lugs to four of them. Place one coil on a dowel situated in a horizontal position and insert a half-inch screwdriver handle between the first two turns. Next, start turning the coil until the screwdriver winds itself to the opposite end. Continue increasing the width of the object placed between the windings until the spacing between turns is about 3 1/2 inches. Place the helix on the dowel so that the solder lug coincides with the drilled hole in the dowel. The first five feet of each helix may be glued to its dowel, leaving the remaining four feet of coil for tuning adjustments. I used electrical tape on every fourth turn.

### Traps and Transformers

The parallel traps and coax transformers require a grid-dip meter and impedance meter for adjustment.

A variety of capacitors may be used for the traps. I pulled two out of the junk box: one was a 15-kv, plate capacitor and the other was a 5-kv, filament by-pass capacitor which has worked splendidly. The 10-meter trap consisted of three turns of 3 1/2-inch diameter wire spaced 3/4 inch apart while the 15-meter trap used four turns with a 2 3/4-inch diameter and 3/4-inch spacing. The traps should be kept away from metallic objects when being resonated, which should be done before installation. You should get a pronounced dip on a grid-dip meter when it is placed near the trap. Since the traps will pull the oscillator of the grid-dip meter, a receiver should be used as a calibrating unit. Resonate the traps at 28.6 and 21.3 Mc.

Solder a male coax connector on one end of each coax line and connect the RG-8/U section to the impedance meter. Set the impedance meter to minimum impedance and, using your receiver as a calibrating unit, set the grid-dip meter to 14.15 Mc. Start clipping the opposite end of the coax until the lowest impedance dip is obtained. This 20-meter coax section is now a quarter-wave transformer and should be 10.8 feet long, or an odd multiple of this value. Follow the same procedure with the RG-62/U section, using a frequency of 28.6 Mc. The length of this 10-meter transformer is 5.1 feet or an odd multiple of this figure.

### Tuning

This ground plane should be tuned in its permanent location, or at least at as near the same height as possible. First, bolt the four radials with their solder lugs in the radial support. Then couple the grid-dip meter to the first or second turn of any radial; a weak dip should be obtained. Clip off turns at the end of this radial until it resonates at 13 Mc. Using the same procedure, resonate the other three radials at 13 Mc, and then return all four to 13.0 Mc. To do the final resonating, either compress or stretch

(Continued on page 160)
When purchasing his first receiver, a Novice is often more concerned with price than with performance. He may soon discover that his receiver is quite satisfactory on 80 and 40 meters but that it leaves much to be desired on 15 meters. This can, of course, make it even tougher than usual to work some of that 15-meter DX he is told about or hears at someone else's shack. However, all is not lost! If the receiver is satisfactory on 80 meters this same performance can be obtained on 15 meters through the use of a crystal-controlled converter ahead of the receiver.

Let's assume your receiver, the one you are about to improve on, is a "single-conversion superhet." (This means that it has a single intermediate frequency.) The crystal-controlled converter is a new "front end" for the receiver that now gives you a "double-conversion" receiving system with a crystal-controlled first oscillator and a tunable first i.f. amplifier. The tunable i.f. amplifier is, of course, the "front end" of your regular receiver. In the design of the converter we elected to put the crystal-controlled oscillator on 25.0 Mc., as shown in Fig. 1. An incoming signal at 21.15 Mc. (Fig. 1A) is heterodyned to a frequency of 3.85 Mc., and if the receiver is tuned to 3.85 Mc. you will hear the 21.15-Mc. signal. An incoming signal at 21.17 Mc. (Fig. 1B) would require a receiver setting of 3.83 Mc., and so on. The difference between 25.0 and the desired frequency at around 21 Mc. gives the required receiver setting, so it should be obvious that with the converter the 21-Mc. band, 21.0 to 21.15 Mc., will be found from 4.0 to 3.55 Mc. on the receiver when a 25.0-Mc. crystal is used in the converter. The receiver tunes "backwards."

Now suppose the signal applied to the mixer of the converter had a frequency of 28.88 Mc. (Fig. 1C). It would be heterodyned to 3.83 Mc., and could be tuned in at 3.83 Mc. on the receiver. If we don't want to hear 28- and 21-Mc. signals at the same time, we have to have enough "select-

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**The "Bonus"**

**21-Mc. Converter**

**15 and 10**

**with One Crystal**

*BY LEWIS G. McCOY, W1ICP*

The cure for most of the high-frequency ills of many receivers is the installation of a good crystal-controlled converter between the antenna and the receiver. The converter described here by W1ICP, while intended primarily for 21-Mc. reception, gives a bonus of 28-Mc. reception without any additional parts or switching. Any Novice or other amateur who has a receiver that is satisfactory on 80 meters but not at 15 and 10 will do well to study these pages; the answer to the problem is here.

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*Technical Assistant, QST.*
This view shows all of the components projecting above the chassis. At the left on the front is the r.f. control and next to it is the mixer tuning. At the far right is the a.c. switch. The tube at the left is the r.f. amplifier, and the crystal is between it and the mixer tube. Screw adjustment to the right of the mixer tube sets the slug of Ls.

The converter consists of three stages, but it uses only two tubes. An r.f. stage amplifies the incoming signals, and an oscillator provides a steady signal that, in a mixer stage, heterodynes the incoming signal to the difference frequency mentioned above. If the input and output circuits of the r.f. stage aren't tuned to 21 Mc, the 21-Mc. signals can't be amplified to the full capability of the stage. However, the 21-Mc. tuned circuits aren't too sharp, so a single setting will usually suffice for most of the 21-Mc. band, and all of the tuning will normally be done at the receiver alone.

The practical circuit of the converter is shown in Fig. 2. Readers familiar with converter construction might think that the r.f. stage tuning capacitors, C1 and C2, should have been ganged, to furnish a "single-knob control" instead of the necessary two. You can build it that way if you want, but this is less expensive and complicated, and it has another advantage that will be mentioned later. Once made, a setting of these capacitors is good for most of the 21-Mc. band. The 47,000-ohm resistor across C2 was used to make this circuit a bit broader.

The selenium-rectifier power supply is quite adequate for the job and makes the converter a self-sufficient unit, although the power may be "borrowed" from the receiver if it is felt that the selenium supply is an unnecessary expense.

In the crystal-controlled oscillator portion, a capacitive divider (C2 and C3) provides a tap on the tank circuit so that the oscillator is loaded very lightly. If you didn't tap down on the tuned circuit in this manner the overtone crystal, Y1, might show lower-frequency energy as well, or

![Fig. 2—Circuit diagram of the two-band crystal-controlled converter. Unless indicated otherwise, all capacitances are in μF, all resistors are ½ watt, all resistances are in ohms.](image)

**C1, C2—35-μF, midget variable (Hammarlund MAPC-35-B).**

**C3—270-μF, silver mica or NPO ceramic.**

**C4—5-μF, silver mica or NPO ceramic.**

**C5—Dual electrolytic, 20-20 μF, or 250 volts.**

**CR—100-ma. 150-volt selenium rectifier (International Rectifier RS-100-E or equiv.).**

**J1, J2—Phono jack, RCA style.**

**L1, L2, L3, L4—Made of No. 18 bare, ¾-inch diam., 8 t.p.i. stock. See text.**

**L5—2- to 3-μH, slug-tuned inductor (North Hills 120-A).**

**RFC—50-μH r.f. choke (National R-33, Millen 34300-50).**

**S1—S.p.s.t. toggle.**

**T1—125 volts at 50 ma., 6.3 volts at 2 amperes (Stancor PA8422) or 135 volts at 50 ma., 6.3 volts at 1.5 amperes (Triad R-30-X).**

**Y1—25.00-Mc. crystal (International Crystal Co., type PA-9).**

34 QST for
it might not oscillate at all.
At this point you may ask yourself how the r.f. and mixer stages in the converter can tune to either 21 or 28 Mc. without switching. That's easy: the circuits \( L_C1 \) and \( L_C2 \) tune from about 17 to 35 Mc. The only requirement is that your receiver tune from 3000 to 4700 kc. and most of the lower-priced receivers will.

**Building the Converter**

The size of the chassis shown in the photographs is 2 × 5 × 7 inches. However, any chassis large enough to accommodate the parts can be used. Most of the construction is simple but there are a few places where certain precautions should be taken, and these will be treated in detail.

Study the photographs, particularly the bottom view, to see how the coils and tube socket are mounted. Notice the shield that cuts across the 6AK5 socket. The purpose of the shield is to minimize the coupling between the grid and plate circuits of the r.f. stage, to avoid oscillation. A scrap of roofing copper was cut to 3½ by 2 inches for the shield. Brass, or any other metal that can be soldered, could be substituted. The shield and socket should be mounted so that the shield bisects the socket between Pins 4 and 5. There is a 1/2-inch lip on the shield which is used to mount it to the chassis top. The metal tube in the center of the tube socket should be soldered to the shield; the shield is held to the chassis by two 6-32 screws. Soldering lugs should be mounted under the nuts that hold the 6AK5 socket, and all the chassis ground connections of the 6AK5 grid and plate circuit should be made to these lugs.

The coils are made from B & W 3007 Miniductor stock. To make the coils, first cut off a coil of 21 turns from the stock. Next, unwind one turn from each end of the 21-turn coil. Now count off 5½ turns from one end and cut the wire at this point. You'll find that if you bend the 4th and 6th turns in toward the center of the coil you should be able to reach the 5th turn with your wire cutters. Unwind the half turn from each side leaving two coils on the same support bars, one 5 turns and the other 13 turns. Two of these dual coils are needed, one for the r.f. stage and the other for the mixer. They can be mounted on a standard terminal tie point or supported by their own leads. We preferred to mount them on tie points, to provide a more rigid support.

The power supply is a simple half-wave rectifier, using a transformer, selenium rectifier, and an RC filter circuit. Incidentally, when connecting the rectifier, the + side is connected to the output side of the supply. Again, a standard terminal tie point is used for most of the connections of the supply.

**Testing and Tuning**

The preliminary checks are simple and should present no problems to the builder. First, turn on S1 and see if the tubes light up. If they don't, turn off the switch and carefully check the wiring. Once the tubes light, allow a minute or two for the unit to warm up. The first thing to check is the crystal-controlled oscillator. If your receiver tunes to 25 Mc., listen in that region for the oscillator signal, which should come in loud and clear. If it doesn't, adjust the slug of \( L_5 \) until the oscillator starts. Should you find that it doesn't oscillate you'll need to make some voltage checks to make sure there is plate voltage on the oscillator. The voltage should be approximately 110, give or take 10 volts. If no voltage is indicated, check the wiring for errors.

Once the oscillator is working, you're practically home. Oh yes, suppose your receiver doesn't tune to 25 Mc. How do you check the oscillator? Simple — build yourself an absorption-type wavemeter such as the one described a few months ago. The wavemeter can be coupled to \( L_5 \) to see if the oscillator is putting out a signal.

Connect the converter to your receiver, using a piece of coax as the connecting line. Coax is used for the lead between the two units to minimize any pickup of unwanted signals near or in the 80-meter band. Set your receiver to tune the right range, 4000 to 3550 kc., and turn both units on.

Adjust \( C_1 \) and \( C_2 \) for maximum background noise. You'll find two values of capacitance (four... (Continued on page 162)

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A Voice Key for the Handicapped

How One Cerebral Palsy Victim Became a Ham

BY JAMES WATT, VE4VJ

Clack went my footswitch, and I sat back after another enjoyable three-way with Myron and Bob, W0GFU and K6QKI. Reflecting on the miracle of amateur radio, I wondered how many handicapped people there are around the world who, for lack of a plan, are denied the chance to enjoy our wonderful hobby. You see, Myron, Bob and I are all in the same boat — physically handicapped in the same way. I was born with cerebral palsy. It affects coordination of muscles. In my case, my arms are more difficult to control than my legs. My left arm is practically useless. I tell you this to give some idea of the obstacles in the way of the cerebral palsy victim who aspires to a career in amateur radio. These obstacles seemed unsurmountable to me, but they have been overcome, and I have been a licensed amateur radio operator for five years. It is my hope that the information to follow will give the physically handicapped, and those who want to aid them, the encouragement they need to push on to the achievement of that prized ham ticket.

This story involves my father and a few others who lent assistance and encouragement along the way. Early in 1930, when I was eleven years old, my dad got his license VE4VK. I soon acquired an interest in the technical aspects of radio and electronics and the urge to become licensed began to assert itself. Through the war years, when amateurs were not permitted to operate, I maintained my interest in electronics by study, and Dad and I built several pieces of test equipment. When amateurs returned to the air in 1945, my urge to become a ham was greatly intensified.

By 1952, I was confident I could pass the technical part of the radio amateur's examination. My problem was the act of sending Morse code with a hand key. To me, this seemed physically impossible. I simply could not form recognizable Morse characters with my feeble manipulations of a hand key.

Realizing that my feet were in better control than my hands, I devised a foot-controlled key. It consisted of a battery clip mounted on edge, under which was a microswitch actuated by the battery clip as I pressed on it with myfoot. This arrangement provided me with the ability to form recognizable Morse code characters. Because of the effort involved, however, a speed of not more than four or five words a minute was attainable and this only for short periods. I had to try something else.

Lurking in the back of my mind had been the thought of a voice-actuated device. I had seen a few circuits in past issues of amateur radio magazines for voice-controlled relay circuits used for break-in. It had occurred to me that I might be able to modify one of these circuits to send

PHOTOGRAPHS, THIS PAGE AND FACING PAGE (LEFT TO RIGHT):

A simple form of foot-operated key devised by VE4VJ. A battery clip operated by foot pressure works a micro-switch connected into the keying circuit.

Main control switch, right, is made from a headlight dimmer floor switch. This is connected to the push-to-talk circuit of the transmitter. Treadle at the left is for operation of the VE4VJ intercom system.

Top and bottom views of the voice-operated keying system shown schematically in Fig. 1. Pulses from a voice-driven amplifier actuate a keying relay. Code may thus be talked or whistled by a person who is deprived of the use of his hands.
In the fall of 1952, I came across an article in *Life* Magazine about a young man similarly affected by cerebral palsy, who had been able to construct a device that operated an electric typewriter by the action of sequenced puffs into a set of four microphones. This ability to be able to control a typewriter with one's breath was much more complicated than what I wanted to do, and it encouraged me in my search for a circuit to send Morse code with voice. I discussed the idea with my dad and he said, "You devise the circuit and I will draw it up and build it."

Encouraged, I looked through my file of past issues of radio magazines and found a circuit, which was desirably simple but in itself was incomplete. It consisted of a voltage amplifier, transformer coupled to a rectifier, the output of which biased the grid of a relay control tube. In

![Image](https://via.placeholder.com/150)

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The operation of the complete circuit, Fig. 1, is as follows:

The output of the microphone is amplified by three 6SN7 triode sections, $V_{1A}$, $V_{1B}$, $V_{2A}$. This amplified voltage is transformer coupled to the plate of the 6H6 diode, $V_2$. The negative voltage output of this rectifier, which is proportional to the sound impinging on the microphone, is used to bias the control tube (the fourth 6SN7 triode, $V_{2B}$) to cut-off. When this occurs, the relay is actuated. Its armature is released, thus closing the normally closed contacts. Therefore, any "dit" or "dah" spoken into the microphone will

(Continued on page 161)
Four-Band Dipole With Traps

Design for the 7- to 28-Mc. Bands

BY DAVID P. SHAFER,* K2GU

The four-band antenna system described herein may be of interest to the ham who wishes to work on several bands but does not have sufficient space for a dipole equipped with traps for five-band operation. Unlike the five-band system,1,2 which requires more than 100 feet, this multiband trap antenna spans less than 60 feet. Low standing-wave ratios on 10, 15, 20 and 40 meters are obtained.

The purpose of the resonant traps is probably well known but will bear repeating. The traps are constructed to be resonant at the desired operating frequency in the 20-meter band — in this case, 14.1 Mc. The “inner” sections, A, as indicated in Fig. 1, form a dipole which is also resonant at 14.1 Mc. The “outer” sections, B, are effectively isolated (at this frequency) by the traps.

When operating in the 10-meter band, the capacitive reactance of the traps increases and the inductive reactance decreases. The net effect is that the traps act as inductors between sections A and B, permitting the entire antenna to resonate as a loaded 40-meter dipole.

When either the 21-Mc. or 28-Mc. band is used, the inductive reactance increases and the capacitive reactance decreases. The traps then act as capacitors between sections A and B. The antenna becomes a 3/2 λ harmonic radiator on the 15-meter band and 5/2 λ on the 10-meter band.

The dimensions shown in Fig. 1 are for half-wave resonance at 7.2 Mc. and 14.1 Mc. and for harmonic resonance at approximately 21.2 Mc. and 28.2 Mc. Since each trap is 4 inches long, the over-all antenna length is 55 feet. In this case, the dimensions of sections A came out very close to the figure of 16 feet 7 inches obtained from the formula for the average length of a 14-Mc. dipole. This indicates that the traps do, in fact, isolate sections B at the trap frequency.

The 14-Mc. trap is enclosed in a weatherproof cover made of plastic sheet. The ceramic capacitor and strain insulator are inside the coil.

Values of L and C

The choice of L and C is simple if only the 20-meter and 40-meter bands are considered, since sections B can readily be cut to produce 40-meter antenna resonance for any reasonable combination of L and C which is resonant at 20 meters. However, sections B should also produce 15- and 10-meter resonances with the same traps. The trick, therefore, is to arrive at an LC combination and a length B which meets all these requirements.

Construction

As shown in the photograph, each trap is literally built around an “egg” or “strain” insulator. In this type of insulator, the hole at one end is at right angles to the hole at the other end, and the wires are fastened as in Fig. 2. These insulators have greater compressive strength than tensile strength and will not permit the antenna to fall should the insulator break, since the two interlooped wires prevent it. There is ample space within the inductor for both the insulator and

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* Western Union Bldg., 60 Hudson St., New York, N. Y.

Since the introduction of the trap-type multiband dipole by W3DZZ, a few years ago, interest has been divided about equally between his arrangement and the parallel-dipole system. While the latter has some mechanical disadvantage, it can easily be made to fit a smaller space when necessary simply by sacrificing the dipole for the lowest-frequency band. If a similar reduction of the trap antenna is wanted, the system must be redesigned. This article shows how to do it.
capacitor. The plastic covers are not essential but are considered desirable because they provide mechanical protection and prevent the accumulation of ice or soot and thus which may not wash off the traps when it rains.

Electrically, each trap consists of a 25-μf., capacitor shunted by 4.7 μh. of inductance. Centralab ceramic transmitting capacitors 857-25%, rated at 15,000 volts d.c., were available and used since they will safely handle a kilowatt. Undoubtedly other similar capacitors rated at approximately 0000 volts would be satisfactory, as well as cheaper. The inductors are made of No. 12 wire, 2 1/2 inches in diameter, 6 turns per inch (B & W 3905-1 coil stock).

One may wish to choose a different frequency in the 20-meter band for which optimum results are desired; for example, 14.05 Me., for c.w. operation, 11.25 Me., for phone operation, or perhaps 14.75 Me., for general coverage. The author's choice was 14.1 Me. In any case, the number of inductor turns is adjusted accordingly.

The trap is then placed in the plastic cylinder and the end disks marked where the antenna wires are to pass through. After drilling these holes, the disks are slipped over the leads, pressed into the ends of the cylinder and a small amount of plastic solvent (a cohesive cement, that actually softens the plastic surfaces) should then be applied under the edge of the overlap and the joint held firmly for about two minutes to insure a strong, tight seal. The disk is pushed out and the inner seam of the sheeting sealed.

The trap is then placed in the plastic cylinder and the end disks marked where the antenna wires are to pass through. After drilling these holes, the disks are slipped over the leads, pressed into the ends of the cylinder and a small amount of plastic solvent applied to the periphery to obtain a good seal. Some air can flow in and out of the trap through the antenna-wire holes, and this will prevent the accumulation of condensation.

**Trap Adjustment**

As a preliminary step, loops of No. 12 wire are fitted to one of the egg insulators in the normal manner (see Fig. 2), except that after the wraps are made, the end leads are snipped off close to the wraps. A capacitor is then placed in position and bridged with short leads across the insulator and soldered sufficiently to provide temporary support. The combination is then slipped inside about 10 turns of the inductor, one end of which should be soldered to an insulator-capacitor lead. Adjustment to the resonant frequency can now proceed, using a grid-dip meter.

Coupling between the g.d.o. and the trap should be very loose. To assure accuracy, the station receiver should be used to check the g.d.o. frequency. The inductance should be reduced 1/4 turn at a time. If one is careful, the resonant frequency can easily be set to within a few cycles of the chosen figure.

The reason for snipping the end leads close to the wraps and the inclusion of the loops through the egg insulator soon becomes apparent. The resonant frequency of the capacitor and inductor alone is reduced about 20 kc. per inch of end lead length and about 350 kc. by the insulator loops.

The latter add approximately 2 μf. to the fixed capacitor value and account for the total of 27 μf. shown in Fig. 1.

**Assembly**

Having determined the exact number of inductor turns, the trap is taken apart and reassembled with leads of any convenient length. One may, of course, connect the entire lengths of sections A and B to the trap at this time, if desired. But, if more convenient, a foot or two of wire can be fastened and the remaining lengths soldered on just before the antenna is raised.

The protective covers are most readily formed by wrapping two turns (plus an overlap of 1/4 inch) of 0.020-inch polystyrene or lucite sheeting around a 3-inch plastic disk held at the center of the cylinder so formed. The length of the cover should be about 4 inches. A very small amount of plastic solvent (a cohesive cement that actually softens the plastic surfaces) should then be applied under the edge of the overlap and the joint held firmly for about two minutes to insures a strong, tight seal. The disk is pushed out and the inner seam of the sheeting sealed.

The trap is then placed in the plastic cylinder and the end disks marked where the antenna wires are to pass through. After drilling these holes, the disks are slipped over the leads, pressed into the ends of the cylinder and a small amount of solvent applied to the periphery to obtain a good seal. Some air can flow in and out of the trap through the antenna-wire holes, and this will prevent the accumulation of condensation.

**Length Adjustment**

It is well known that s.w. ratios are not uniform throughout the band or bands for which an antenna is designed. In a trap antenna, the choice of frequencies for best performance is a compromise. After making the traps resonant at 14.1 Me., sections A were adjusted for resonance. Sections B were then adjusted for resonance at approximately 7.2 Me. and simultaneous readings were taken in the 10- and 15-meter bands. For the dimensions shown, with the antenna about 250 ft. above street level and 35 ft. above electrical ground, the author obtained an s.w. of virtually 1 to 1 at 7.2 Me., with maximums of 1.3 and 1.1 at 7.0 and 7.3 Me., respectively. In the 20-meter band, the s.w. was also 1 to 1 at 14.1 Me., 1.1 at 14.0 Me. and 1.3 at 14.3 Me. In the 15-meter band, the values show the effect of dimensions favoring best operation on the other three bands. However, they are quite satisfactory — 1.9 to 1 at 21.15 Me., with maximums of 2 at 21.0 Me., and 2.2 at 21.4 Me. In the 10-meter band, the s.w. was 1.3 to 1 at 28.0 Me., 1.1 at 28.4 Me., 1.5 at 29 Me., and only 2.4 at the upper
extreme of the band.

RG-59/U 75-ohm coaxial cable forms the transmission line and is connected to the antenna through a Continental Electronics & Sound Co. "Dipole Dri-Fit Connector." After connecting the cable and antenna wires, the connector was coated with several layers of insulating varnish to make certain that the junction was watertight.

For those who prefer to operate mostly in the phone portions of each band, optimum performance will be obtained with somewhat different dimensions than shown in Fig. 1. The traps should be resonant at approximately 14.25 Mc. Each section A probably will be about 2 inches shorter, since the resonant frequency changes about 65 kc. for an inch of change in A. Dimension B is, of course, affected by any change in section A as well as the loading effect of the traps. For resonance at 7.25 Mc. and 14.25 Mc., sections A and B will measure about 18 feet 6 inches and 10 feet 6 inches, respectively. To arrive at the correct lengths, s.w.r. measurements should be taken in the 10- and 15-meter bands, in addition to those made in the 20- and 30-meter bands, since at the higher frequencies antenna resonance varies rapidly with changes in length.

The antenna should be resonant, independently of the transmission line, at the desired frequencies. Since the impedance of the antenna, at resonance, depends on height, proximity to nearby conductors, and other factors, it is wrong to assume that the antenna and feedline impedances are matched. Usually, they are not.

To enable one to "look" at the antenna separately while it is in its working position, the length of the transmission line should be adjusted to a halfwave length or some multiple thereof. This length can be determined, if coaxial cable is used, by shorting the feedline at its junction with the antenna and (using a grid dipper loosely coupled to a small link across the station end of the cable) varying its length until a dip occurs at the chosen trap frequency. Here, as before, the station receiver should be used to check the grid-dipper frequency.

The transmission line is then reconnected to the antenna and transmitter and dimensions A and B were varied until a minimum s.w.r. (which will be very nearly 1 to 1) is obtained at the trap frequency. The antenna is then resonant at this frequency. Dimension B is similarly found for the desired frequencies in the 40-, 15- and 10-meter bands.

In the determination of exact antenna length, the usual method is to start with too much wire and observe the effect on the resonant frequency as the wire is pruned. Where two sections (A and B) are involved, as here, one may wish to see the effect of undercutting one section, varying the length of the other, and so on. To simplify this procedure, it is suggested that several 2-inch links of wire be prepared so the antenna can readily be lengthened or shortened. If the ends of the links are given rather sharp bends and crimped when put together, the resulting hook joints are strong enough to support the experimental antenna safely. After final dimensions are decided upon, the links and piece-out sections are replaced with unbroken lengths and the completed antenna pulled up to its working position.

It might be mentioned here that the antenna erected by the author is made of enameled wire. After the wires at the free ends of sections B were looped through the supporting egg insulators, the wraps were soldered. This was done so that the electrical length would be the same if others chose to use bare wire.

The antenna described is sufficiently broad to give very acceptable results on all four bands. With low s.w. ratios, one has the satisfaction of knowing that most of the transmitted power is placed where it belongs — in the antenna. The time and effort put into its construction should be quite rewarding to the ham who must compete with beams and rhombics.

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**Quist Quiz**

This month's switcheroo was submitted by Carl Jockusch, Jr., K5CRU of San Antonio, Texas. He figures you all know how the familiar "three-way" switching system works in a house, where either of two switches can control a light or set of lights. In case you don't know how it's done, the sketch below shows you. The Quiz this month: Devise a "four-way" switching system, in which any of three switches can control a light or set of lights. Hint: don't confine yourself to the use of single-pole switches.

If you properly redrew last month's balalling problem, you found that you had nine 10-ohm resistors in parallel, and the resultant is 10/9 or 1.111 ohms.

**QUIST QUIZ QUIDDITY**

*Making 23 the Hard Way*

2300 28th Ave.,
San Francisco 16

Dear "Quiz":

The answer to the capacitor question in July Quist Quiz as given in the August issue is somewhat labored. Anyone familiar with binary nomenclature would have disconnected between Nos. 1-2, 3-4, 7-8 and between 15-16. This is the normal binary break-up.

The number of capacitors might as well have increased to 31, since to do so would not require more than the five groups of capacitors required in the published solution which permits only a total of 25 pf.

— Hal S. Ayres, WOOGV
The crystal-controlled converter described in this article has many features that should make it especially appealing to the mobile operator, as well as to the experimenter who is interested in transistor circuitry. One of the most interesting characteristics of the circuit is its simplicity. It is a crystal-controlled, fixed-tuned converter which can be made very compact and exhibits excellent performance when used in conjunction with the automobile receiver. With slight modification of the oscillator frequency, it can be used effectively in conjunction with the popular Q5-car from the Command Set series. This should also be a particular attraction to the Novice who desires additional band spread for 80 and 40 meters.

All of the components for the converter are housed in a small Minibox that can be concealed behind the dashboard of the car. This contributes to much better family relations in cases where the XYL objects to the many dangling devices that some of us so frequently mount in plain sight under the dash.

Special consideration was given to the stability of the unit. For this reason the author decided to incorporate crystal control in the oscillator circuit. This not only contributes to stable operation but reduces the complexity of initial adjustment.

The Circuit

The oscillator circuit is a transistorized version of the ever-popular triode Pierce. There is nothing tricky about its operation. Injection for the mixer is taken from a small link which is wound over the cold end of the collector tank coil. The emitter of the mixer transistor is returned to ground through this link. The mixer circuit corresponds to a triode vacuum-tube mixer utilizing cathode injection from the oscillator, the major difference being the low input impedance of the transistor base as compared with the relatively high input impedance of a vacuum-tube grid.

The crystals used in the oscillator portion of the converter are of the surplus variety for fundamental operation. Although many surplus crystals lend themselves to overtone operation quite readily, the author has experienced difficulty on various occasions in getting some of them to oscillate easily in the overtone mode, and more satisfactory results should be obtained

* Box 164, Luther, Mich.
by using overtone crystals for 20-, 15- and 10-
meter operation.\(^1\)

The inductances are wound on slug-tuned forms and shunted with the capacitances shown in Table 1.

The circuit shows an NE-2 neon lamp connected from the high impedance end of \(L_1\) to ground. This gives a measure of protection for the mixer transistor in the event that an unsafe amount of r.f. energy is introduced into the converter. A "zener" diode such as the ZA-6 may be substituted for the NE-2 and will break down at lower voltage (6 volts) to give better protection.

**Power Supply**

The converter requires 3 volts d.c. for operation and takes on the order of 3 ma. of current. For all practical purposes two penlite cells, series connected, seems to be the logical choice for powering the circuit. The choice of dry cells serves two important purposes. First, it eliminates one of the prime sources of ignition interference. Various noises from the electrical system of the car are carried into the converter via the leads which supply power to it. By using self-contained batteries this possibility is eliminated.

The second appealing feature resulting from the use of dry cells is that it is unnecessary to make any power-supply connections either to the car receiver or car battery. This saves considerable time during installation and makes the unit readily adaptable to portable operation should the occasion arise.

**Construction**

The chassis used by the author was made from \(\frac{1}{2}\)-inch Plexiglass. Convenient tie points were made by using \#40 nuts and bolts which held small solder lugs to the chassis. Small holes were drilled through the chassis where needed to facilitate bringing leads from one side of the board to the other. Transistor sockets can be used, but this is not necessary; the transistor leads can be soldered to small lugs on the board and the transistors tied to the chassis with small pieces of bus wire.

No particular layout is required. No instability was experienced as a result of lead and component placement. Keep all leads as short as possible and mount all the parts securely to the chassis. This will prevent the leads from breaking as a result of the vibration which occurs in mobile operation.

**Wiring**

Because of the small current and voltage requirements of the converter, it is not necessary to use standard hook-up wire in the circuit. No. 30 insulated wire is entirely adequate and results in a much more compact and neat-appearing finished product. Care should be exercised when soldering the transistor leads into the circuit, since the transistors are easily damaged by heat.

The leads should be held with long-nose pliers, above the point to be soldered, while installing them in the circuit.

**Table I**

TUNED CIRCUIT DATA

<table>
<thead>
<tr>
<th>Band</th>
<th>Coil</th>
<th>(L_1) turns</th>
<th>(L_2) turns</th>
<th>(C_1) (\mu F)</th>
<th>(C_2) (\mu F)</th>
<th>Crystal Freq.</th>
<th>I.F. Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>Me.</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>15</td>
<td>9265 kc.</td>
<td>650-1600 kc.</td>
</tr>
<tr>
<td>31</td>
<td>Me.</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>15</td>
<td>6731 kc.</td>
<td>650-1100 kc.</td>
</tr>
<tr>
<td>14</td>
<td>Me.</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>15</td>
<td>4150 kc.</td>
<td>650-1000 kc.</td>
</tr>
<tr>
<td>7</td>
<td>Me.</td>
<td>-</td>
<td>-</td>
<td>33</td>
<td>33</td>
<td>6150 kc.</td>
<td>650-950 kc.</td>
</tr>
<tr>
<td>4</td>
<td>Me.</td>
<td>-</td>
<td>-</td>
<td>40</td>
<td>40</td>
<td>2850 kc.</td>
<td>650-1150 kc.</td>
</tr>
<tr>
<td>1.8</td>
<td>Me.</td>
<td>-</td>
<td>-</td>
<td>40</td>
<td>40</td>
<td>2709 kc.</td>
<td>700-900 kc.</td>
</tr>
</tbody>
</table>

\(^*\) 28.5 to 29.45 Me.

All coils close-wound on \(\frac{1}{2}\)-inch, diam. slug-tuned (iron slug) forms. Tap on \(L_1\) to be made near cold end of coil. \(L_2\) wound over cold end of \(L_1\).

**Note:** Because the odd-numbered wire sizes specified for the 4-Me. coils are difficult to obtain the next-smaller even-numbered size may be used, by reducing the number of turns 10 to 15 per cent to maintain approximately the same inductance. Alternatively, commercially-made slug-tuned coils such as the North Hills 120 series or the CTC LSS series may be used for this and other frequency ranges, with links as described above added and \(L_1\) tapped approximately \(\frac{1}{2}\) the winding from the bottom end. \(C_1\) and \(C_2\) should be chosen to resonate, in a given amateur band, with the inductance of the particular coil used; the \(L/C\) ratio is not critical.

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\(^1\) A trial of the circuit in the QST lab gave negative results in attempted overtone operation, with surplus crystals of the FT-213 type. However, all crystals designed for actual overtone operation worked very well. — Editor.
B—Penlite cells.
Ci, C2—Silver mica or NPO ceramic; see Table 1 for values.
C0—0.005-µf disk ceramic.
Ci—250-µf, silver mica or NPO ceramic.
J1, J2—Coax chassis-type connectors.
Li, L4, inc.—See coil table.
L5—Broadcast-band r.f. or mixer coil, replacement type.
Q1, Q2—SB-100 (Philco) or types having equivalent alpha cut-off frequency.
Si—S.p.s.t. toggle.

Fig. 1—Circuit of the transistorized converter.

Only two external connections to the converter are necessary. A coax lead from the antenna must go to the input of the unit and an output coax connection to the input of the car radio is required.

Adjustment and Testing

When the unit is wired and ready for testing it will first be necessary to make certain that the oscillator is functioning. An easy method for determining this is to turn the converter on and listen on the home receiver for the signal from the oscillator. Tune the receiver to the oscillator crystal frequency and adjust the slug in L3 until the signal is heard. The oscillator will not oscillate until the collector tank (C2L3) is resonant. If the converter was built for operation on 20, 15 or 10 meters, it will be necessary to tune the home receiver to the third harmonic of the crystal frequency while making the above adjustments.

After the oscillator is known to be operating properly, install the unit in the car. With the car radio tuned to the intermediate frequency of the converter and the converter turned on, adjust the slug in L3 for maximum background noise as heard on the car receiver. Next, adjust the slug in L1 for maximum noise, or select a weak signal and peak it up for maximum gain. After this adjustment is completed, set the car radio for the center of the i.f. frequency band to be used with the converter. Adjust the slug in L5 for maximum gain. If only one segment of a particular band is going to be used, additional gain can be realized by peaking the coils for that portion of the band. Example: Peak the converter for 3800 to 4000 kc, rather than 3500 to 4000 kc, if 75-meter operation is contemplated and you are interested primarily in the phone band.

Results

The converter built by the author has been in constant service for seven months and the two penlite cells are still delivering plenty of voltage. Under normal circumstances they should last their regular shelf life. The measured current drain of the converter was 2.7 ma.

The sensitivity of the unit on the lower frequencies is comparable with that of a 3-tube converter which was originally used in the writer's mobile installation. It does not compare as favorably with a vacuum-tube converter when used on 15 and 10 meters because no r.f. amplifier stage is incorporated. However, it proves to be adequate, and an S6 signal or better is comfortable copy at these frequencies.

Changing to a transistorized converter was one of the most gratifying experiments I have undertaken and was well worth the effort. I'm sure you will find the results equally satisfactory.

Strays

A new QSO marathon record is claimed by K2RRV and K2EGP. Using 50 Mc., they maintained contact for 33 hours and 11 minutes. Another pair of lads (W7GIA and K7CYQ) challenged on 21 Mc., but collapsed at the 32 hour and 30 minute mark. Both were phone efforts.

CAA has a number of openings in the Second Region for electronics technicians at salaries of $4080. For complete details write to the Board of Civil Service Examiners, Civil Aeronautics Administration, Fort Worth, Texas.

KN2JQP says that KN2SHE is an XYL.

October 1958
The Centimeg 432-Mc. Converter

HERE IS A REAL RARITY — A PIECE OF COMMERCIAL EQUIPMENT FOR AMATEUR U.H.F. USE. Part of a 3-converter line (others are available for 144 and 220 Mc.), the Centimeg Converter \(^1\) for 432 Mc., makes high performance available to the u.h.f. enthusiast who doesn't want to build his own receiving gear.

The principal feature of the Centimeg product, aside from its remarkably clean layout and wiring job, is the use of silver-plated coaxial tank circuits in the r.f. portion. These 1-inch cylinders, 2 inches long, with \(\frac{1}{4}\)-inch inner conductors, are used in the cathode circuits of the two 6AM4 grounded-grid r.f. stages, and in the cathode circuit of the grounded-grid mixer. This last tube is a 6BK7B, with its other triode operating as a cathode follower.

The injection system has a 12AT7 Butler oscillator and frequency tripler, followed by a 6AK5 tripler, the injection frequency being 418 Mc. Tuning range, for 432 to 436 Mc., is 14 to 18 Mc. Other i.f. ranges are available on request. The oscillator uses a 46.444-Mc. overtone crystal. Alignment of the converters is done at the factory with the aid of a sweep generator, resulting in a substantially flat response across 432 to 436 Mc., with steep slopes above and below these limits.

--- E. P. T.

\(^1\) Centimeg Electronics, Inc., 312 East Imperial Hwy., El Segundo, Calif.

Bottom view of the Centimeg Converter, showing the coaxial tank circuits.
The dust cover has been removed from the tuning-capacitor gangs to show the construction. That variable capacitor at the upper right of the front panel is the tuning control for the rejection notch slot frequency.

The Hammarlund
HQ-160

If one has been in ham radio since the late 30s and interested in receivers, he will have no trouble in spotting the Hammarlund HQ-160 as a direct linear descendent of the old HQ-120, circa 1938. Of course you have to exercise a little imagination and you have to know what to look for to spot the hereditary traits, but they are there. The HQ-120 was a two-dial (bandspread and handset) receiver that covered the range 0.54 to 31 Mc., in six bands with smooth-running directly-calibrated dials. The 160 has two smooth-running directly-calibrated dials, with good big knobs very unlike the diminutive ones on the 120. The single-conversion HQ-120 and its descendants used the first wide-range selectivity crystal filter that became the standard in the field for many years. The 160 has gone double conversion and the crystal filter has been discarded. But don't worry, selectivity hasn't been discarded! In the 160 you have an adjustable notch for knocking out an undesirable carrier or interfering signal plus a variable bandwidth Q Multiplier for peaking a signal. The appearance of the 160 is in keeping with the other current Hammarlund receivers — cast panel, perforated metal case, gray paint — and a far cry from the 120 and its staid black finish.

The block diagram, Fig. 1, will point up many of the general electrical features. The tunable front end uses a 6BA6 r.f. stage, a 6BE6 mixer and a 6C4 grounded-cathode oscillator. In the two low ranges (.54 to 3.2 Mc.) the receiver is a single-conversion affair; the 6BE6 mixer works into the 6BE6 converter at 455 kc., and the converter operates as an amplifier. On the other bands, the first conversion is to 3035 kc., where three tuned circuits start knocking out a few of the undesired signals. The crystal-controlled 6BE6 converter heterodynes the signals to 455 kc., where the selectivity can go to work. One triode section of a 12AU7 (marked V3A in the diagram) serves as a Q multiplier and furnishes a peak that is sufficient for single-signal c.w. reception or broad enough for one sideband of a phone signal. The Q multiplier has two panel controls, one to set the frequency and the other to adjust the band width. The bifilar T trap behaves like a bridged-T notch filter and uses the circuit that

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October 1958

45
Using packaged circuits at several points and laying the bulky cabling around the edge of the chassis adds to the clean appearance of the HQ-160. Heavy flywheels on the tuning knobs contribute to the traditionally smooth tuning of the HQ receivers.

Last but not least is the 6BZ6 calibrator. This is a 100-ke. crystal-controlled oscillator that furnishes the markers for setting the band-set dial. Factory-set, its accuracy can be checked at any time by comparison with WWV. We used its harmonics to check the dial calibration; there was excellent agreement on the several ranges we checked, but with a built-in calibrator one can always be sure where he is, even if the dial is a bit off. As an aid to bringing the dial into agreement on any band, adjustable-from-the-panel hairlines are provided on both dials.

Speaking of the 100-ke. oscillator, the circuit involves only the 100-ke. crystal, a variable capacitor and some fixed capacitors and resistors (Fig. 2). In the HQ-160 most of the fixed resistors and capacitors are made up in one single packaged circuit (Hammarlund Part No. 38081-1 RC Network, calibrator), and it would be a very simple job to throw together a 100-ke. oscillator like this when such a packaged circuit is available. This isn't the only packaged circuit in the HQ-100; packaged circuits are used in the audio amplifier, the automatic noise limiter and the diode detector.

Some slight mention was made earlier of the external appearance of the HQ-100, and the two...
photographs show some of the interior. The bandspread dial is calibrated for the bands 80 through 10 meters, 80, 40 and 10 meters require about 9 knob revolutions to cover the bands, 20 takes 8 and 15 requires 6. The bandset dial uses 9 revolutions to cover its ranges: 0.54 to 1.32 Mc.; 1.32-3.2; 3.2-5.7; 5.7-10.0; 10.0-18.0 and 18.0-31.0 Mc.

Most of the panel controls have already been mentioned or implied. There is an antenna trimmer control, and a send-receiver switch that removes the screen voltage from the r.f. and second i.f. stage. A standard power receptacle at the back of the chassis is marked “Relay,” which may make a few customers think that an antenna relay can be controlled by the send-receive switch through this outlet. To the contrary, this is where you connect to the extra normally-closed contacts of an antenna relay, so that the receiver will be turned on and off by the externally-controlled antenna relay. It might be less confusing if the outlet were labeled something else so that a customer wouldn’t think this might be an outlet where the transmitter or relay could be controlled by the receiver send-receive switch.

As mentioned at the start, the HQ’s have a long lineage; the 100 should continue to make it a proud one.

B. G.

The Central Electronics MM-2 R.F. Analyzer

One of the marvels of amateur radio (at least to the writer) is the fact that so many phone transmitters have been put on the air and operated without a monitoring oscilloscope of any kind. Having on several occasions done exactly the same thing (put a phone rig on by rules of thumb or by guess and by gosh) and then checking later with a scope to see how bad the thing was (it was bad!), the writer never has any confidence unless there is a monitor ‘scope nearby. That he is not alone in this reaction has been brought out many times in conversations with other hams.

Years ago, of course, there was every good reason for not having a ‘scope in the shack. They hadn’t been invented or they were too expensive/complicated/esoteric. Those excuses no longer hold. Oscilloscopes in kit form make it possible for all but the most impecunious amateur to own a cathode-ray monitor, for continuous observation of the transmitted signal and for the occasional testing and adjustment of the rig. True, the available oscilloscopes have not always been designed with the operating amateur in mind, although they can be modified to work fairly well without too much trouble.

The Central Electronics MM-2 R.F. Analyzer is a monitor oscilloscope designed expressly for the operator. As normally used in the station for everyday operating, it will monitor the outgoing signal to indicate modulation level and also show when the overload (distortion) point is reached. With an adapter (more on this later) it will automatically switch to your receiver i.f. when you aren’t talking, to show what the incoming signals look like at r.f. (before demodulation). For transmitter tests it can be quickly switched to give a linear sweep or an audio sweep, for the observation of envelope patterns or trapezoid patterns. And, just in case you are ready to complain that you can’t make some of the tests because you don’t have an audio oscillator, the MM-2 has a built-in audio oscillator that delivers a low-distortion tone around 1000 cycles! With an MM-2 hooked into your station, you don’t have to ask “How’s my modulation?” You know. And of course using a ‘scope for monitoring means that you can keep the peak modulation (on a.m.)

The MM-2 R.F. Analyzer is a versatile oscilloscope designed expressly to monitor outgoing transmissions and also what is coming through the receiver i.f. The empty socket visible here takes an adapter tuned to the receiver i.f. The small lamp near the panel is not for illumination; it is the stabilizing element in a low-distortion 1000-cycle audio oscillator.
or peak amplitude (on sideband) right up to the point where you are getting the maximum without distortion.

For the simplest form of test with the MM-2, you connect the coax from your transmitter to a receptacle on the MM-2, and then connect another length of coax from the MM-2 to the antenna or antenna coupler. If you don’t use coax you connect a small antenna or pick-up loop to one of the fittings. R.f. from the line or antenna passes through a panel-controlled attenuator on to a vertical plate of the 3BP1 3-inch oscilloscope tube. The MM-2 doesn’t dissipate any of your r.f. power; the two fittings are there to make it easy to sample the output of a transmitter. The r.f. sampled from the transmitter also actuates a 6X4 “keying rectifier”, and the 6X4 output controls a 6U8 “keying tube.” These have nothing to do with c.w.; the 6U8 keying tube controls a pair of diodes (6AL5) that “switch” the horizontal sweep for the scope tube. For example, you may use an audio sweep from your transmitter to give a trapezoid pattern on “transmit”; when the r.f. is removed (when the transmitter is turned off) the 6U8 will switch, via the diode, to an internal sawtooth sweep and the r.f. from your receiver’s i.f. string.

The sweep oscillator mentioned above is a cathode-coupled 12AT7 that can run free or sync in with an internal 1000-cycle sine-wave oscillator (12AT7) or an external audio signal. The 1000-cycle oscillator is brought out at two levels (1.5 and 0.015 volt) at the rear of the MM-2, where it can be piped to the audio stages of the transmitter for test or tune-up purposes. A 6AU6 horizontal amplifier is provided to build up the various sweeps to a suitable level.

To pick up the signals at i.f. and transfer them to a vertical deflection plate, a Central Electronics Model RM adapter is required. These little units, available for 455, 80 and 50 kc., use a 6A8 tube and a suitable tuned circuit. The i.f. is fed to the grid of the pentode portion of the 6A8, and the triode section serves as an output stage. A socket is provided on the MM-2 chassis for the plug-in RM units.

A 24-page instruction book explains how to connect the MM-2 into the station for the many possible methods of utilization. It also includes over 11 pages of typical patterns, explaining what they are and what good or bad things they tell about your signal.

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**WBE**

The WBE (Worked British Empire) award is issued by the Radio Society of Great Britain upon proof of contact with a British Empire station in each of the five continental areas — North or South America, Europe, Africa, Oceania, and Asia. RSGB has recently increased its awards fee (for non-members of RSGB) to $1.00. Three types of awards are available: all phone, all c.w., and mixed (a combination of phone and c.w.). Amateurs residing in the U.S.A., Possessions and Canada may submit their confirmations for the award through ARRL. Those living elsewhere must apply directly to the RSGB headquarters, New Ruskin House, 28/30 Little Russell Street, London W.C. 1, England. The WBE award is the only foreign award handled by ARRL.
How I Come to Be a Ham
BY FLOYD C. DENCE,* K2RGH

Now this here account is what I been a going to write fer quite a spell, 'cause I thought it would maybe keep somebody from making all the fool mistakes I did, and show 'em it ain't so tough to be one of these here hams.

It all started when my boy got a ham license. Right away he started finkerin' with a mess of wire and little pieces of somethin' with colored marks on 'em and wires stickin' out on both ends, and a few other dingeses I never had seen before.

I was pretty busy for a spell, and didn't notice what was a goin' on 'til I thought I'd see how the kid was a gettin' along, and so I stopped by the shack, as he calls it, to find out.

Wal, there he was with a couple tin boxes with knobs on 'em and some light bulbs what wouldn't light very good, and wire runnin' all over the she-bang, an' he was just settin' there making a lot of noise on a little lever, and I asked him what he was doin' and he sez he is talkin' to another ham, so I thought I woukl set a spell and see what they said to each other.

Wal, the kid would rattle on the little lever for a spell, then he'd qui! and then the thing would start rattlin' back. I set there for a half hour and didn't hear anybody say a thing, so I asked the kid when he was goin' to start talkin', and he sez he'd been talkin' to a guy in BuZalo. It sure got me. I never heard nobody say nothin'. All I heard was that rattlin', so I went and done the chores.

It was a long time 'til I stopped again to see what was a goin' on 'til I thought I'd see how the kid was a gettin' along, and so I stopped by the shack, as he calls it, to find out.

Wal, I could send for the license O.K. and I already knew the code — you just done what was right by the people — but why I had to keep a log I didn't see no sense to, but I got the old mare out and went up to the woods and cut a log. It wasn't too big a one 'cause I was alone and the mare was kinda old, but I got it down to the shack all right.

The kid seen me comin' and wanted to know what I was gettin' fire wood for now, seein' as how he had the woodshed full, and I says you told me I had to have a log so I got one, and he says “you old knuckle head, a log is a book you keep your records in.” I was kinda put out, all that work for nothin', but I am learnin' all the time that you don't know as much about talkin' as you think you do. I found out an alligator clip ain't a bite from one of them critters, and a pig tail ain't the end of a hog and Henry or Jack ain't a couple more hams. Then there's a bug what ain't a bug, and a bleeder don't mean you've cut your finger, and hush ain't what's been put together for supper.

And you know, I found out that all them OMs and YLs ain't exactly what I was thinkin', either.

* Box 3, Lisle, N. Y.

Strays

If you can stand another coincidence — both W1EBO and K2EBO live in the city of Norwich — Connecticut and New York.

October 1958 49
Obviously unhampered by the blustery weather, W3LOE was far ahead of the nation's c.w. men with 922,355 points. Landing 125 countries on 3.5-28 Mc., Bob used home-designed receivers and kw. rigs to win the Md.-Del.-D.C. certificate. During the fray, split 'phones were often brought to bear, each ear listening to a different receiver on a different band, with instant selection of the appropriate transmitter. Antennas were four rotaries for 28 to 14 Mc. and a ground plane and zepp on lower bands.

Official Results—
24th ARRL International DX Competition

On March 20, one day before the second c.w. week end got underway, a blizzard came churning up the Atlantic seaboard. Billions of tons of wet snow twisted beam elements, crumpled towers, knocked out commercial power lines. Many DXers jumped to the fore to handle emergency traffic for isolated communities, several instances of which have already been covered in “With the AREC.” Others counted on hastily-erected random-length wires to raise such DX as they could, but understandably most scores in W2, W3, and W4 dropped when compared with those of last year. One member of an east coast club termed the gavel race, “the battle of the dipoles.”

Opinions on band conditions, procedures and such were mixed, depended largely on where you were and whether you were the seeker or the sought. Said VK2GW: “Conditions both periods were fantastically good, the best I have experienced in a major contest, and there were more W’s on than ever.” Said 4-watt SP6XA: “It was a great pleasure to work so many FB American ops. Intended to do more but, the solar eruption the last day (c.w.) made this impossible.” Said KH6BG: “First Test and what QRM, what pile-ups, wotta panic but, boy-oh-boy, what fun! A golden opportunity for a fast WAS.” Said W62FA: “While some fellows ‘tailed’ widely, others called immediately after I stood by for a specific station. This practice would surely get them in bad with the DX under noncontest conditions.” Said ST2AR: “Enjoyed every minute. The bands were superior the first week end but what happens to the rarer states like North and South Dakota during the Test? If they don’t come out of hibernation on these occasions they never will.” Said W1MJ: “Got four new ones but some of the fellows are getting bloodthirsty. Heard one poor DXer plead for the W’s to wait until he finished before calling but to no avail. I don’t mind stiff competition but much of it is just plain kid-antics.” Said PA6LOU: “The bands were excellent the first c.w. part and very poor the second. However I am more than satisfied with a score tenfold last year’s. Thanks to all the boys for their excellent work. Moreover, the contest gave me Nevada for WAS at last!”

As QSL managers around the globe wrestled with the post-Test card deluge and the log jam hit 38 La Salle Road, W2SKE was pounding out something called “The Battle of the Hams” for the June 30 issue of Sports Illustrated. An experienced accumulator of sparkling phone totals, Bill Leonard knew whereof he spoke and succeeded admirably in describing the almost incredible enthusiasm which besets the diehard contesters. In an aptly-phrased comment later
The battle over, two tired DXers relax. Left: W9HUZ got 539,850 points, honors for top W9, and the Illinois c.w. Certificate of Performance aided by a pair of 813s at 800 watts and an impressive collection of twirlers and dipoles. Right: With 658,698 on c.w. and 219,564 on phone, versatile W6ITA easily bagged both Los Angeles Section awards, was fourth nationally on mike and key, and became the first ever to lead the Sixes on the two modes. Gordon attaches his Collins gear to an 80-meter half-wave or a triple-band beam.

Published by the magazine, W4RNP declared:

"... Hams will don their headphones to Sports Illustrated and Leonard for combining on the most readable piece on the hobby seen anywhere outside of publications devoted to it. Any ham who has ever battered his way through a DX contest can thank Leonard for making it all seem plausible, exciting and even reasonable—something few amateurs can ever achieve with their neighbors, friends and wives in describing the miserable ecstasy of a DX contest." Amen, anyone?

Now a somber note. Out west during both code periods, FCC had conducted some surprise power-input checks in a move heartily approved by the Body Amateur. Some were given a clean bill of health ("A Hot Contest," May QST). Some weren't (p. 9 last month). Happily, the crackdown's deterrent effect probably kept a few other lawbreakers QRT.

Following the 1957 Competition, the cry "Where were the Canadians?" was raised. Because the score of those abroad depends on a maximum band-multiplier of 19 (made up of the ten U.S. licensing areas, the eight in VE, and VO), the concern was natural. Before this year's affair, therefore, preprints of the rules were circulated to Dominion clubs urging participation. Yet again in 1958 DJ1BZ, DJ3JZ, DJ3KR, DL7AH, EI9J, G2HPF, G3PKH, HB9QO, VK2GW and ZS6AJO bemoaned the lack of VE/VO activity. With a ham population some 3.7 per cent of the U.S., Canada actually holds its own; the chances of swarms of them taking part parallel the odds of landing six ZAs in an hour stint on 14 Mc., or hearing ACs on 160 meters. But for what it's worth: Canadians, the DX wants YOU in '59!

Rules preprints also went to IARU Societies, to foreign QSL bureaus, and to many individual amateurs in "multiplier" spots. Such advance publicity brought '58 Test announcements in two dozen IARU publications and helped bring out the usual slam-bang degree of DX activity. Our thanks to the hundreds of hams who spread the word in prior on-the-air pep talks, to OK1AAI, EA4ER...
of URE, to SP2DX of PZK, to Mr. S. Matlin of the Soviet Central Radio Club, and to all the rest who afterwards collected and forwarded entries from their countries.

The number of logs received, one yardstick of the success of the Acid Test, shaped up at 1672 (1158 c.w. and 514 phone) and 337 Certificates of Performance are en route at this writing. These are divided as follows: 66 U. S. mainland and Canadian c.w. single-operator ARRL Section winners, 6 U. S. c.w. multioperator stations, 91 foreign c.w., 65 U. S. mainland and Canadian phone section winners, 62 non-W/K/VE/YO phones, and 47 club leaders.

C. W. Highlights

W3LOE paced the U. S. c.w. contingent in score (922,355), multiplier (365), and number of contacts (851). In his slipstream was W3BVN, another Marylander, with 668,118 points, 318 multiplier, and 701 QSOs. Third nationally was Virginia's W4KFC who was presented with a brand-new daughter during the second weekend, resurrected his downed antennas by much floundering about in a foot of snow, and still managed to post 662,936 points.


In Africa, where GNSGU's 820,620-pointer set a new record for the continent, these other FB totals were reported: G5JS 296,730, EH5BF 171,807, OQ5GU 157,092, CNSLU 88,200, ZS6AJO 75,200, ZS6AJO 75,200, ZE2IS 74,037, YQ4FK 57,165, Z1OJX 56,430, 3RODA 54,648. Every last African competitor ran 150 watts or less, proving the old adage that you don't need much steam when your prefix is in demand.

In Europe, source of 60 percent of all DX entries, was marked by nip-and-tuck duel for country honors between OZ1W and OZ7BG, G3LJJ and G2QT, F9MIS and F8VJ, DJ1BZ and DL7AI, HA8WS and HA5BW, PA0LZ and PA0LOU, and 34 single-op scores of 100,000 or more (against 1957's 24). Continental leader was SVOWP (W3.ITC Stateside) with 550,000 points, a 65 multiplier and 2054 contacts. Next came OZ1W with 503,117 and the number-one Euro multiplier of 69, followed by OZ7BG 283,724, F9MIS 280,170, PA0LZ 252,882, EA6QA 244,688, EI1FJ 229,524, DJ1BZ 225,018, DL7AI 220,000, PA0LOU 207,083, F8VJ 207,083, PA0BW 170,018, PA0BW 150,052, PA0LOU 150,052, OZ7BG 125,016 and 3RODA 125,016. Also over six digits were DJ1BZ, DL1AB, EA1AB, F8ZJ, G3DC, G2HPP, G2QT, GH6J, G3FKH, GM3EO.
Both N. Y. C-L. t. awards wenf to W2WZ for scores of 565,812 c.w. and 185,871 phone. There are separate triode finals for each band, three 5- and 6-element rotaries, 3-wire folded dipoles on 80 and 40, a 7-Mc. ground plane, and V beams. As an added signal booster, AI has thousands of feet of radials buried beneath the skyhooks.

HA5BW, HA8WS, HB4FE, HB9EU, HB9QO, OE1BZ, OE6HV, ON4LX and TF2WCT. DJ3JZ's team turned in 384,120, as OK1KT's 159,636 and SM9AP'S 130,389 points rounded out the multiplier picture.

In North America (outside U. S. and Canada), XFI1 wasn't present for a change but XE2FA kept Mexico on the map with 985,423 points and 3301 stations worked. Second was VP7NG, efficiently keyed by visiting W0NWX to the tune of 922,320 points. Other outstanding work in the Possessions and Caribbean: KL7CDF 404,712, XE1YF 387,288, CO7PG 173,880, KV4AA 153,627, P1JME 143,782, KL7BLK 122,670, KZ5LY 121,605, KL7AUK/KL7 117,-798, VPI9CR 105,948, H12BE 102,438. KV4AA's QSO total of 1249, by the way, represents a cool SO-pei-hotn- average.

Oceania was dominated by K6OJJ's world-beating 1,139,488 and the 810,810 and 790,335 points of KH6MG and KH6AYG, ( of 910 highs: VJK2GW 401,310, ZL1MQ 304,902, KHGBYM 169,984, ZL1APM 162,864, KH6BIB 155,550, W3CR 133,620, W1QCR 124,431, PJ2ME 124,431, W3A9P 117,798, VP9CR 105,948, H12BE 102,438. KV4AA's QSO total of 1249, by the way, represents a cool SO-pei-hotn- average.

In South America, ever-reliable CE3AG (who became CK0AA in '53 and will create even more excitement should plans to open up from Robinson Crusoe's Juan Fernande?, Islande materialize) racked 970 contacts and 192,000 points with a KWS-1 and a spicy collection of multielement rotaries. Excellent tallies came too from ZP9AY 147,655, PY7AN 140,538, OA4BP 137,535, P1JAN 124,431, PY7AFK 111,642.

**Phone Highlights**

Plenty of very hardy folk took part on A-3 and of them all none was harder than Ohio's W8BKP who showed that the Midwest can top the U. S. (as did W8BIH on c.w. back in '49). Running 500 to 800 watts into 10-15-20 meter twirlers and a 640-foot long wire on lower bands, George broke out 278,568 points, a 210 multiplier, 424 QSOs in 53 hours of yakking to lead the single operators comfortably. Close on his heels was none other than W1ONK (see photo) and then came Frankford Radio Club's W3DHM with 220,584 points, 182 mult, 104 contacts.

These 15 solo performers also got 100K or more: W6ITA 219,564, W8NXF 210,684, W8WINO 198,944, W9EWC 190,576, W2WZ 185,871, top VE4SCCK 165,789, W8ZOK 163,680, W3ALB 156,529, W1QWI 140,840, W3ECR 136,320, W1FZ (whose awesome antenna structure was pictured last month on p. 58) 133,960, W1BII 129,297, W6AED 122,715, W8SDD 109,980, W1GET 103,750, VE5VL and his 91,390 points was Canada's runner-up.

**Single-op license area leaders:**

<table>
<thead>
<tr>
<th>Operator</th>
<th>Score</th>
<th>Multiplier</th>
<th>QSOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1ONK</td>
<td>255,056</td>
<td>910</td>
<td>560</td>
</tr>
<tr>
<td>W2WZ</td>
<td>185,871</td>
<td>910</td>
<td>356</td>
</tr>
<tr>
<td>W3DHM</td>
<td>220,581</td>
<td>910</td>
<td>356</td>
</tr>
<tr>
<td>W4NBV</td>
<td>91,068</td>
<td>310</td>
<td>309</td>
</tr>
<tr>
<td>W5CX</td>
<td>74,763</td>
<td>91</td>
<td>309</td>
</tr>
<tr>
<td>W1XTA</td>
<td>209,564</td>
<td>104</td>
<td>256</td>
</tr>
<tr>
<td>W7JEV</td>
<td>99,800</td>
<td>256</td>
<td>256</td>
</tr>
<tr>
<td>W8BKP</td>
<td>273,568</td>
<td>490</td>
<td>256</td>
</tr>
<tr>
<td>W9EWC</td>
<td>190,576</td>
<td>590</td>
<td>580</td>
</tr>
<tr>
<td>W9C6K</td>
<td>97,333</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The multiplier teams were paced by four talkers at W3A0H and their 308,940 points, 190 multiplier, 542 QSOs in 96 countries. Other joint

---

**October 1958**
CN8GU produced 820,620 points, a new c.w. record for Africa, and 2910 contacts with foot-switch controlled rig. Ray, who signs W9FJY at home, handled the QSL chores of ZD7SA until recently.

accumulations that should be mentioned: W3VKD 267,600, W6AM 238,266, W8 NGO 222,855, W6 NJU 148,200, W3FYS 122,285, W3BES 120,984, W3KFQ 116,375.

ZS6UR and ZS5JY engaged in a free-for-all for Dark Continent honors, the former triumphing 161,246 to 143,832. Canaries’ EASCF fired well with 93,993 as CR4AD, CR4AS, QG5DG, VQ4FK and ZE2KR kept the boys hopping and hoping with scores ranging between 10 and 60K. Although ZS5NZ/ZS7 consummated just 27 contacts, his presence was responsible for quite a bit of furor March 8.

In Asia, KA2RB cut a swath into W6 and W7 on 7-Mc. a.m. and managed to land 70,080 points for Asia’s top tally, and in the Middle East ON5BZ’s 59,450 points came about through 100 watts to 6146s and a quad.

FSPI’s 192,942-pointer lead Europe’s 57 competitors and Paul’s 1194 QSOs was also in front.

DL4AAP — of SV9WQ “Invasion of Crete” fame — was second scorewise (174,582) and contactwise (1008), after which came G3HCL’s 139,722. Holding forth on five bands ON4OC garnered the biggest Euro mult of 63 and a score of 136,899, thereby extending his Belgian winning streak to five straight. Other leaders across the pond: DJ1BZ 113,684, G3DO 100,944, G3HJJ 95,628, EA3JE 91,434, H1AIM 81,576, EI5I 55,840, G2DYV 54,510, G2PU 53,808, OH5PE 50,055.

In North America VP9L, who swears he’s QSLing all 834 contacts via the bureaus, led with 212,670 markers. Next: CO2USA 133,008, TT2OE 107,916, CO2HB 50,028, XE1RE 46,110, CO3HD 22,080.

In Oceania, we have KH6IJ 535,311, KX6AF (multiop) 117,183, ZL1MQ 79,980, VR2BC 22,751, DU7SV 20,355, VK5XN 18,090, VK5WO 13,962.

W1ONK talked his way to second-ranking single-operator W/K score of 255,056 and Eastern Mass. phone plaudits with maximum input of 250 watts.
Potomac Valley Radio Club
Northern California DX Club
Frankfort Radio Club
Southern California DX Club
Kual High School Radio Club (Hawaii)
Hollenum and Chappers Society (Pa.)
Rochester DX Assn.
San Diego DX Club
Ohio Valley Amateur Radio Assn.
Central Ohio DX Club (Ohio)
The DX Club of Greater St. Louis
Connecticut Wireless Assn.
Hampton County Radio Assn. (Mass.)
Dodge Radio Club (Va.)
Garden City Amateur Radio Assn. (N.Y.)
Milwaukee Radio Amateurs Club
Eagle Radio Club (Mich.)
Westfield Radios (Ohio)
The DX Club (P.a.)
South Jersey Radio Assn.
South Lyons Beer, Chowder & Propagation Soc. (Conn.)
Hamelstreet Radio Club (III.)
Lake Success Radio Club (N.Y.)
Four Lakes Amateur Radio Club (Wash.)
Cayuga Suburban Radio Assn.
Trum Iraq Amateur Radio Club (Calif.)
Joliet Amateur Radio Society (III.)
Southwestern DX Club (Ga.)
Peoria Radio Club
Dallas Radio Club
Nehava Frontier DX Assn. (N.Y.)
Columbus Amateur Radio Assn. (Oh.)
Western Amateur Radio Club (La.)
Central Amateur Radio Society (Mich.)
Central High School Radio Club (Iowa)
Miesiana Amateur Radio Club (Ind.)
Johnstown County Radio Assn. (Pa.)
Atlantic Radio Club
Springfield Amateur Radio Club (Ohio)

HP7LX 60,255, OA4V 22,032, VP4LO 17,010, grabbed its second gavel in a row (and ARRL's year's aggregate, Potomac Valley Radio Club then came OA4AQ 81,510, HC1HL 63,455, who has set eyes on one of the handsome hammers eocobolo gavel with the silver band, and anyone Wonder where all the LUs and PYs were hiding.

30 c.w. and 17 voice certificate winners can be seen in the accompanying box fabulation.

249-561, 260-885, 281-900, 292-100, 303-100, 314-127, 327-081, 338-059, 351-227, 362-066, 375-025, 380-268-505-0-46, or final score 478,380; multiplier 268; hour is given for each station and is the last figure followed by 150 watts; C indicates over 150 watts, up to and including 500 watts; B indicates power over 500 watts; total operating time 46 hours. . . . Stations manned by more than one operator in each station in determining score is given with the score by each station in determining score is given with the score — in the case of U. S.-Canada this is the total of the country worked on each frequency-band used; in the case of non-W/K/VE/VO entries it is the total of the U. S. -Canada districts worked on each band... The total number of contacts is listed next... The letters A, B, and C approximate the input to the final stage at each station; A indicates power up to and including 150 watts; B indicates over 150 watts, up to and including 500 watts; C indicates over 500 watts... The total operating time to the nearest hour is given for each station and is the last figure followed by 150 watts; C indicates over 150 watts, up to and including 500 watts; B indicates over 500 watts; total operating time 46 hours... Stations manned by more than one operator are grouped in order of score following single-operator listings in each section or country tabulation; calls of participating at multi-operator stations are listed in parentheses... In sections or countries where three or more multi-operator entries appear, the top-scoring station is being awarded a certificate.

C. W. SCORES

**Twentieth-Fourth ARRL International DX Competition**

Operator of the station first-listed in each section and country is winner for that area. The multiplier used by each station in determining score is given with the score — in the case of U. S.-Canada this is the total of the countries worked on each frequency-band used; in the case of non-W/K/VE/VO entries it is the total of the U. S. -Canada districts worked on each band... The total number of contacts is listed next... The letters A, B, and C approximate the input to the final stage at each station; A indicates power up to and including 150 watts; B indicates over 150 watts, up to and including 500 watts; C indicates over 500 watts... The total operating time to the nearest hour is given for each station and is the last figure followed by 150 watts; C indicates over 150 watts, up to and including 500 watts; B indicates over 500 watts; total operating time 46 hours... Stations manned by more than one operator are grouped in order of score following single-operator listings in each section or country tabulation; calls of participating at multi-operator stations are listed in parentheses... In sections or countries where three or more multi-operator entries appear, the top-scoring station is being awarded a certificate.

VP3HAG's 135,040 topped South America and then came OA1AO 81,510, HC1HL 63,455, HK7LX 60,255, OA4V 22,032, VP4LO 17,010, CX1AR 16,925, ZP9AU 15,972, OA4FA 14,752. Wonder where all the LUs and PYs were hiding.

The Clubs

Each of the dozen postwar Tests has been characterized by heated races for possession of the cocobolo gavel with the silver band, and anyone who has set eyes on one of the handsome hammers will know the reason for the fervor. Although the afore-mentioned inclement weather precipitated a noisette to four million points less than last year's aggregate, Potomac Valley Radio Club grabbed its second gavel in a row (and ARRL's WIZDP was tickled to present it to Prexie W4ZM at the National Convention's contest forum August 16 in Washington). In a determined bid, Northern California DX Club forged ahead into second place in the standings with a hair over five million, as Philly's Frankford Radio Club held firm in the show spot. Thirty-nine clubs in were there fighting and the calls of their 30 c.w. and 17 voice certificate winners can be seen in the accompanying box tabulation.

Disqualifications

In accordance with contest rule 14, the following have been deemed ineligible for score listings and awards. In each rule disqualification is for violation of Sections 12.111, 12.113, 12.23 or 12.133 of the amateur regulations as confirmed by one FCC citation or two accredited ARRL Official Observer measurements: C.w. — K2OEA, K6IYJ, W9EXY, KN9IIW; phone — W2DFT, W2VCZ, W3ROA, W4OM, K4PHY, K6CTV, K6AP, K6HJH, W8BHM, W8GKB, W9IRH, K38LY, K4PVA.

_RAW_
Among the best Asians catchable was Thailand's HS1C who brasspounded his way to 11,016 points.
CO2USA netted 133,008 points and Cuba phone honors. Jack got 46 states the first week end but never did find Utah and Wyoming.

October 1958
How:

It's an infinitesimal world. The Lt. G. J. Raymon, USAF, who unwittingly supplied our April shortie on "The World's Smallest Colonial Possession" (via K9KFU and the Western Stamp Collected) turns out to be numbered among QST's readership. We might have suspected as much. Who but one fired with the ham and DX spirit could have scored his point with such heraldic zeal? More from Gale:

6035 Hornwood Drive
Houston 36, Texas

Dear OM:

I was delighted to see your reprint of my article on Fort San Juan Baptista de Ajuda. Yes, I'm a regular QST reader and was working on my own General ticket when polio hit me while flying as navigation instructor at Killeen AFB, Texas. Both hands are still paralyzed but I can get one finger stiff enough to punch this mill. Can't push a bug, though — darn it. I do have hundreds of ham friends, particularly in the more remote areas, who are most kind in mailing philatelic covers to me for my collection of postmarks and material on postal history. An S-53A provides many enjoyable hours of short-wave listening and a special thrill is the receipt of a cover posted from some DXpedition. I appreciate it when the ham gang remembers me by sending envelopes to the effect that they originated from DXpeditions to Clipperton, Galapagos, etc. 73.

— Gale J. Raymond

We trust it won't be long before this stout heart is logging two-ways with our rover set. Yes, you never can tell what will pop out of the "How's" mail sack from month to month. Some well-seasoned cogitation nourishment from a recent visitor to the Continent:

Madrid, Spain

Jeeves, OM:

I had the pleasure of meeting a 200-country EA2 yesterday. He tells me he is growing sick and tired of DXing because American amateurs are "poisoning the sport with dollars." On a tentative trip to Rio de Oro he said he was offered a transmitter if he would send all his QSLs through a certain W who planned to get back the money for the rig, etc., by charging for the cards. He is deeply resentful that more than a few DXpeditions have gone so far as to reply first to QSLs bearing "contributions" — even so far as to have the gall to emblazon TNX FOR CONTRIBUTION on their DXpeditionary confirmations. He feels strongly that radio amateurs who undertake DXpeditions should use their own capital.

— Marty, W1FTI

In casual DX days before inevitable supply-versus-demand economics barged into our QSL picture any Yank swapped cards with his Baluchistan or Christmas Island counterpart on the same basis that he exchanged QSLs with a fellow down the street: mutual desire. Rarely is this so today. As a concession to undeniable imbalance in QSL...

swab desires we have come to recommend individual defrayals of bona-fide QSL postage expense — in stamps or IRCs. But we hold that solicitations for the financing of DXpeditionary enterprises are a matter to be kept independent of on-the-air activity, QSL exchanges and the pages of "How's".

W1CTW closes this little forum with comment bearing on last month's theme:

... There is much emphasis on putting times of QSOs on QSLs in Greenwich Mean Time to avoid confusion but I have seen no suggestions to avoid conflict in dating methods. For instance, 1/12/57 and 1/12/57 (European style) for December 1, 1957. I spell the month.

Budding DX hounds ordinarily spot this pitfall when they inspect their first batches of European pasteboards. Adopt a spell-out-the-month habit early to thwart OM Ambiguity's raids on your QSL returns. And do use GMT.

What:

Kemény-Heveside pyrotechnics brighten our October DX horizon. Those dazzling displays of ham radio's unique togetherness, the pile-ups, zoom to new heights of frenzy. Recent annexations to your ARRL DXCC Countries List — the VP2s abroad, Lord Howe Island and the Clathams — occasion heavy fire. And then there are the old stand-bys, such perennial DXpeditionary targets as the Galapagos, Clipperton, Seychelles, Revillagigedos, Zanzibar, Andamans & Nicobars, Lower Slobovia and Outer Baldonia ready to erupt at any time. Frankie's right: we've got the world on a string, or headset cord if you prefer! What else is available on what bands and when? We'll let's quote word from the herd...

0/0 c.w.'s late-summer antics drew typical comment from KG7HJZ: "Boy, what a month — one minute they're coming in 599, the next minute they're all getting weak, and finally it takes superskip to get the west out to your own antenna." This view is generally seconded...
stations and no self-addressed envelopes in which to mail them. As hundreds of pieces of mail are received each month it is necessary to check them against the unclaimed cards and this can be a time-consuming process. Regularly we receive cards from QSL clubs and personal callers that are in letters at least one-fourth-inch high. Place a four-cent stamp on each envelope; this will take care of six or seven QSL cards. Mail cards directly to W2KP. This will be handled by W2QKP and QSL cards will be mailed via W2KP. QSL cards should be addressed: ARC QSL Bureau, Box 39, Pyongyang, North Korea.

K5KPA tells us his OTH which results in delays of as long as six months. The Box 301, Kampa, address should be used. This courtesy, W1AOG—Accepting clerk at V93CF's North American QSL representative. W2CTN reminds all amateurs that self-addressed stamped envelopes are the thing. W6AGW—Desires QSL for W6ABN and W6ABK for QSLs prior to their Galapagos odyssey. (Photo via W6NXP)

VQ2JB is among the more DX-inclined of our Northern Rhodesia colleagues with a self-assembled v.f.o.-807-parallel 807's r.f. section modulated by 6SJ7-6SN7. Plenty of W/K/VE6s regularly bong through on that SX-42. (Photo via W6NXP)
VK9AA enjoys 15-meter rag-chewing with Stateside friends and also collects his share of rare ones. His postal QTH is ambiguous but he's actually in the Territory of New Guinea. (Photo via K5KHU)

HF2R, E. D. Russo, Box 508, Colon, Panama
HRIUE, A. Ehler-Ugarte, P.O. Box 516, Texcuzalpa, Mexico
HR1OL, Col. O. Lopez, Apartado Postal 072, Tuxtla Gutierrez, Mexico
K2QUP/KC4, D. Mazzara, 175 Hewes St., Brooklyn 11, N. Y.
K3BWA/VO1, J. Monroe, WO-15, Electronics Dirn., FPO, New York, N. Y.
ex-K5ZS (see: XE0WUE)
K5DW, Canton Island, Phoenix Gr., So. Pacific (air only)
K7TC C DDI, Capt. J. H. Emerson, HQ AAC, OC-3, APO 142, Seattle, Wash.
K94APA, M/S E. C. Smith, Box 500, APO 815, New York, N. Y.
K96KJ, Japanese radio operators, Manila, Philippines
K976PE, Inst. 21, Innsbruck, Tirol, Austria
O15RO, P. K. Lampada, Vattakuta 61, Kusanshoki, Finland
OK1MX, O. Mentlik, Malaostr. N-5, Praha III, Czechoslovakia
PA0JBE, IL. N. van Dongen, Speidellamaan 6, Brede, Netherlands
PAOGD, G. H. Bergman (ex-PA0GH), Arnhemseweg 48, Leiden, Netherlands
PJ2MA, c/o B. Swidolf, K2SWZ, Box 82, Blackwood, N. J.
PJ2BB, P.O. Box 28, Belmos, Para, Brazil
PJ2AM, A. Meughman, Box 12, Conime, Surinam
PJ28, P.O. Box 347, Paramaribo, Surinam
TEN85X, C. T. Johnson, 992nd AC&W Spdn., APO 811, New York, N. Y.
TF3R4, K. Thorman, P.O. Box 901, Reykjavik, Iceland
UPK0GZ, PEDagogical lnstitut, Shanghai, Lithuanian S.S.R.
VA5JM (via W8ZP)
VP2KE (via K4AAA)
VPSCSE, Pete Cattow, KD1S Base J. Fenin Head via Port Stanley, Falklands
VP5CM (via W5CTN)
VO4BN (via RSGB)
VO6QG (to VK1QJE)
VQ1GZ, C. P. C. Carter, Karolove Beach Hotel, Karolouve, Fiji
W26JF, J. Fulton (via W26KFJ), c/o Cable & Wireless Ltd., 14 Northam Rd., Penang, Malaya
W26YM, D. Traanner (J76DT), KAP, Gan Island, BFP0, Maldives via Simora (or via RSGB or MARTSI ex-V8SO, K. Hauckma (G7RIRQ), Bouna Farm, Areleigh, Essex, England
W3AZ/3W (see text preceding)
WBB8L, K66, A. Rainous, Box 1263, Agana, Guam
X2NVS, Box 145, Comerica, Durango, Mexico
X50UN (to W3UN)
X6IJFR (to W9UB)
X6WULZ, S. Sprague (W6WUJ), 482 E. Olive St., Oxnard, Calif.
X8MWA, P.O. Box 115, Vientiane, Laos
X8WAI, Mouhounal Saingniel Director of Service, Statistique de Laos, P.O. Box 115, Vientiane, Laos
YN7TE, Apartado 180-5, Managua, Nicaragua
YV5HR (via RCV)

73 SE, K. du Buisson, P.O. Box 86, Welwitschian, S. W. Africa
ZS6AOQ/ZS9 (via W4LYC)
AZ2CG (via I4UH)
AZ2RS, c/o J. S. Embesse, Bonnba, Cyrenaics, Libya
9A4T1, APO 251, New York, N. Y.
9G1CS, P.O. Box 529, Accra, Ghana

Whence:
Asia — Gay tidings from W3ZA/3W: "On August 7, 1951, FCC approved the portable operation of W3ZAA in the Republic of South Vietnam. The Commission's letter states in part, 'Communication between that station and other amateur stations licensed for the Commission is not prohibited. This does not change the status of Vietnam with regard to Article 42, Section 1, of the International Radio Regulations (Atlantic City, 1947), Vietnam still is on the banned list but W3ZA/3W, licensed by FCC, is definitely off and okayed for work with W/K stations.' W3YA and AMU pooled efforts to supply Maldives island station V85ON with two spare power transformers and a reactor for the outfit's 1X-55. V85ON's receiver is an English-made HRO and it also is a mouthpiece for many other amateur stations licensed by the authorities' caused the prime minister to advise the country's postmaster general to take possession of all communications with stations in the countries listed below. This is in accordance with FCC Public Notice of December 21, 1950 (p. 233, Feb., 1951 QST), and as such received much attention. In addition to taking up half my vacation it required me to put the 21-Me. wireback on my cube quad and borrow single additions while on the way. Surely there are things more interesting when they're tough to catch! But now how can I live down the fact that I have one country to sign. Any new country listed in QST for some little time" before he's heard again.

VK9AA, Capt. J. H. Emerson, 11Q AAC, OC-8, Canton Island, Phocnix Op., So. Pacific (air only)
DUHKA, C. R. du Buisson, P.O. Box 115, Vientiane, Laos
W9MOW, au air during the chase but comments, "In addition to taking up half my vacation it required me to put the 21-Me. wireback on my cube quad and borrow single additions while on the way. Surely there are things more interesting when they're tough to catch! But now how can I live down the fact that I have one country to sign. Any new country listed in QST for some little time" before he's heard again.

Under this country's treaty obligations and on formal notice received from other nations, FCC-licensed amateurs are warned to engage in no communications with stations in the countries listed below. This is in accordance with FCC Public Notice of December 21, 1950 (p. 233, Feb., 1951 QST), and as such received much attention. In addition to taking up half my vacation it required me to put the 21-Me. wireback on my cube quad and borrow single additions while on the way. Surely there are things more interesting when they're tough to catch! But now how can I live down the fact that I have one country to sign. Any new country listed in QST for some little time" before he's heard again.

For those whose QST files do not go back to 1960 we will gladly supply, upon request, literature describing the circumstances of this prohibition.

CAUTION
VS1BB/VS9 highlighted and delighted this spring's DX season by making the Maldives workable on 10, 15 and 20 meters with a DX-35, HRO-MX and dipoles. Here Barry faces camera while second op Vic makes the log. A view of the encampment's "Sunset Boulevard" also appears. Equipment used by VS1BB/VS9 remains on the scene for the use of 4S7RD and friends who now sign VS9MA. Meanwhile VS1BB sets his sight on something even rarer: the Nicobars and Andamans. (Photos via W7PHO and W9YFV)

letter to W8KDL confirms the absence of authorized French Somaliland activity as of August. FL8s AA AB and AC closed down on July 1st, May 30th and July 9th, respectively. W8KDL was delighted to find former colleague W8WET behind the RTTY key. SU10C forwards a rare press release copy of the Elfo Bulletin, organ of the Experimental Radio Society of Egypt, circa 1969. Some calls which appear: SU1s AM AX CH DB IB JM MB MG PG RD RO SG TM W1v SU2s JR TW and SU3HC. Remember? . . . . . W6DGC has QSL HEGB contemplating Seychelles shenanigans a year hence. How's this for advance notice? . . . . . OVARA's Ether Waves deduces that Trou Tec isle will be operationally dormant for some time to come, F888K being in no rush to reactivate.

Oceania — ZL3DX (ex-VR2CG) sails to the Chatham Islands in high spirits with extensive s.s.b. intentions and gear assembled with the assistance of ZL1AAX. Twenty-meter resident ZL3VB expects to remain a Chathamite for several years but he chooses to remain rather rare . . . . . VK2AIR, who racked up some 1200 c.w. QSOs over 1400 with W/Ks in his August VK2AVY/LH skirmish, hopes to return to Lord Howe isle in February accompanied by VK2GL. The West Gulf gang observes VK2GCX cooking up an L.H. phone log, too . . . . . W7FB sends congratulations to F08AC with VK7WG at the 11-Mc. key in early August. This Six also scheduled tours to VR2 and ZM6 elaines

October 1958
the c.w. and phone erowd ethaciously on 20, 15 and 10.
of August, Licensing arrangements expedited by F08AC
hours of action daily, the boys nevertheless accommodated
plus handy transportation from Seripps Instituto of dcean-
as radio engmeer lor an Ecuadorian heet. Wonder if
QRL with skeds, charging batteries and feeding the hounds
and must operate eutirciy from O-volt battery supply. Pete
sah.'ll wanns over DX efforts. however . . .
OA41GY has a Viking-500 and similar radiators. Tracking
hooming signais of OA4s AGI and IGY. OA4AGI uses
inception, Septemher 1957, Possibilities iuclude P'STs EW
KWM-1 and associated apparatus. Limited to about rive
notes from the fur south, VP8CD prefers 15 phone with Iris
4-40nAs and a 3- or 5-cIetnent beam, whilo sister station
WfKG found HC4IAI (WGGTO) chatting about his duties
islands to Gsit and a considérable axnount of movie and still
s.s.b., a.ru. and c.w. VWAGO warns. "If DX hoggery gets
P8CE could stand some spare reading material
were^mostiy Fs and Ils —called my head ûff for some of
reports G4zu to WIWPO. " Best DX included VKs 3AHO
whio and ZL2BK on 21-Me. phone. The rest of the contacts
were mostly Fs and Ils — called my head ûff for some of
my G-hant pals but no joy. That mountain at the back
surely is a radio. No W/K QSOs either, unfortunately."
... W3DKT points out that YW5D and YI are DXing
brothers at the same QTH . . . WHAN declares, "Had a
small time visiting the homes of Norway in July, Holland
next..." W5MCN has YL8G returning to G6WA
LEW soon . . . . LAGCF tells WGDXG members that next
summer is the easiest possible time for the next Jan
Mayer activation.
South America — Operation Turtle 1958, the Galapagos
project of W6E (HCO8) ACO LUX and W9G, enjoys
close liaison with Ecuador's Quito Radio Club. Equipment
includes an HT-32, SX-101, KWM-1, Telex tribuador,
II-Gain transistor, HCPF3's 2.5-kw. power plant plus an
Omn 500-watt, and abundant photographic and recording
rear. HC1LE and other JIC brethren are slated to accompany
Ron, Paul and Victor to ensure round-the-clock operation
on 10, 15, 20 and 40 meters for several weeks using
s.a.b., a.m. and c.w. W6AGO warns, "If DX hoggery gets
too rough we will simply shut down, for we have sixty
islands to visit and a considerable amount of movie and still
film to shoot. Please assist by not QRMing our skeds with
your notes after 20, 15 and 10 phone, and we may keep
in touch with our families. Operators will be on hand to man our home stations." Turtle
terminal early this month. Check on W6E's schedule for
arrival.
JÂit builders will be interested in an operating
table now available from Electro-Voice, Buchanan, Mich. Designated the KDB, this kit is
made of tongue-and-grooved gumwood with a
masonite top. It has a sloping portion along the
rear edge, to permit easier reading of receiver and
transmitter dials. Stowage is provided for log and
log sheets, and there is a pull-out shelf for addi-
tional writing space.
WE6KVT adds that W6FA and YS85 are due to
reverse. With reference to the transistor power supply
and modulator in September QST (p. 19) the polarity of the 5 µF electrolytic across R1 should be
reversed.
No power there is many an amateur who has found himself in my position. If we, the XYL and I, could have found four rooms, one room could have been used as a spare room and I might have found myself operating from room number four. The best we could do was a three-room apartment, and decisions had to be made as to just how I could operate — with the least inconvenience to all.

The XYL's desire to have the TV set in the bedroom gave me only one choice, the living room, and it was a very desirable one for me for several reasons.

I could operate early in the morning without disturbing the XYL's sleep, and late in the evening and into the morning I could operate while the little lady watched her late, late, late, late movies etc.

The next step was to make the operating position as neat as possible. I got myself an unpainted six-drawer desk, keeping in mind all the things I could put out of sight in these drawers, that usually find their way in a big heap in the shack.

Next, I made up from plywood a platform which would give me some writing space, also a place to set in my Match Box, speaker, s.w.r. monitor, key, etc. This kept these items from being piled sky-high on top of the rig or receiver. At the very top of this special platform (or shelf, if you like) went the receiver and transmitter. To balance the tops of the rig and receiver I had to use some method for raising the receiver. This was done with two strips of wood, which allowed me to take advantage of space below the receiver for my conelrad system which uses two pilot lights in series with the secondary of the output transformer of a radio set that is out of sight behind the desk. A toggle switch throws out the lights and then the speaker takes over if the audio from the radio is desired. This system was written up in QST.

The platform is screwed to the desk top and in the event that a new QTH is obtained the equipment can be dismantled, the platform removed, and the desk separated for easy moving.

* 57 Bracewood Lane, Stamford, Conn.

**Strays**

Anyone who has children in the family will appreciate W6JAT's definition of a decibel: One decibel equals the amount a youngster turns down the TV set after being told it is too loud!

If you'd like a frequency list of all the North American a.m., f.m. and TV stations, try the 50¢ booklet published by Vane A. Jones Co., 3749 N. Keystone Ave., Indianapolis 18, Ind.
Increasing international tension during the week preceding May 6, 1958, created a serious situation, and on that date a sudden, surprise attack was launched on all major U. S. cities and target areas. If you were busy working DX or chewing the rag, you probably didn't even know it, but quite a number of amateurs were very much aware of what was going on and were in the thick of it. In fact, 42 reports were received from amateurs, most of them AREC or RACES leaders, in 26 states telling us what they did during OPAL 1958. Only those with a RACES status were requested to take part in the exercise this year, which somewhat limited amateur participation.

The enemy was kind enough to let us know the day on which he would attack, but other details were withheld in sealed envelopes which were not placed in the hands of state and local civil defense directors until the day of the attack. The envelope contained the exact time of the attack, location of ground zero, type of burst, size and yield, and other information. Some of the attacks included chemical, biological and sabotage aspects. During the first day, communications were supposed to be available as if there were no interruptions or damage. On the second day, communications were to go to (simulated) pot and emergency facilities be invoked. This, of course, is where RACES came in.

We are sure that many amateur groups other than those reported took part in the exercise. This is really only a sampling. But these are the ones who told us about it, so here's what they did:

Alabama

The Jefferson County RACES group set up at City Hall.

California

In San Francisco, Operation Alert was a huge success. Communications with all wardens was 100%; and all messages were delivered prior to 2300. The control station was manned by K6ANP on 20,450 kc. while the mayor, police chief and fire chief looked on. Thirteen other amateur took part from home and field stations, plus members and member stations of the Mission Trail Net, American Legion Net and Northern California Net. Coverage also extended to Marin, Sonoma, Mendocino, Alameda, San Mateo, Santa Cruz, Santa Clara and San Benito countries.

Colorado

The Montrose Daily Press reports a 'dastardly vicious hydrogen bomb attack on Grand Junction' which spread death over the western slope area. They had a simulated disaster almost more real than the real thing, in which the RACES station was the only link between Grand Junction and Montrose for three days. K6ICC did the communicating from Montrose.

Connecticut

The Newington RACES, under W1 WDXT, participated in the Connecticut Area 3 OPAL Drill, six amateurs taking part. Other towns in Area 3 likewise were in the area net, conducted under the supervision of W1WYM, area radio officer.

Florida

A 2-KT bomb fell on central Florida, wiping out Orlando, rocking Tampa and causing some fallout over St. Petersburg. In the latter city, a school evacuation was held in which eleven amateurs participated. Everyone was well pleased with the smoothness of the operation.

State Communications Officer W4UHY reports (in Florida Skip) that this year's OPAL placed great importance on communications, especially on RACES. A new half-kw. rig at state headquarters gave a good account of itself, operating strictly on c.w. in contact with stations in Jacksonville, Miami, Orlando, Tampa, Tallahassee and Pensacola. County RACES organizations also were active from Dade, Orange, Pinellas and Manatee Counties. Others may have been active but are unreported.

Illinois

The Bond County RACES organization operated both days of the alert. Radiological data were relayed from the...
Traffic from E. St. Louis and Belleville. Notices and re¬
cess in getting all traffic through promptly" and the lo¬
cal defense in procur¬
ing equipment for its RACES op¬
eration.

Fortunate to have the financial coop¬
eration of the city civil

Twenty-one amateurs were on hand.

Strictly phone operators also helped considerably.

In the Woodsfock, Illinois, Operation Alert, K9HKJ checks out

Radio Officer W1WNP. On May 3, contact was made with

In Atchison, six operators worked for 16 hours during the

Amateurs in St. Mary’s County, operating under their

Maryland

Amateurs in St. Mary’s County, operating under their

Missouri

One only Missouri report comes from an almost unreadable

In the Woodstock, Ill., Operation Alert, K9HKJ checks out

October 1958
New Jersey

The Monmouth County RACES Control Center was operated for a 12-hour period each day, using emergency power. A total of 2880 word groups were handled, much of it by radio-teleprinter. Circuits on 2 and 80 meters were maintained to state control in Trenton. Within the county, operation was on 10, 6 and 2 meters. The county now has 121 amateur stations, 74 municipally-owned stations and 239 RACES amateurs in its lineup.

New Mexico

Bernalillo County RACES was right in there with its amateurs in Operation Alert. The group, under RO W7UGQ, maintained communication between the various evacuation areas, established the feasibility of a 2-meter net for communication with Santa Fe and San Ysidro, and successfully operated a c.w. net with Santa Fe. The alert began on 0819Z on May 6, and within a half hour all units were on their way to their assignments throughout the area. This included five evacuation areas, an 80-meter link to state headquarters, activation of the 10-meter station at c.d. headquarters, a couple of 2-meter portables and two ten-meter mobiles at San Ysidro. The following day, the entire c.d. headquarters was evacuated from Albuquerque, and 15 minutes after arrival at the new location the headquarters stations were back on the air, communication being maintained meanwhile from mobile units. All in all, it was a great demonstration of RACES versatility, with mobiles traveling an average of 300 miles and all operators putting in two days of hard work which included camping out overnight. Twenty-five amateurs participated in all.

New York

The c.d. authorities of Erie County evacuated a token convoy of six cars containing 25 people from Buffalo into Allegany County. The Allegheny County RACES was to pick up the convoy and follow them through the various stages of their medical check and welfare care. County Radio Officer W2SRB alerted the local county RACES net on 160 meters, while the convoy operated on 10 meters, liaison between the two nets being conducted by K2GQU. As soon as the convoy entered the county it was joined by a 160-meter mobile unit, which thereafter maintained contact with the county net. The control center in Wellsville was kept informed of the exact whereabouts of the convoy, and Area X control in Lancaster was kept posted on the 10-meter frequency. The convoy entered the county at 1250 and left at 1445. This was the first time that a joint exercise was conducted with personnel of Erie and Allegany County working together, and the Allegany County c.d. director pronounced it "another job well done by the RACES net."

OPAL 1938 started in Erie County at 0330 on May 6 with the activation of all RACES nets in the area. Two-meter contact was established with Lockport, Springville, Jamestown and Mayville. Communication with all points was excellent and the exercises continued until 2300. The following day (May 7) four evacuation convoys were sent out to points in surrounding counties, each equipped with 2 and 10 meter mobile equipment. Constant communication was maintained with all convoys during the entire period they were en route to their destinations. During the two-day period a total of 195 messages were handled by the control center, approximately 175 amateurs taking part.

North Carolina

Two statewide nets were established, one on 3097 and one on 3099.5 kc. All 42 of the state's counties covered by RACES reported to the Command nets during the exercise, which was conducted by State Radio Officer W4IUW and his assistant, W4LOV. Nearly every county of QRP was experienced and worked through successfully. Some counties held drills on 2 meters, but with considerable difficulty because of the mountainous terrain, and this band was nearly useless at area or state level. Thanks to W4RHI for this information, our only report from N. C.

Oregon

The Coos County Radio Club provided the operators for the county RACES net on 3017 kc., in which 19 stations participated on May 6 and 17 on May 7, about twelve hours each day. Five mobiles and a total of 29 stations were active all told. Traffic was handled between county control and county stations, and between county control and state control in Salem. Some 50 messages were handled. The mobiles had a special job in connection with assistance in routing traffic during the dynamiting of an oil-shackled. About 30 amateurs took part under the direction of W7BLN, EC and RO for Coos County.

Pennsylvania

The AREC of Philadelphia participated in OPAL on May 6, in cooperation with the Philadelphia Council of Civil Defense. RACES nets were activated on 75, 10 and 2 meters. SEC W3DYB operated from the City Communications Van, which moved out of the city at the yellow warning. Three other amateurs participated, including W3PST, Phila. RACES radio officer. Montgomery County AREC/RACES was also active on 10, 6 and 2 meters during the alert. The operation was divided into two phases on May 6. The first phase, from 1100 to 1300, saw four stations in the ten meter net and four in the two meter net, with two operators at the control center. Some traffic was handled intercounty and with the state control. In Phase II, the county c.d. headquarters station was activated on 10, 6 and 2 meters with five operators. Attendance was much better, with 32 stations in the 10 meter net and 14 in the two meter net. Approximately 30 messages were handled during this period, mainly from local directors to county c.d. headquarters. All areas of the county were well represented and all presently-installed control centers were in operation, although 90% of the operation was on 10 meters. W3ZBV and W3FSZ conducted the operation during the absence of RO W3CNO.

W3CNO reports that 18 amateurs are on hand for the Lackawanna County OPAL with good coverage of the county, competing favorably with the telephone company for speed in message relay. Since the major activity was to the south of them, the traffic was not heavy.

South Carolina

Last minute RACES authorizations made it possible for the Charleston Amateur Radio Club to assist in Operation Alert. Stations on 75 and 2 meters were set up at County Hall and contact made with state headquarters in Columbia and U. S. Army Engineers in Charleston. The two-meter link worked fine, but conditions were impossible on 75.

South Dakota

W7ZLB headed up operation from Aberdeen, emergency capital and c.d. headquarters, using three other operators in one ten-hour and one 7½-hour session on May 6 and May 7 respectively. During the first session, 113 incoming messages were received, and 44 similar messages were handled during the second session; total time, 17½ hours, traffic 197. A very creditable performance, despite difficulties which
forced a move from c.d. headquarters to amateurs' homes. Contact was made with FCCA regional headquarters in Denver by W8ELV, but conditions made the passing of traffic impossible.

Tennessee

A fine report from Oak Ridge RO W4CXY tells of an initial alert at 1002 which set off a prearranged plan involving immediate activation of control centers at Rockwood and Oak Ridge to make contact with each other and with Knoxville c.d. headquarters, all on six meters. This contact was maintained solid throughout the drill. Additionally, contact was made with Nashville on 75 phone and 80 c.w., the mode used depending on which was getting through best. The Oak Ridge control station was closed at 2130. Opening at 0830 May 7, the same channels were again set up, but this time contact was made with Nashville on 6 meters instead of 80 c.w., enabling both Oak Ridge and Knoxville to route their Nashville traffic on that band. The operation was concluded at 2025. Seventeen amateurs took part, four additional reported but were not used, and seven others stood by to help if necessary.

In Memphis, the club station W4EM was set up at the c.d. control center on 2, 10 and 75 meters, and K4SHJ was set up on 6 meters to handle traffic with the U. S. Public Service Hospital. Out-of-town traffic was handled on 75/80 meters with Nashville and other outlying cities. Operation continued on May 7, but considerable difficulty was experienced on 75 meters because of conditions. About 20 amateurs were active.

Virginia

The Tri-County RACES Organization covering the counties of Mathews, Gloucester and Middlesex participated only from its control station, K4AET, which was very useful in relaying traffic from many of the area stations which could not be copied at state control. Three control stations were ready to operate but were not called on, as were three additional supporting stations.

In Falls Church, the sealed envelope with instructions was not opened until 0100 May 6. Three members of the RACES organization were available. Contacts were made with Fairfax County RACES headquarters and with regional headquarters. Telephone service was not available.

In the Fredericksburg area the alert began at 1006, May 6. The RACES part of the operation was conducted by three amateurs, who maintained a 13-hour radio watch.

West Virginia

State Radio Officer W8HIYA gives us a concise report of operation of the state group on 3800 kc. Two target cities, Wheeling-Moundsville and Charleston, showed good amateur participation. Elsewhere in the state, a great increase in participation was shown, 52 amateurs in all. Kanawha County operated a six-meter net, with W8CLX as control, a "first" for this county. AREC in the state supported the operation wholeheartedly. Message traffic totalled 55, with 20 West Virginia municipalities represented.

Wisconsin

We know that Milwaukee amateurs were in the c.d. alert because K8CDEC reported operating for six hours. Other than that, we have no information.

SCM W9KQB reports information received from two main CD control stations, one in Watertown under RO W8NRP and another at Stevens Point. At the Southeast Reception Area at Watertown, 80 messages were handled by nine amateurs, while at the Central Reception Area at Stevens Point RACES handled about 100 messages with nine amateurs on duty. The tests were considered successful.

Comments

Alabama RO W4GELT says that traffic handling on 3865 kc was practically impossible and recommends that RACES be given additional frequencies in the 7.2-7.3 Mc. band segment. He also recommends the establishment of a RTTY frequency in the 7.0-7.2 Mc. segment. W4BAZ feels that c.d. exercises of this type should be held at least quarterly to eliminate some of the "how-lows" which always crop up in the annual tests. W4HOJ, also from Kentucky, lists some of the common mistakes made which could be corrected by more practice: long and poorly-worded messages; poor penmanship; unwieldy message forms; lack of c.w. facilities. Samen W8XPP, Chief of the RACES Branch, Minnesota c.d., "We need more practice and training in drills to keep interest in the RACES program." W4CXY, Oak Ridge, Tenn., RO comments favorable on the whole operation, but observes a few shortcomings: RACES frequencies for statewide operation are not at all satisfactory; frequencies in the 40 meter band are needed, as well as additional space on 80. More information and drill on the c.d. message form are needed, since it differs from the standard form used by amateurs. Conflict in the information passed out to RACES from higher levels should be coordinated. A meeting of ROs throughout the state to resolve these difficulties should be called after each alert.

K4AET, RO for the Tri-County c.d. in Virginia, points to lack of personnel to keep stations operative (not prevalent in his own area, but obvious elsewhere), and thinks that more amateurs should be trained for phone traffic work. Also, misuse of the 3997 kc. frequency makes its intended use (as interstate) largely impractical. He recommends a stricter set of rules and more control from the top.

Strays

Interest in two-way sideband DXCC is running high, and there are a number of fellows who now have confirmed two-way sideband QSOs with more than 100 countries. One of the leaders (possibly he has the top score) is W4IYC, in Richmond, Va., who has 143 worked and 130 confirmed on two-way s.s.b. W4IYC has been active since 1923 in many phases of ham radio and has held a number of ARRL appointments. He has been an enthusiastic sidebander since 1923. His present rig consists of an Eldico 100F driving a Johnson Kilowatt, while the beam is a W3DZD three-bandener and the receiver a 75A-4.
NOTES ON THE GONSET COMMUNICATOR III

One possible characteristic of the Gonset Communicator III is hum modulation of the transmitted signal. This occurs only during push-to-talk operation when microphones similar to the surplus T-17 are in use. Under these conditions, modulation by a.c. hum or vibrator whine can be quite severe. A glance at the microphone circuit will show that the relay circuit and microphone “talking” circuit have a common return wire in the microphone cable. Therefore, these circuits are coupled across the resistance of a common wire, namely the resistance of a five- or six-foot length of wire. This condition can be alleviated if a four-wire microphone cable is substituted for the original three-wire cable. This eliminates the common return lead and reduces hum modulation to negligible proportions. Self-coupling four-wire cords which are ideal for this purpose are sold as replacement cords for some types of dynamic microphones. One possible trouble which will remain after this modification is the contact resistance between the sleeve of the PL-68 and the jack. Be sure that the PL-68 is clean and bright, and that it is not worn to a sloppy fit.

—R. A. Johnson, K2E0C

Some owners of the popular Gonset Communicator III have run into difficulty with the push-to-talk arrangement. Carbon mikes which do not have a conventional push-to-talk circuit, or do not open the mike circuit when the button is released, have been found to cause feedback. In addition, when a conventional push-to-talk mike is used, hum is often evident. This hum disappears when the front-panel “transmit-receive” switch is used instead of the push-to-talk button. The hum is caused by the a.c. component of the voltage drop in the mike control wire appearing on the grid of the speech amplifier. Both of the above difficulties may be remedied by making the following modifications.

First, locate the 1.5-megohm resistor connected at pin 2 of the 12AX7. This is R31 in the 6-meter or R32 in the 2-meter model. Lift the other end of this resistor from ground. At this end, connect a 0.1-μf., 200-volt capacitor and a 470,000-ohm resistor. The free end of the capacitor is then grounded to a convenient spot, such as pin A of the heater terminal strip. The hum is caused by the a.c. component of the voltage drop in the mike control wire appearing on the grid of the speech amplifier. Both of the above difficulties may be remedied by making the following modifications.

Late productions of all models of the Gonset Communicator III incorporate the following circuit modification. The purpose of this change is to copy c.w. with a Communicator III simply plug in a crystal having a frequency at the i.f. of the Communicator. The function switch is thrown to “spot” for weak signals. For stronger signals requiring greater injection, the switch is thrown to “exciter.” In this way, a crystal controlled b.f.o. is furnished. A 2.3-Mc. crystal is used for the 6-meter Communicator and a 6-Mc. crystal for the 2-meter model.

—Samuel M. Bases, K2UV

—Rudolph Schwerdt, Jr., K3QVU

—W. H. Schroeder, W9VCL

While trying out a factory-fresh Gonset Communicator III, I was intrigued by how I could arrange my surplus 243 crystals in the six position socket. The spacing is too close to accommodate more than three crystal holders. Two adjacent crystal positions will accept FT 243 crystal holders back to back.

Examining my 243 crystals I found that they all have about the same outside dimensions, but that some cases are shallow with thick plastic covers and some are deep with thin metal covers. Using parts from a handful of junk crystals, I assembled my crystals in “thin” FT 243 holders made up of a shallow case with a thin cover. The modified cases measured about 3/4-inch thick and racked up neatly in the crystal sockets.

Before starting this project, be sure to clean your working space since crystals may look just alike when out of their holders. Clean the rubber gasket off the metal cover, then insulate the center, at the point of spring bearing, with a bit of plastic electrician’s tape. Use the YL’s tweezers to handle the crystals and pressure plates. The three screws will be too long, so cut them down with a file using a nut as a thread guard. Seal the modified crystal cases with a plastic spray after assembling and checking. Be sure to mark the cases with the correct crystal frequency if the covers have been changed.

—Phares W. Callihan, W4ZIO

—Woodrow Smith, W6BCX

The accessory v.f.o. for the Communicator III can be employed as a b.f.o. for both the 6- and 2-meter Communicators by throwing the v.f.o. switch to “spot” and beating the c.w. signal with the v.f.o.

—Irvin L. Schroeder, W9VCL

—Samuel M. Bases, K2UV

—Rudolph Schwerdt, Jr., K3QVU

—W. H. Schroeder, W9VCL
is to delay the application of a.v.c. voltage to the cascade r.f. amplifier, thereby improving signal to noise ratio on medium strength signals. (Receivers having a.v.c. stamped on the rear apron of the receiver chassis have been wired with this change at the factory).

Fig. 1—Diagram showing modification to Communicator III a.v.c. circuit.

First remove the jumper connected between pins 2 and 5 of the 6AV6 socket (X in Fig. 1). Also remove the lead between pin 5 and the ground lug. Disconnect the .01-µf. capacitor lead from pin 5 and connect to the ground lug. This frees all connections from pin 5. Next, locate the three lug terminal strip mounted between the v.h.f. oscillator coil and i.f. transformer no 5, see Fig. 2. Connect a 3-inch length of No. 20 solid insulated wire between pin 5 of the 6AV6 socket and the forward lug of the terminal strip. Then connect a 91-megohm, ½-watt resistor between the forward and aft lugs of the terminal strip. Now replace the 3rd i.f. amplifier tube (V5) with a 6BJ6 tube.

Fig. 2—Sketch showing placement of the 91-megohm resistor and the new lead to the 6AV6.

The above modification is very desirable, but obtaining a 91-megohm resistor may be a problem. However, it is a standard Motorola replacement part on certain late model Motorola auto radios and probably can be found in service shops which specialize in repair of Motorola sets.

WOODROW SMITH, W0BCX

MODIFICATIONS TO THE ELMAC AF67

From time to time minor changes are made at the factory in the circuitry of the Elmac AF67 to improve the performance of the transmitter. Here are some of these modifications that are simple to install and use a minimum of parts.

Fig. 3 shows a jumper wire (heavy black lead) mounted between two sections of the final coil band change switch SW516 and SW518. The addition of this wire will reduce TVI and will effectively short out L54 (the 80-meter coil) when the rig is in operation on 10 meters.

Because of the extensive shielding in present-day receivers, especially the Elmac PMR-7, it is somewhat difficult to hear the v.f.o. spotting signal. Fig. 4 shows how to cut one wire (at X) and add another (heavy black lead) to put the 6AQ5 in the spotting circuit. The spotting signal will now be much stronger.

Fig. 4—Modification to improve signal spotting with the v.f.o.

Transmitters manufactured several years ago did not incorporate the 6146 filament by-pass capacitors. The addition of a .01-µf. 1500-volt disk capacitor very close to pins 2 and 7 of the 6146 will suppress audio oscillations.

Another possible modification in the speech section is the addition of a 250-µf. capacitor from each grid (pin 5) of the 5881 modulator tubes to ground. A 250-µf. capacitor is also connected from the grid (pins 2 & 7) of the 12AU7 to ground.

It has also been noted that some transmitters
have a high modulation resting current. This high static current of 60 ma. or more is usually caused by one of two things. A defective bias battery may be at fault, but the most likely reason is excessive voltage on the screens of the 5881 modulator tubes. This “low level voltage” is the same voltage that operates the v.f.o., buffer, driver, and speech tubes. It is recommended that this low voltage be about 225 volts. If you are using a M-1050 or M-1470 power supply and it provides 300 volts (which is much too high) for the “low level voltage,” it is suggested that terminal K be switched from I to J in the low voltage section in the M-1050 or M-1470 power supply. This change will lower the receiver voltage, the low level voltages, and the total B plus when the supply is used on the transmitter. The modulator static current should now be about 30 ma.

— Harry Stewart, WSPSV

BOOK HOLDER-OPENER

Having trouble keeping QST or the Handbook open to the right page while at the work bench? An old coat hanger is the simplest answer.

No bending is necessary. Just slip it over the favorite article as shown in the sketch.

— Bob Ellis, W5YVQ

MOUNTING QSL CARDS

Mounting QSLs on walls without marring wall paper, paint, or damaging the QSLs is always a problem. One solution is to mount the QSLs with folded stamp hinges, the type used by stamp collectors for mounting stamps. Put a hinge on the back of the corner of each QSL, wet the other half of the hinge and hold in place for a few seconds. After the hinges are dry they will hold the QSL in place indefinitely, and they may be removed when dry without the slightest danger to walls or cards.

— Mike Kaufman, K6VCI

CHEAP AND EASY SHIELDING OF POWER CABLES

Plate, filament, power mains and relay control leads are expensive and difficult to shield by conventional methods. However, such shielding can often result in a substantial reduction of TVI. The idea is to slice an 18-inch roll of heavy duty aluminum foil into 2-inch-wide rolls with a single-edge razor blade. Then spiral wrap the power cables with a 1-inch overlap to provide good contact. The ends can be fastened tightly with metal cable clamps to which the grounding system is connected. This method easily accommodates wires fanned out of the cable. Lacing or spot tying of the cable before shielding helps to make it a neat job.

It should be noted that it is essential to use heavy duty aluminum wrap since the lighter foil tears easily.

— Jack Blindbury, W6VJO

MAKING SLUG-TUNED COILS FROM COAX

Tunable coil forms for v.h.f. and u.h.f. converters or transmitters can be made from scrap pieces of coax cable, such as RG8/U or RG8/AU. The outside shield and inner conductor are removed and the end product is a polyethylene or teflon tube with an o.d. of 0.3 inches and an i.d. just large enough for a 6/32 tap. The plastic tube can be cut with a tube cutter or a small hack saw to any convenient length. The 6/32 thread is tapped clear through; this allows you to fasten one end to the chassis with a short screw and a star washer to prevent turning. The brass screw changes the inductance enough to shift the frequency a few megacycles. The wall thickness is about 0.1 inches which allows a small hole to be drilled between the outside wall and the center. Choose a drill to obtain a snug fit for the wire being used.

— James Theodore, W7LJA

NOTES ON THE GONSET V.H.F. V.F.O.

In order to minimize spurious emissions, the Gonset V.F.O. for 6 and 2 meters has an output of 24 to 27 Mc. In spite of the fact that this is mentioned in the instruction manual, some hams seem to think that the v.f.o. is operating in the 8-Mc. range. This is not the case. When the v.f.o. is used with equipment other than the Communicator, it may be necessary to modify the crystal oscillator circuitry if the oscillator was designed for 8-Mc. crystals. The Communicator III crystal oscillator is designed to work either with an 8-Mc. crystal or from the 24-27 Mc. output of the v.f.o.

— Woodrow Smith, W6BCX
A BALANCED MODULATOR FOR THE W1JEO EXCITER

For the last five years I've been using a W1JEO exciter (QST, November 1950) with very good results. Reports were always excellent but I sometimes received comments on a trace of carrier. After being reminded many times about the carrier, I decided to install a balanced modulator. I was interested in something simple that could be installed without too much difficulty.

I went back to a technical topic by Byron Goodman, W1DX, in QST, February 1957, in which the operation of the Crosby balanced modulator was explained. An article by Dan Hesley, W3HEC, in QST, December, 1957, was also consulted.

After studying the above material, I came up with the circuit shown in Fig. 7. A conventional amplifier (6B6) was added to the Crosby circuit to boost the output to a higher level. A 30,000 ohm resistor, R1, was used as a plate load for the mixer instead of an r.f. choke. C1 is a neutralizing capacitor that compensates for capacitive feedthrough between V1a and V2.

— James Zvolanek, W9WIO

CHANGING CRYSTAL FREQUENCIES

The usual procedure for changing crystal frequency involves grinding which is fine for making large changes or for certain low frequency crystals. However, for small changes ensuring stability of frequency when reached, and also for insuring that the activity of the crystal is not diminished by the change, etching is preferred.

Etching material used, ammonium biflouride, is not commonly found at the corner drugstore. Fortunately there is a ready source of this chemical in a preparation sold as an aluminum cooking utensil cleaner called "Aluminum Brite." Since it attacks glass or ceramics, it comes in a plastic bottle.

When etching crystals, put about an ounce in a plastic dish (or you can use copper or stainless steel) at room temperature. The action is greatly accelerated by heat but by the same token becomes harder to control. Bend a copper wire hanger to hold the crystal blank in the etching solution. As an indication of the speed of etch, it takes about eighteen minutes to move a 7-Mc, crystal 8 kc.

Determine the frequency accurately before starting, and make a trial etch of five minutes. Wash and dry the crystal and contact electrodes and reassemble in the holder. Use the same holder for checking that will finally be used with the crystal so that capacity, pressure, etc., will not be changed. Cleaning is important for high frequency crystals for two reasons. First, the crystal will have difficulty oscillating if not clean; second, the solution apparently leaves an invisible deposit, which if not removed will load the crystal and give a lower than true frequency.

Since etching reaches all surfaces of the crystal there are no changes in the proportions. Hence the activity is unchanged for moderate frequency shifts. There is less danger of chipping or breakage since handling is at a minimum. Grind ing leaves a microscopically fine dust in the surface pores of the crystal which gradually comes off and causes an upward drift in frequency. Etching eliminates this problem.

— J. H. Klisson, W0AOI

REMOVING STATIC ELECTRICITY FROM PLASTIC METER COVERS

A static charge, as noted on plastic meter covers of various test instruments and meters, can in most cases be greatly reduced or eliminated by cleaning the plastic meter face with a liquid detergent. Use the detergent full strength, wipe it on and off the face of the meter with a clean soft cloth.

— Stuart Leland

MEDICAL TOOLS FOR THE WORKBENCH

The act of holding the wire leads of a diode or transistor in place to absorb heat while soldering, holding a soldering iron in the other hand, and then reaching for solder with the third hand is quite a problem!

One solution is to use any of the large assortment of surgical clamps known by a variety of names: hemostats, snaps, mosquito forceps, Kelly clamps. These instruments all have an automatic locking device yet have the same grasping action of pliers. They can be quite expensive if purchased new but probably can be obtained reasonably second hand or as discards from hospitals.

— Dr. Ernest S. Pentland, VE3DWP
27-MC. BAND DELETED

In time for only a brief announcement in September QST, in early August FCC made final its proposal of April, 1957, to withdraw the band 26,900-27,230 kc. from amateur use and assign it to the Citizens Radio Service. The Commission's order is some 30 pages in length, but we reproduce below only the text of that portion which deals with the strictly amateur aspects of the matter and outlines the reasons FCC took the action it did despite heavy amateur opposition as indicated in filed comments.

Reallocation of frequencies in the range 26.96-27.23 Mc.: The Notice of Proposed Rule Making in this proceeding recognized a need for additional spectrum space for personal use by any individual, especially those persons now holding authorizations for Class A stations in the Citizens Radio Service who will not be able to establish eligibility in any of the Industrial or Land Transportation Radio Services, as well as a substantial need for additional frequencies in the 28 Mc. range for use in the remote control of such objects or devices as model aircraft. Accordingly, it was proposed to reallocate frequencies in the band 26.96-27.23 Mc. from the Amateur Radio Service to the Citizens Radio Service for use by Class A stations for general purposes and, in addition, provide certain other frequencies to Class C stations exclusively for the purposes of remote control. The Commission stated that this reallocation appeared appropriate because the frequencies in this band are a part of a larger frequency band within which interference may normally be expected and must be accepted from industrial, scientific and medical (ISM) devices and because, as a result of the foregoing, only limited use of this band has been made by the amateurs. In addition, it was pointed out that amateurs, as individuals, would be able to obtain licenses in the Citizens Radio Service for either radio control or voice communication in this band.

In connection with this proposal, the Commission received a very large number of comments from both individual amateurs and modelers, as well as clubs and organizations representing persons active in each of these hobbies. In general, it may be said that all but a few comments from modelers enthusiastically supported the proposal and most of those from amateurs and modelers who supported the reallocation. Most of the comments from other amateurs were in complete opposition to any use by the Citizens Radio Service of frequencies in this band. However, a substantial number suggested that the band be shared by the Amateur and Citizens Radio Services. A few amateurs suggested that other amateur frequencies be substituted in lieu of those proposed, or concurred in the proposed reallocation.

Typical of the reasons set forth by the amateurs opposing deletion of the availability of frequencies in the 26.96-27.23 Mc. range to the Amateur Radio Service are:

(a) The adoption of the Commission's proposal would constitute a derogation of the Atlantic City Radio Regulations to which the United States is a signatory nation.
(b) This band is the only one in the lower frequency ranges open to the amateurs where the Commission permits certain types of emissions and operations, and accordingly where the amateurs may engage in experiments in familiar, continuous carrier, and duplex operations.
(c) The characteristics which make these frequencies particularly good for long-range and international communications will cause too much interference and "skip," and prevent the widespread use of this band for short-range communications and remote control.
(d) The recent non-use of this band by amateurs is due to eyecial "sun spots."
(e) Other amateur bands are overcrowded, the service is expanding at a rapid rate, and the 26.96-27.23 Mc. band is the only area left for expansion.
(f) The fact that an amateur might obtain a Citizens Radio Service authorization is not an adequate substitute because some amateurs could not meet the age requirements of that service, and in addition, amateurs would not be permitted to make their own adjustments to a citizens radio station.

On the other hand, the modelers point out their dire and immediate need for additional frequencies, stating that the situation has been aggravated by recent authorizations of high-powered stations in other radio services on the frequency 27.255 Mc. for such purposes as traffic controls and remote radio paging. They further state that the use of frequencies in the 26.96-27.23 Mc. band for control of models is feasible and is superior to allocation practices found practical by other governments.*

The Commission is well aware of the history of the Amateur Radio Service in the development of the radio art and in providing a springboard of interest for future engineers and scientists. However, it must also be remembered that the remote control of models fosters a similar interest in young people and is a hobby in which young people are able to participate. The Commission is aware of the Amateur's outstanding record of assistance in local and national disasters. The Commission also recognizes that the Amateur Radio Service is a rapidly expanding service, but then, so is the number of persons engaged in the remote control of models expanding at an ever-increasing rate.

While both amateurs and modelers suggest that spot frequencies located in different portions of the spectrum might be more desirable for remote control, such allocations are simply not possible at this time with the present scarcity of spectrum space.

In addition to filling the need for additional frequencies for remote control purposes, the proposed reallocation would also fill an urgent need for additional frequencies for voice communications by persons who will be unable to establish their eligibility in any of the Land Transportation or Industrial Radio Services. Although the Commission may have originally underestimated the use of the 26.96-27.23 Mc. band by amateurs, the use of that band is still considerably less than in other bands available to the amateurs, a fact which is admitted by many amateurs and established by monitoring observations of the Commission.

As to whether the proposed reallocation would be in derogation of the Atlantic City Radio Regulations, the Commission considers that no derogation is involved. The primary world-wide allocation of that frequency band is to the Fixed and Mobile Services and the footnote permitting its use by amateurs is merely permissive. Therefore, the reallocation ordered herein and in the companion proceeding in Docket No. 11959 from the Amateur Radio Service to the Citizens Radio Service is not in derogation of the Regulations.

As stated above, the 26.96-27.23 Mc. band is a part of a larger band in which interference may normally be expected from ISM devices. Most of the reasons presented in opposition to the proposed reallocation of that band to the Citizens Radio Service were based upon potential use of this band in the future by the Amateur Radio Service instead of actual need or existing use of the band. Monitoring records indicate that this band is not heavily used by the Amateur Radio Service, due obviously to the limitations usually presented by the operation of ISM devices on 27.12 Mc.

* For example: It is understood that in England six frequencies for the remote control of model aircraft and five frequencies for the remote control of model boats have been allocated within the band 26.96-27.23 Mc.
and also due to the proximity of the more desirable 10-meter exclusive amateur band. The Commission feels that substantially greater use can be made of this band by the Citizens Radio Service and that the loss to the Amateur Radio Service is negligible. While it is true that certain operations have been possible in this band which were not permitted on lower frequencies available to the Amateur Radio Service, such operations are still possible on frequencies above 51 Mc and frequencies in those ranges appear to be coming into even greater usage by the amateurs than the band here under consideration. Although the Commission realizes that, in many cases, an authorization in the Citizens Radio Service may not be an adequate substitute for the privileges lost in this band; nevertheless, the Commission finds that public interest, convenience and necessity requires the reallocation of the 26.96-27.23 Mc band to the Citizens Radio Service for the purposes proposed. The recommendation that this band be shared by the two services involved is not adopted, since that action would be inconsistent with the Commission's position in international affairs regarding the shared use of amateur bands.

STAFF NOTES

We regret to record the resignation from the Hq. staff of C. Vernon Chambers, W1JEQ. A long-time member (28 years) of the League's crew, Vern's handiwork is well known to the construction-minded readers of QST, especially in the mobile and general transmitting fields (the 813 rig in our January, 1954, issue was built by more amateurs than perhaps any other QST design in history). His first job at Hq., at the tender age of 15, was in the strictly non-ham category in the upper left-hand corner. But the bug bit, and he soon became W1IJEQ, whereupon his interest and developing ability made him a logical candidate for lab work. He shortly took over the Technical Information Service until War II interrupted with both Army and civilian service in the field of guided missiles. Postwar, Vern has been a heavy contributor to both QST and the Handbook — the latter's tube tables, practically a career in itself, being one of his recent responsibilities.

We are mighty sorry to lose him, but Vern found an opportunity in the field of real estate he felt he could not turn down. In wishing him all the best, we know we are joined by the many hundreds of QST readers whose amateur stations have included at one time or another an example of W1JEQ-designed gear.

FCC FORMS

The Amateur Service Group at FCC in Washington, struggling to keep up with the thousands of license applications received each month, still finds one of its biggest problems is due to carelessness on the part of hams in filling out forms. Many licenses are being needlessly delayed, and the staff caused extra work, by minor slips on the part of the applicant — he forgets to sign the paper; or he signs it but doesn't have it notarized; or he fails to answer one of the questions; or he shows the correct month and day of his birth but then adds "1958" for the year. All these and other incomplete papers have to go back to the applicant, a procedure consuming time which the staff would much rather spend on issuing new tickets. So, please — help FCC to help you, and double-check every space on your Form 610 or 405-A to make sure it is complete and accurate before dropping it in the mail.

A.R.R.L. QSL BUREAU

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

W1, K1 — G. L. DeGrenier, W1GKK, 100 Gallup St., North Adams, Mass.,
W2, K2 — North Jersey DX Association, Box 55, Arlington, New Jersey.
W3, K3 — Jesse Biehorman, W3KCM, 36 Sylvia Crescent, Cynwyd, Pa.
W4, K4 — Thomas M. Moser, W4IVY, Box 464, Municipal Airport Branch, Atlanta, Ga.
W5, K5 — Robert Stark, W5OIG, P.O. Box 261, Grapevine, Texas.
W6, K6 — Hance M. Greer, W6TT, 414 Fairmont Avenue, Oakland, Calif.
W7, K7 — Salem Amateur Radio Club, P.O. Box 61, Salem, Oregon.
W8, K8 — W. D. Walther, W8XGR, 1215 E. 187th St., Cleveland 10, Ohio.
W9, K9 — J. F. Obory, W9DSD, 3001 Gordon Drive, Florence, Ill.
W4, K4 — Alva A. Smith, W4DMA, 238 East Main St., Afton, Minnesota.
VE1, K1FQ — L. F. Fader, VE1FQ, 125 Henry St., Halifax, N. S.
VE2 — George C. Goode, VE2YA, 392 Lakeview Ave., Pointe Claire, Montreal 33, Que.
VE3 — Leslie A. Whetlum, VE3Q6, 32 Sylvia Crescent, Hamilton, Ont.
VE4 — Len Cuff, VE4LC, 286 Rutland St., St. James, Man.
VE5 — Fred Ward VE5QP, 899 Connawatha Ave., Moose Jaw, Sask.
VE6 — W. R. Savage, VE6EO, 422 10th St., North Lethbridge, Alta.
VE7 — H. R. Hough, VE7LH, 1081 Freeman Rd., Victoria, B. C.
VE8 — W. L. Geyer, VE8AW, Box 534, Whitehorse, Y. T.
VE9 — Ernest Aah, VO1AA, P.O. Box 8, St. John's, Newf.
VE2 — Douglas B. Ricey, Dept. of Transport, Goose Bay Labrador.
K1P — E. W. Mayer, K1P4KD, Box 1061, San Juan, P. R.
K1H — Andrew H. Fleet, K1DBA, 1013 Namaqua Dr., Honolulu, T. H.
KL7 — KL7CP, 310-10th Ave., Anchorage, Alaska.
K2S — Catherine Howe, KZ5KA, Box 407, Balboa, C. Z.

October 1958
Whatever else can be said of the 1958 Perseids, it is reasonably sure that this was the most exploited meteor shower in history. From Aug. 9 on, schedules were being kept in all sections of the country, and there were at least two well-organized expeditions to rare states. Results thus far reported range all the way from "very poor" to "excellent." We've not yet heard from all the major participants, but here are the reports we have on hand at press time.

W7GC, Denver, Colo. — W8PT, Benton Harbor, Mich.: pings and short bursts 8/9 and 10; calls exchanged 8/11. QSO 8/12, 0140-0149 MST. W5CAK, Akron, Ohio: pings 8/9; all 8/10 and 11. QSO (best DX, 1240 miles) 8/12, more pings 8/10, QSO 8/11. W9TDR, Harrington, N.J.: pings 8/9; more pings 8/10, QSO 8/11, 0516-0530 MST. W5RCL, Marias, Miss.: many pings and short bursts 8/9 and 10; QSO on 30-second burst at 0553 MST. W5RCT had best DX, signal 900 miles. W5RCW, Palos Verdes Estates, Calif.: calls heard 8/9, 10, and 11. QSO on extended sked of 12/8, 0608, still going when QSO concluded. W6WQ, Pasco, Wash., Calif.: near misses 8/9, 10, 11, 12, 13, 14. W7FGG, Tucson, Ariz.: W5DFU, Tulsa, Okla.; similar to W7FGG. W6AJF, W20RI, WOGAB, W0SMJ, W9KLR, and W6NLZ. Though pings were heard on skeds with W5LPG, W2CXL, W6AJF is a pair of 4X250B.S at 1 kw., feeding a 32-element Yagi array. Good bursts were heard on the other 7 and 144 Me., is too much of a task for two operators.

Don comments that he and W6NGN found that keeping skeds over a continuous period of 10 to 12 hours, working both 7 and 144 Me., is too much of a task for two operators. Adequate provision should be made for sleep and operator relief, where the expedition is to continue for several days at a stretch, particularly when a long trip to the working site is involved. Don and Ed wish to thank the people at Rock Springs, especially K7DLP and K7KLO, for their hospitality and help.

W2CXY, Chatham, N.J. — W5AJG worked after nearly 5 years of trying. QSO resumed when, after hearing nothing on direct path, W2CXY swept 45 degrees either side with his 52-element 4-Yagi array. Good bursts were heard on the south side of the path, and were found to peak 30 degrees down line. After working W2CXY, H. Samuel, W8IAT, Pawnee City, Neb., and W6EMS, Omaha, W8IOT, Lincoln, Neb., was heard. Both W6EMS and W8IAT were in the 100-watt power range. Signals from the west peaked on the direct path or slightly south of it.

The QSO with W5AJG was the best DX reported for the 1958 Perseids, 1350 miles. W2CXY's skeds at greater distances with W7FRG, W6LIT/7, W0IE, W5WU, W7FGG and W7YMP produced absolutely nothing. Good liaison was maintained with these stations on 7 Mc. Addition of Nebraska and Kansas gives W2CXY a 37-state total, and every state inside the 1400-mile range. His nearest unworked state is now Colorado, the eastern boundary of which is about 1450 miles distant. This dismal pros-...
The southern end of the 225-mile 1296-Mc. record reported in September QST. Russ Robertson, W6DJQ/6, operating atop Mt. Pinos, is shown as he worked W6MRIU/6 on Mt. Hamilton. Equipment was crystal controlled, both transmitting and receiving, and operation was by cw only. The path is obstructed at three points.

Sweden and Norway have 6-meter activity; American 6-meter men don't have to be told that. They also have some 2-meter stations, more than 250 active in the two countries, mostly in Sweden. Denmark has about 70 stations, and there are a few on 420 Mc. Good-sized stacked-Yagi arrays are common. Western Germany has some 300 v.h.f. enthusiasts. Around 10 German stations work on 420, and there is a smattering of interest in still higher bands. Despite mountainous terrain (or perhaps because of it, in some instances) many German stations have worked all over Europe on 144 Mc. Their central location helps, too; a 300-mile radius from 1)J4WW takes in most of Europe. France has around 230 v.h.f. stations, with 30 or more working on 420 Mcs, largely during contest periods. (Is Europe, too?) Even tiny Luxembourg has a few 2-meter men, with LX181 most frequently heard. Swiss v.h.f. enthusiasts number about 50, several of whom combine mountain climbing with v.h.f. activity. HB1RO has operated (as HB1RO) from near the 13,000-foot peak of the Jungfrau. It is estimated that there are about 100 v.h.f. stations in Italy, and contact with them is made occasionally over the Alps. Czechoslovakia is a leader in v.h.f. interest, with several hundred operators active. These combine forces at club stations during European v.h.f. contests, providing formidable competition. There are perhaps 50 v.h.f. stations in Austria, 30 in Jugoslavia, 25 in Hungary, and over 50 in Poland.

Equipment is almost entirely crystal-controlled. Good-quality low-noise converters are used, and cw is employed perhaps more universally than in this country. Frequency usage is well organized; by voluntary arrangements in several countries stations are spread well through the band, which is only 2 megacycles wide. Though they were out of business longer due to World War II, European amateurs have made rapid strides in catching up with us. Lower power levels, largely because of government restrictions, keep them from exploiting scatter types of propagation very effectively, but considerable aurora work has been done recently. Meteor scatter on 144 Mc has been pioneered by 8A16FFT, who enjoys a 500-watt power limit. Europeans have one big jump on us: they can run up amazing totals of countries worked on 144 and even 320 Mc.
You don't have to run high power, or even put up a very large array, to do well on 144 Mc. Both factors help, but W8GTK, Rochester, Mich., has made out well without them. Stan runs 10 watts input, phone and c.w., and uses a 6-meter-6-array. With this he has worked 18 states in 7 call areas on 144 Mc. Just half this total was raised on c.w., and of two of the states were worked via aurora.

Operating hint for American 50-Mc. men from ZE2J, Hatfield, Southern Rhodesia: "You can't put out too much confidence about working DX stations on 144 Mc. because he has received less than 30 per cent QSLs. " Kot, W7HOL, Rochester, Mich., has made out well without any band, lacks confirmation from two of the 26 states on any band, and particularly oft' the frequency of DX stations!"

Another v.h.f. DX man interested in 144 Me. is LU9MA, Mexico. Eugénie thinks that there is a possibility of transcontinental scatter work on 144. He has seen Channel 4 from Venezuela regularly and Channel 5 from Mexico now and then, during TE conditions. He says that reception of Channel 7 from Trinidad has been reported in the U.S., QST for...

### 2-CHANNEL STANDARDS

| Figures are states, U. S. call area, and mileage to most distant station worked. |
|---------------------|---------------------|---------------------|
| WIREZ... | 29 | 3 | 1175 | 12 | 3 | 950 |
| W1AZK... | 27 | 2 | 1303 | 8 | 2 | 560 |
| W1CTQ... | 24 | 2 | 1253 | 7 | 2 | 560 |
| W1CEN... | 26 | 2 | 1308 | 8 | 2 | 560 |
| W1CGZ... | 26 | 2 | 1303 | 8 | 2 | 560 |
| W1JRG... | 23 | 2 | 1193 | 5 | 2 | 560 |
| W1HTE... | 26 | 2 | 1308 | 8 | 2 | 560 |
| W1HTR... | 27 | 2 | 1303 | 8 | 2 | 560 |
| W2AWA... | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2CPL... | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2FZ...  | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2KJI... | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2KJY... | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2KJZ... | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2LW...  | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2N...  | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2Q...  | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2R...  | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2W...  | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2X...  | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2Y...  | 26 | 2 | 1253 | 7 | 2 | 560 |
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Looking for better noise figure, plus lower cross modulation? W6NLZ recommends trying the 6E88, a premium dual triode designed for high-grade TV receivers. It is generally superior to other litters in frequency stability and in amplifiers, except that it has a transconductance of 12,500. The 6H9Q-K-77 series run from 6200 to 9500. Even if preceded by a high-Q tank circuit for rejection of spurious signals (an addition to the resonating circuit), the device's higher Qa, should make possible a better noise figure than is obtainable with other dual triodes, and with considerably better overload characteristics. Freedom from cross-modulation trouble is more marked when a grounded-grid amplifier circuit is employed, it appears, though the exact reason for this is obscure.

"I'm another sidebands on v.h.f. who is having trouble making contacts. Most of the boys just don't know what it is, and I get too many "very poor audio" reports. I hope that your comments in QST will help to wake up more of the gang to the value of sideband, and encourage them to try to use it in properly. If things don't improve soon, I'm going to give up!" — W7FQV

An outstanding event of the fall season for W1-2-3 v.h.f. enthusiasts is the V.I.F. Roundup, sponsored each year by the Syracuse V.H.F. Club, It's Oct. 11 this year. Here's a 144-Mc. s.s.b. hint from W4FJ, Richmond, Va. He would like to test skeds with high-powered c.w. stations, particularly in southern U. S. A., during the fall TE season.

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| W2N...  | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2Q...  | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2R...  | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2W...  | 26 | 2 | 1253 | 7 | 2 | 560 |
| W2X...  | 26 | 2 | 1253 | 7 | 2 | 560 |
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signal had fading characteristics associated with trans-equatorial scatter.

Being on the air in a hard-to-get state is not all gravy, says W7UEB, Casper, Wyoming. Bob complains that on the rare occasions when he hears double hop to the East Coast, and goes on the air to try for some of the rare states he still needs, he is immediately overwhelmed by calls from all the stations at single-hop distances who need Wyoming, and just happen to be on at the time. W7UEB will do the best he can to provide his rather rare state, and he will QSL, too; all he asks is a little consideration from the gang in the single-hop range when the band is open for the rare stuff. Look for Bob on back-swat during the fall season. He says that he uses c.w. a lot for calls, but that too many people don’t seem to have a b.f.o.!

ZS3G, Windhoek, Southwest Africa, picks us up on a statement made in June QST. We credited ZS6UK and HB9BNB with a “first” between their two countries. If you go by the ARRL Countries list, the statement still stands, but the first ZS-HB 50-Mc. QSO (if you state it in that way) was made by ZS3G and HB9BNB March 17. ZS3G has worked VQ4CL, VQ4AF, CT3AE, several ZS call areas, and 150 W's in 26 states. His crossband list (to 28 Mc.) includes F0BG, 4X4IX, OD5AC and Z41P. He will be active again this year, and is setting up on 144 Mc. also.

Two DXpeditions carrying 50-Mc. gear failed to produce positive results on 6. W1QMS and W1UXK spent their July vacation on Prince Edward Island without making a 6-meter contact outside of local. They did make a convert, however, and VE1ZM is now on 60.5 with 30 watts and a 3-element beam. W2ORA made a trip to F88 but worked nobody on 6, despite a busy time on lower bands, working as FI8AO.

Here’s a suggestion from VE3BPB that might well be taken to heart by the hotter c.w. operators on the v.h.f. bands. Ralph asks the gang on c.w. to slow down. Quite a few of the people on 6 and 2 are beginners, as far as knowledge of the code is concerned. More of them might have a go at working c.w. if they felt that they had a chance of copying the fellows they hear. Making more and better contacts and getting more people to use c.w. in v.h.f. work are legitimate aims that will be better served if those using c.w. send slowly and carefully, at least until it is established that the fellow at the other end can take it faster.

The Society for the Preservation of Amateur Radio’s Kindred Spirit on 50 Mc. is the impressive name of a new club operating in the Pittsburgh area. W3INZ says that he can give technical advice and assistance to those experiencing difficulties with 6-meter gear are available on request. The club also has full construction information on simple equipment for mobile or fixed-station use, free of charge. A calling frequency of 50.2 Mc. is used, and crystals for this spot are supplied at low cost. For more information write PARKS, Box 300, East Pittsburgh, Pa.

**Did It Happen?**

One afternoon recently we received a telephone call from a New Jersey Novice reporting a 2-meter contact with New Zealand. We feel reasonably sure that the call was made in good faith, and that the caller was convinced that he had worked some choice 2-meter DX. If it was faked, the trickster at the other end went to some trouble to simulate DX conditions. But up to now there has been no confirmation, nor have we heard of other 1X worked at that time.

In more than 35 years of v.h.f. work your conductor has had to deal with lots of reports like this one. Especially in the early years the writer was the object of innumerable pranks of this kind. It got so bad that when we heard our first sporadic-E 1X on 50 Mc. we exclaimed up and said nothing about it, feeling certain that it was just another log-pulling incident. That wasn’t the only case where what seemed to be a rare turn out to be authentic. Who will say that it is impossible for a Novice to work New Zealand on 2? Not this department!

**Coming — Lower U.H.F. Noise Figures?**

Readers of technical journals are aware that the problem of lower noise figure, and therefore better reception, in the u.h.f. and microwave range is under attack on several fronts. One promising approach is the MASER principle, described in QST for December, 1947, page 184. This device is far removed from the world of amateur radio, requiring the super cold of liquid helium for effective operation.

Showing more promise, though still highly experimental, are the various forms of what is termed a “reactance amplifier” or “parametric amplifier” now under development in several laboratories. The Bell Laboratories Record for July carries some details of the work being done by that organization. The Correspondence Section of the June issue of IRE Proceedings has four letters dealing with the new techniques.

Those attending the morning v.h.f. session at the National Convention heard a talk by Walt Bain, W4LTU, Ross Bateman, W4AO, and Steve Martin, in which the theory of the reactance amplifier was discussed. W4AO and W4LTU have built experimental models of the reactance amplifier that work extremely well at frequencies in the h.f. range. They are confident that with the right diodes it will be possible to achieve far lower noise figures in the u.h.f. and microwave region than we have known to date. Watch QST for more along this line soon.
YL DOINGS AT THE TENTH ANNUAL A.R.R.L. CONVENTION

No two amateur conventions are alike. Each has its own special high lights and atmosphere. Perhaps this is what makes them all alluring and memorable.

At the Tenth National Convention of the ARRL in Washington, D. C., on August 15, 16, and 17, some sixty licensed YLs seemed to have one fine time. From start to finish the convention was filled with interesting events, the result of long months of planning by hard-working committees.

Scene of activities was the spacious Sheraton-Park Hotel on Connecticut Avenue. The capital city did its best to keep visiting hams happy by providing hot but not unbearable temperatures outdoors, while in the catacombs of the hotel some Yankees, unaccustomed to such artificial comforts, shivered amid the icebox effect of the air-conditioning system.

The hotel’s Caribar Room was Ladies Headquarters. There a YL or XYL could meet friends,

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

Dorothy Strauber, K2MGE, dropped by the ARRL booth to say that she believes she is the first YL to have 100 countries confirmed using s.s.b. Back at her Lynbrook, N. Y., QTH, Dorothy uses an HT32 and 75A-4 with Gonset Tri-Band beam for her sideband QSOs.

The majority of YLs who attended the convention are shown together here. The girls considered it a special treat to meet Meg Cauffield, W3UTR, who occupies the wheel chair in the front row. Meg is on the air regularly from her Washington QTH.
play bridge, canasta, or bingo, or doff her shoes and relax. A hobby display of assorted handiwork done by YLs attracted much attention. For out-of-towners the wide choice of tours available made decisions difficult, but hardly conventioneers shuttled about and “did” as many of the points of interest in the interesting city as possible.

Activities got into high gear Friday night with a cocktail party and buffet dinner-dance. At noon on Saturday YLs and XYLs assembled at the nearby Shoreham Hotel for the ladies luncheon, fashion show, and SWOOP initiation.

Ethel Smith, K4LMB, presided at the luncheon. Mrs. Grace Bissell, XYL of W3BMK, arranged for the fashionable fashion show. The models in their style-setting clothes were lovely to look at, but many a YL recoiled at the suggestion of wearing vivid red, blue, green, and purple stockings and of dyeing her hair to match such costumes. Joan Thompson, KN3AMT, who worked with Mrs. Bissell on arrangements for the fashion show, had departed before the convention on a mission for the Chinese Embassy and was presumed to be hunting tigers in China. Following the fashion show XYLs stepped forward to membership in the Suffering Wives of Operators’ Protectorate, a kind of XYL Order of the Good Time.

Meanwhile, back at the Sheraton-Park licensed YLs gathered for the YLRL session. Elizabeth Zandonini, W3CDQ, program chairman, opened the conclave, and Ethel Smith, K4LMB, founder and first president of the YLRL, and Irene Akers, W3RXJ, president of the Washington Area YLRC, made introductory remarks. Guest speakers were Kay Anderson, W4BLR, vice-president of the YLRL, Betty Frederick, W3PVH, past YLRL president, and W1QON. Claire Bardon, W4TVT, moderated the forum which followed. Letters were read from Beth Taylor, W7JJS, president of the YLRL, and Louisa Sando, W5RZJ, editor of the YL column in CQ magazine and author of CQ YL. W5RZJ’s new book is a record of YL activities which had been requested by the YLRL at its First International Convention in Santa Monica, California in 1955.

The YLRL Forum was lively, with a variety of ideas presented and discussed. It was announced that thanks largely to the intense campaign made by the special membership committee during the last several months YLRL membership has reached a new high, with 804 paid-up members. Next year

October 1958
Highlight of the YL program was the YLRL Forum. Claire Bardon, W4TVT, served as moderator. Guest speakers were Betty Frederick, W3PVH, Ethel Smith, K4LMB, Irene Akers, W3RXJ, (W4TVT), Elizabeth Zandonini, W3CDQ, Kay Anderson, W4BIR, and W1QON.

will mark the twentieth anniversary of the YLRL, and W4TVT read a recommendation by W5RZJ that the YLRL consider plans for a third international convention, with the possibility of the affair to be held in New England and hosted by the Women Radio Operators of New England. Other subjects discussed included the likelihood of printing a YL certificate directory, the satisfaction with the new method of producing Harmonies, and the type of news desired for Harmonies. The moderator regretted that there was not more time for further discussion. Expressions of opinion were noted and were to be reported to the YLRL President.

Early Saturday evening YLs had a choice of attending the S.S.B. or RTTY dinners or dining at Hogate’s famed seafood restaurant. At ten p.m. everyone was invited to a floor show in the main hall, and at the stroke of midnight mysterious Wouff Hong rituals commenced.

Sunday brought more amateur sessions and meetings and more sightseeing tours. YLs were noted attending the ARRL and DX luncheons and the ARRL Forum in the afternoon. The highlight of the Hiram Percy Maxim Memorial Banquet Sunday evening was the visit by Vice President Nixon, who won the applause of 830 hams in the hall when he related his three experiences with amateur radio. Mrs. Glen Saehso, (Continued on page 188)

Evelyn Wikoff, W4VCB/3, and Fran Darne, W3AKB, take time out to look at an issue of Auto-Call, which Editor R. V. Anderson, W3NL, published daily during the convention to keep everyone up to the minute on latest doings. W3AKB conducted the slow- and high-speed code contests.

An attractive YL inspects the loading coil of a mobile rig in a Continental II, one of hundreds of cars harboring mobile rigs which jammed hotel parking spaces. The YL: Virginia Knoerl, K4ETC/3 of Washington. Owner of the shiny red Continental: Byron Roudabush, W4AHG, general manager of the convention.
ANNUAL SIMULATED EMERGENCY TEST
October 11-12, 1958

The above dates for this year's SET were first entered in the ARRL Activities Calendar in July QST, so they should come as no great surprise to those amateurs who have been intending to take part. For others, this is a reminder that the test is coming up and we hope that you can plan to be with us.

The annual SET is at once both a demonstration of our AREC facilities and versatility to the public and a look-see at our own emergency capability as it exists today. It resembles both the annual Field Day and the annual civil defense Operation Alert, but differs from the former in that it is not a contest and from the latter in that it is strictly AREC-sponsored and AREC-perpetrated. It is the annual nationwide exercise of our own Amateur Radio Emergency Corps and the ARRL Emergency Coordinator is the king pin. It is primarily his job to develop, execute, and report on the exercise.

Naturally, he cannot do this without the active support and cooperation of the amateurs within his area of jurisdiction. We urge all amateurs at this time, if you have not already done so, to notify your EC of your availability for this exercise and for continuing support of the AREC emergency-preparedness program in the future. You know you will be available if you are needed. Why not prepare for it? It won't take much of your time, and then you won't be just available, you'll also be useful.

This year's SET will be conducted on the same date as last year's, October 11-12. This is to allow time to get that AREC registration card endorsed, renewed, or entered in the ARRL Activities Calendar for local SETs. See page 79 of this issue for details.

As previously stated, this is not a contest, like OAIt but it is, like both of them, a test of emergency communications facilities under conditions of stress. Your "score" competes with no one, except your own last year's score, but it does add to the national score which we try to improve from year to year.

Here's how you can best participate in the SET:

1. Contact your local Emergency Coordinator (if he doesn't contact you first) and get signed up in the AREC if you are not already registered (you should be). Even if you are, this is a good time to get that AREC registration card endorsed if it needs it. If you have no EC, get together with other interested local amateurs and recommend one to your SEC (see page 99) or SCM (see page 6).

2. Take part in the local simulated emergency which your EC will organize for the October SET this year, October 11-12 week end (we hope). It may be that for local reasons he will throw this test on a different date, so it is important that you contact him. If no local SET is planned, appoint a temporary leader (who may later become EC) and see what you can "whomp up" around town. This is often a good way to make local amateurs emergency-conscious and at the same time interest your townsperson and town officials.

3. Originiate a message to ARRL headquarters indicating your participation. Remember, there are about 35,000 AREC members and if each one originates a message (we hope all do) we'll be swamped (and we hope we are), so keep them short. Ten words should be sufficient. Put the messages on the regular traffic nets of the National Traffic System (many of which will be conducting extra sessions for this purpose) or clear them on one of the National Calling and Emergency Frequencies (3550, 3875, 7100 or 7250) are usually best for this purpose, but 14,050, 14,225, 21,050 or 21,400 may serve some long haul purposes). Regular traffic men will be monitoring these frequencies and will be on the lookout for such traffic. WA1AW and some of the ARRL staff, as well as other Connecticut amateurs, will be watching for traffic addressed to ARRL. Red Cross and civil defense stations, ARRL amateur stations will be monitoring for traffic addressed to National Red Cross.

4. After the test, your EC will summarize results on a form with which he will have been provided. See that yours reports, so your work will receive credit.

By the time you read this, all ECs have received a bulletin giving details of participation by Red Cross and civil defense stations, ARRL stations and others, setting down the scoring system (there are only group scores, no individual scores), suggesting some test exercises and publicity releases and providing a standard reporting form. Will you be in the October SET this year, OAIt? Hope so.

QSL CARDS

A great many amateurs — newcomers in particular — appear to be totally unaware that most QSLs from other countries intended for W, K and VE amateurs do not come direct but rather through the ARRL QSL Bureau System.

If you have worked DX stations and sent cards but received few or none in return, chances are the QSLs came through the bureau system and are awaiting only your sending a self-addressed, stamped envelope to the volunteer manager of your call area. See page 79 of this issue for details.
Widespread sporadic-E openings provided the great equalizer in the 1958 June V.H.F. Party. Just about every part of the country caught at least a little of the 50-Mc. DX, with the result that section multipliers and contact totals went soaring in areas where local contacts are hard to come by. The highest single-operator score came from a Florida station, and there were surprising totals from Texas, Montana, Wyoming, Colorado, Arizona and other areas where contest participation is often low or nonexistent. Section awards were won by 6-meter operators in 24 ARRL Sections.

If memory serves us correctly, the work of W4GJO, Sarasota, Fla., in the June Party represents a single-operator record for the spring and fall events. Grid made the most of the 50-Mc. opportunity, working 346 stations in 35 ARRL Sections. Adding 20 local contacts on 144 Mc. gave W4GJO a whopping 13,176 points. This was surpassed only by one two-operator home station, K2ITP, and three portable setups, each of the latter manned by large operator staffs and running simultaneously on two or more bands.

Those of us who stay home during v.h.f. contests owe a debt of gratitude to the hardy souls who take to the hills. By setting up Field-Day style in choice v.h.f. locations all over the country, individual and group stations make the contest more productive and more fun for all. How large portable operation looms in the June and September parties can be judged by the 80 calls listed with a portable sign in the tabulation. Outstanding work in this department was done by W1MHL/1, W6EJM/6, W1HGV/1, W3KX/3, W3MPF/8, W3PGA/4, W6ZOP/6 and scores of others.

The Waltham Amateur Radio Association put W1MHL/1 into the top portable-station spot without going to their favorite New Hampshire site, Using Prospect Hill, a minor elevation in the home town, Waltham, Mass., they worked 437 stations on 4 bands for 16,065 points. The Two Meter and Down Club of Los Angeles made the “and Down” pay off handsomely. Operating from Green Valley Lake in the San Bernardino Mountains, W6EJM/6 ran up the highest contact total of the contest, 511 stations, on 50, 144, 220, 420 and 1215 Mc., for 14,350 points. This is probably the highest score ever posted in a v.h.f. party by a station west of the Mississippi. They had 30 QSOs in 3 sections on 220, 23 in 3 on 420 and 5 in 3 on 1215 Mc. These were no “manufactured” local contacts. Note the three sections on 1215. All work on this band was over distances in excess of 40 miles. Best DX was W6BUT, Taft, 146 miles away. W6NLZ, also a home station, was 80 miles distant.

The highest score in the contest was turned in by the Taylor brothers, K2ITP and K2ITQ. Keeping K2ITP on the air throughout the party, Hal and Joe made 300 contacts on 50 Mc., 113 on 144, and 16 on 220, for 20,470 points. They give credit to the 220-Mc. operators who are set up for c.w. for their fine showing (7 sections) on that band. On 6 they used c.w., a.m. and s.s.b., a 4-250A final and a 5-over-5 array. The 2-meter rig has an 820B final, feeding 3 stacked 6-element Yagis. On 220 they ran a 4X150A and a single 6-element Yagi.

The higher bands are coming into their own steadily. Some 49 stations (better than 10 per cent of those reporting) worked on 220 Mc. The 420-Mc. band was used by 27 contestants. At least 5 stations were active on 1215 Mc., though only 2 reported. W7P7A/7, the Valley Amateur Radio Club, used 10,000-Mc. gear, along with 50, 144, 220 and 420 Mc.

The fine conditions on 50 Mc. made nearly all 6-meter men happy, but none more than W9ROS, Roselle, Ill. Brownie caught W0GNS and W7JHX for his first North Dakota and Washington contacts, just before midnight Saturday. Sunday he worked W5EWW, Mississippi, for No. 48.

There are tricks to every trade, and posting winning contest scores is no exception. WINSY, reporting for W1MHL/1, passes along a few suggestions:

1) Every operator should be briefed on how to keep a log, and should bear in mind that the correctness and legibility of his entries may win or lose the contest for his station. Legal aspects are important, too; everyone should sign his full name in the log for each of his shifts.

2) Intelligent use of c.w. is a must. Far too few v.h.f. men know how to use c.w. effectively.

3) Two receiving positions were used for both 6- and 2-meter operation. This enabled us to tune the band more effectively for answers, and despite heavy QRM we missed very few possible contacts. We also had two complete operating setups for each band, operated by the owners of these. They were not used simultaneously on a single band, of course, but with each operator being most familiar with his own gear, and using slightly varying techniques, they covered the territory with greater over-all effectiveness than either would have alone.

4) Get on at the start of the contest, regardless of available equipment. If high-powered gear is not ready, get on with anything. It's more important to be on at the start than to be loud at the start!

Several other operators commented on point 2. How about more and better use of c.w. in future contests? Don't be afraid of lack of skill; there are few hot shots with a key on the v.h.f. bands. There's no better time than a contest to get in
One of the outstanding single-operator jobs of the June V.H.F. Party was turned in by W6ZOP/J. With this FieldDay type setup on Ladd Peak, in the San Diego Section, W6ZOP worked 405 stations on 50 and 144 Mc, for 4050 points. Crystal-controlled converters fed a 75A-2 and an HQ-129. Transmitters ran about 90 watts on both bands, feeding vertical arrays.

some practice. You know what everyone's going to say, anyway. — E. P. T.

SCORES

In the following tabulation, scores are listed by ARRL Divisions and Sections. Unless otherwise noted, the top scorer in each award is the ARRL Director, who receives a special award, with the top scorer's call sign first. The scores shown are the final scores, the number of contacts, the section multiplier, and the bands used. A represents 50 Mc.; B, 144 Mc.; C, 220 Mc.; D, 400 Mc.; and E, 1215 Mc. or higher. Multiple-operator stations are shown as such in the following section tabulation.

<table>
<thead>
<tr>
<th>Division</th>
<th>Section</th>
<th>Score</th>
<th>Contacts</th>
<th>Multiplier</th>
<th>Bands</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>W38JW</td>
<td>370-37-7</td>
<td>37-7</td>
<td>37-7</td>
<td></td>
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<tr>
<td></td>
<td>W3TBX</td>
<td>390-39-8</td>
<td>39-8</td>
<td>39-8</td>
<td></td>
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<tr>
<td></td>
<td>W3PCH</td>
<td>380-38-6</td>
<td>38-6</td>
<td>38-6</td>
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<td></td>
<td>W3SJE</td>
<td>390-39-8</td>
<td>39-8</td>
<td>39-8</td>
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</tr>
<tr>
<td></td>
<td>W3REX</td>
<td>390-39-8</td>
<td>39-8</td>
<td>39-8</td>
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<td></td>
<td>W3RDE</td>
<td>390-39-8</td>
<td>39-8</td>
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<tr>
<td></td>
<td>W3RJH</td>
<td>390-39-8</td>
<td>39-8</td>
<td>39-8</td>
<td></td>
</tr>
</tbody>
</table>

| DAKOTA DIVISION  | North Dakota | W9EOZ | 90-9-3 | 9-3 | 9-3 |
|                  | Minnesota   | W3AJX  | 350-35-5 | 35-5 | 35-5 |
|                  | W3WNE   | 390-39-8 | 39-8 | 39-8 |
|                  | W3WYJ   | 390-39-8 | 39-8 | 39-8 |

| DELTA DIVISION   | Arkansas    | W9HJE  | 90-9-3 | 9-3 | 9-3 |
|                  | Louisiana  | W9KTD  | 90-9-3 | 9-3 | 9-3 |
|                  | Tennessee  | W9HJK  | 90-9-3 | 9-3 | 9-3 |

| GREAT LAKES DIVISION | Michigan | W9CC  | 370-37-7 | 37-7 | 37-7 |
|                      | W9FEY  | 390-39-8 | 39-8 | 39-8 |
|                      | W9MYX  | 370-37-7 | 37-7 | 37-7 |

| MIDWEST DIVISION   | Iowa        | W9ZML  | 390-39-8 | 39-8 | 39-8 |
|                    | Wisconsin  | W9DAG  | 390-39-8 | 39-8 | 39-8 |
|                    | Minnesota  | W9GZD  | 390-39-8 | 39-8 | 39-8 |
|                    | Missouri   | W9KCC  | 390-39-8 | 39-8 | 39-8 |

| CENTRAL DIVISION   | Illinois    | W9HYY  | 420-42-7 | 42-7 | 42-7 |

|                    | W2BAA/604  | 390-39-8 | 39-8 | 39-8 |

| WESTERN DIVISION   | Nevada      | W9NXX  | 390-39-8 | 39-8 | 39-8 |
|                    | Oregon     | W9GDC   | 390-39-8 | 39-8 | 39-8 |

(Continued on page 170)
CORRESPONDENCE FROM MEMBERS

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

TWO KINDS OF HAM

16 Sycamore Lane
Levittown, N. Y.

Editor, *QST*:

I've been a ham actor (on several TV shows, including *Garry Moore's* and in clubs) for a number of years; finally I'm an FCC-type ham, W72AEQ. I'm just as green as green can be. Only trouble is there are a lot of hams greener than me. I've been mistaken for South American DX so many times in my 2½ weeks on the air that I've already worked 17 states!

 Seriously, though, if every op is as friendly and as eager to help other guys as some have been with me, I'm more than proud to join this friendly fraternity of brass-happy key-pounders.

— Jack H. Smaha, W72AEQ

SALES PITCH

Route 2
Childress, Texas

Editor, *QST*:

It's been many years since I attended a convention, but last month I managed to make one. Of course I enjoyed meeting old and new friends and all that, but I was dismayed, to say the least, at the apparent trend of the technical talks to commercialism. ARRL boys excluded. One talk listed on the program as "Technical Talk on Double Sideband" was no pretense of being a technical talk by any stretch of the imagination, but a simple high-pressure sales pitch, with no holds barred. I wonder how many conventions this same team has hijacked? While one fuddles for the ladies, the other jigs the males.

Let's keep the merchants in their booths, unless they keep their talks really technical. Let future program committees be hereby warned. . . .

— Jack E. Cox, W5JPM

HELP, DON'T HOLLER!

Sierra Itambe 4
Lomas de Chapultepec
Mexico 10, D. F.

Editor, *QST*:

Let's stop arguing about the Novice class operators and make the most of them. A sloppy novice signal indicates some general has overlooked his obligation to "help the other guy."

The XYL used to QRM me quite a bit. Now she is W6YOU and there is peace in the family again. *Gracias a Dios* for the novice license. Without it, she would probably have been an ex-XYL by now.

— J. A. "Hank" Scharf, W6SKU

BICKERING

2906 Washington St.
Alameda, California

Editor, *QST*:

...I think our present bickering about licensing is most degrading if even in our own eyes alone. The right we present to our contemporaries is not flattering.

From my own limited experience and successes (with a peanut whistle running less than a "Novice Killowatt") a conclusion has been drawn, to wit: the most enjoyable contacts made are with those in our own power class, kw's mostly work other kw's; peanut whistles, other peanut whistles; and half gallons, other gallons. Then why not divide the various bands into power groups? Think of the enjoyment of each group working where and whom it wants to work, when desired. Think of the lack of interference. Think of the enjoyment of the smaller fellows working another one for real DX.

It would be no problem at all to segregate the hands in this fashion . . . rather like the left high-speed lane, the middle-medium speed lane, and the radiiolow speed lane, on our super-highways. Effective? We know it is . . . — Harry E. Blomquist, K6JJS

202 Genesaue
New Hartford, N. Y.

Editor, *QST*:

Damn those "against" amateurs!

Against Novices! Against Technicians! Against everything they aren't. How holy can one become?

The Good Lord gave us one radio spectrum and it should be respected. Amateur radio can be a friend to the lonely, a challenge to the contestant and technically inclined, and assistance to the disturbed. It is more than fun; it is real pleasure.

It is work to enjoy amateur radio — not the work of getting a license, but the real grown-up work of doing something well. It is work to handle traffic, to contact a new country, to make another ham enjoy talking with you. It is work to think and hope, as one must in any line or activity if he is to secure lasting enjoyment.

It is exploration and discovery, not necessarily in the field of great or important techniques. Like every other great endeavor, this hobby gives an eager person the chance to discover himself, his limits as well as his abilities. It is dangerous to find one's limits, for only the strong of character can resist severing those who can or even might better them.

On second thought, pity the "against" amateur, and if you can, help him.

— David T. Geiser, W3ANU

FULL POWER POWWOW

8411 Hilgert Drive
Cleveland 4, Ohio

Editor, *QST*:

Cannot something be done about policing ham frequencies? I like to work DX on the 20-meter band. While waiting for a chance to work a VK the other morning at about 0140 EST, I was nearly knocked from my chair when a couple of local boys opened up and had a powwow for about half an hour. These fellows only live a few blocks from each other and its doesn't seem to be quite the right thing to rag chew on full power on 20 meters under the circumstances. . . .

— Eric J. Young, W8RLE

TECHNICIANS

P. O. Box 38
East Setauket, N. Y.

Editor, *QST*:

The purpose of the Technician Class License (page 15, *Radio Amateurs License Manual*) is said to be "To encourage a greater interest among would-be amateurs in experimentation on and development of the higher radio frequencies."

This purpose has been entirely defeated: the result of the six-meter phone band being available to the Technician licensee. Most Technicians don't give a whoop about the development of the higher frequencies (220 and above), their only interest being ragchewing, mobile work, etc. on six phone. Please do not get the impression that I am speaking of all Technicians. There still are a few true experimenters, hobbyists and microwave enthusiasts around. The Technician license can be of great value. It is, for instance, of considerable importance to engineering students as it enables them to conduct a lot of on-the-air experimentation. But then again, there are those clumps on six doing anything but experimenting. For passing a childish 5-w.p.m. code (Continued on page 158)
A Ham's Pledge

I am proud of this call because I am the only person in the world who has the privilege of using it. I identify myself with as many other friends as keep me only by my call. When I do not use the air with this cherished call, will bring my usual friends or currents to set it. It is used on my call. As I will not be missed, it is worth more than a few moments and the conversation I show my little time, while on the air. I value my friends more than any words. To make this friendship stronger, I desire you to be a better operator by following some good operating practices.

1. I will listen on the frequency before testing or transmitting.
2. I will give the frequency immediately to a station AU calling break or emergency. I will assume that his call is urgent.
3. I will acknowledge a joining station immediately if he may have an important message.
4. When waiting to join a QSO, I will announce my call only, between transmission breaks.
5. When working mobile or on known mobile frequencies, I will keep a short and allow time to transmit communications for new callers or urgent traffic.
6. I will not forget mobiles are in motion and must have priority.
7. I will always be helpful and tolerant with my fellow amateur.
8. I will gladly take or give advice when I know it will help my fellow amateur or our hobby.
9. I will leave the public whenever the opportunity arrives.
10. I will do all in my power to cause my fellowmen to respect all Radio Amateurs.

A list of QO Signals — Op. Aid No. 9. On some nets, QO procedure has reached the point of using phrases such as “up five with Jack and clear his two.” Such understanding should be valuable adjuncts in any on-the-air operation. Points 3-4-5-6 doubtless were drawn with specific applicability to surmounting certain difficulties in mobile operation, but points 1-2-7-8-9-10 are of general application. These count for every minute and every time we each operate on the air. It’s a well-worded pledge to keep before us mobile operations, but points 1-2-7-8-9-10 are of general application. These count for every minute and every time we each operate on the air. It’s a well-worded pledge to keep before us mobile operations, but points 1-2-7-8-9-10 are of general application. These count for every minute and every time we each operate on the air.
contests. Detailed appointment requirements are set forth in the booklet, *Operating an Amateur Radio Station*, available to members on radiogram request. Types of operational service represented in the available SCM-posts are as follows:

**ORS** — Official Relay Station. Traffic service, 15 w.p.m., v.h.f. requirement.

**OPS** — Official Phone Station. Voice operating, example in setting operating standards, activity on voice.

**OBS** — Official Experimental Station. Experimental operating on v.h.f., u.h.f. or s.h.f. bands, collection of propagation data.

**ECS** — Emergency Coordinator. Organizes amateurs of a community or other area for emergency radio service; liaison with officials and agencies served, also with local communication facilities. Assists in RACES implementation.

**OBS** — Official Bulletin Station. Transmits ARRL and your SCM (if you are an active operator) invites members and the leadership of the office to clubs. Much depends on the desires of the leaders, and training aids material not available to your SCM helps on club activities and public recognition, helps on club activities and public recognition, helps on club activities and public recognition, helps on club activities and public recognition, helps on club activities and public recognition, helps on club activities and public recognition, helps on club activities and public recognition.

* Available where SCM determines vacancies exist or quota of qualified workers is not full. Ask your SCM.

Unless you already hold some station-post, your SCM (if you are an active operator) invites your application for an official-station. ARRL-post. This should be along the lines of your natural interest. One good way to get in line for appointment is to report your station activities, traffic, and other operational accomplishments to your SCM (for the previous 30 days) the first two or three days of each month. Reporting regularly in your own state or section net once or twice a week helps make a good start.

**Benefits in Club Membership.** League benefits to radio clubs through affiliation are listed in CD-105 (on request to clubs). These include mailings of amateur news to clubs, national recognition, helps on club activities and publicity, and training aids material not available to non-affiliates. There are now over 1000 active ARRL affiliated club groups coast-to-coast. Probably but one FCC licensee amateur in every five, however, belongs to an active radio club.

Some clubs cater to just v.h.f., DX, mobile, RTTY or other specialty; however, most clubs like most amateurs are somewhat balanced in having interest in various forms of amateur doings, and arrange diversified discussion topics for meetings. Whether a club has a clubhouse, issues a local bulletin, or has a club-station for members to operate depends on the size and kind of group and the initiative of members and leaders to tackle such projects. Field Days, transmitter hunts, code and theory classes, field trips, picnics, auctions, hamfests and operating activities constitute group benefits often provided through a club. As a source of technical and operating bet-terment, such as comes through fraternal meet-ings and discussions you can hardly do better than to belong to a near-by club.

Some clubs may offer special benefits, unavailable to all clubs. Much depends on the desires of members and the leadership of the officers. A letter that the Garden State Amateur Radio Association sends its new members lists some 11 benefits available. We recite these as typical, since to amateurs not familiar with clubs it may suggest what can be gained through belonging to a local amateur group. The GSARA list: (1) club membership card, (2) club badge with call, name, etc. (helpful in large clubs, identifying new faces at meetings), (3) subscription to the "Scope," (4) free ham-ads in the Scope, (5) QSL cards at reduced prices, club stock, (6) eligibility to hold office or for committees, (7) listing in GSARA directory of call, (8) silver lapel pin with personal call engraved at nominal cost, (9) use of clubrooms, (10) use of club station W2GSA, (11) eligibility for club-group activities, contests, lectures and meetings.

**October and the S.E.T.** Have you asked your ARRL Emergency Coordinator about the local plans for the annual *Simulated Emergency Test*? If not, by all means do so at once when you receive this QST.

This test should be your occasion (1) to get re-registered in the Amateur Radio Emergency Corps, (2) to get reactivated in your thinking about your own mobile gear, and to define if your emergency-powered radio provisions are all they could be, and (3) to make sure you are lined up in your AREC or RACES to use your amateur radio to practical advantage if and whenever the occasion arises. This test, like all others, is only what you make it!

Unlike the SS coming in November, and the Frequency Measuring Test opportunity of each September, this one is not sparkplugged by Headquarters at national level. This one is strictly up to you and your Emergency Coordinator. There's room for initiative, planning, station deployment, testing, operator instruction and critiques to the profit of both individual and organization. The test can be the first of the fall season in which the public can learn of your positive and useful capabilities, or it can be a quiet exercise in which you build a foundation for real service. The type contingency or emergency, the duration, degree of surprise, if it is held at all, is a matter for local determination as explained on page 80 of last QST and in other announcements. ARRL has the usual full operating program for the 58-59 season. Every test is a chance to improve your station and operating and have real fraternal and com-

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**NATIONAL CALLING AND EMERGENCY FREQUENCIES (Ke.)**

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<tr>
<td>3550</td>
<td>3875</td>
<td>7100</td>
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<td>14,050</td>
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<td>28,100</td>
<td>29,400</td>
<td>50,550</td>
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</tr>
</tbody>
</table>

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 and held for use by other teller calls.

The following are the National Calling and Emergency Frequencies for Canada; c.e. — 3535, 7050, 14,000; phone — 3763, 14,100, 28,250 ke.
communications enjoyment through Amateur Radio. Not every test, however, has the same degree of connection with possible Public Service as our S.E.T. This start of season dedication of a small part of your amateur capabilities to public service and emergency preparedness is therefore a special incentive and opportunity. Come those dates of Oct. 11-12 we'll be looking for your radiogram on the S.E.T.

F. E. H.

With the AREC

How are your plans for the SET coming along? What, you have none? Well, let's get going! By the time you read this, the October 11-12 dates will be upon you (if not passed). Contact your emergency coordinator, see what he's doing about it. Full details elsewhere in this issue.

Chester County (Pa.) Radio Officer W3DBL tells us he inadvertently omitted a list of amateurs participating in the snow emergency described on page 77, July 1958 QST. Here are the boys who did the job: K6s BFS MXW ZAT VXJ DEL DYN DBN WGC JRY BRU ZSD FTY, K8s BFP C2I DJO. Also worth mentioning are about twenty others who monitored the frequency throughout the emergency, ready to be of service if needed.

On their way home from a committee meeting of the Lehigh Valley Amateur Radio Club in Macungie, Pa., on March 26, a group of amateurs heard a crash. Investigating, they discovered that 40 cars of a Reading Railroad train had derailed, spilling butyl alcohol and ethyl acetate over the tracks, thus creating a serious fire hazard. Immediate contact was made on 6 meters with state police, local police and fire department, and a firm equipped with foamite firefighting equipment. The Water Department in Allentown was also informed of possible pollution of the water supply, a source of which was nearby. After that, the group remained on the scene to assist in controlling traffic, install warning lights and enforce a strict smoking ban. The incident occurred at 0630 and the group remained on the scene to assist for four hours. Amateurs taking part were K7s LXM TEB MIU and PHP.

The recently organized Huntington (W. Va.) Weather Net not its first real workout on May 7 when W8FUM was informed by the Weather Bureau that they were unable to get reports from the observer at Kermit. K5CAY was asked to monitor the net frequency of 60.65 Mc. and alert any net members. K5E2EJ soon showed up and was able to make arrangements to get reports through. K5NAY stood by on the frequency to alert stations along the watershed. W8FNT was excused from school to report in. At 1700 W8FUM called the net to order, assisted by K5AFP and K5TUX. W8CGBL and K5JTX were sent to the Cabell County courthouse to set up equipment and take over the net. The net also assisted the Huntington Automobile Club in obtaining information on flooded-blocked roads, with K8GXR as liaison. Mobile K7s KNC NJL and CAY were used to scout road conditions in the area. A number of informal messages were handled for the Weather Bureau and the Auto Club. Other amateurs participating: K7s IFQ VBD RDD V7JYI, K8s DWU GOM IYU DKK ELS HIT JNF CYW AON BEL, K4ETA. — W8FUM, EC Cabell Co., W. Va.

From 1000 on June 7, to 0300 June 8, and also from 0800 to 1830 June 8, mobile K7s SWD RYQ ZTD STW and JSE worked with the e.d. police in the Ravenswood section of Indiana in connection with flood conditions at that time. Their function was to give precipitation and river readings from over the state in cooperation with the Indiana Fone Net on 3910. Mobile operation was conducted on 6 and 2 meters. — W9MHP, EC Marion Co., Ind.

The Davidson County, Tenn., Six Meter Emergency Net provided local coverage for TV station W6X on an 8-hour telethon to raise funds for crippled children, March 29. Much favorable publicity resulted for amateur radio when the TV camera picked up occasional action shots like this one.

A very heavy rainfall in Iowa on July 1 and 2 precipitated extensive amateur operation in Audubon County and vicinity. K8DLV reports the condition to K5OHC on six meters, then went out with the National Guard, as radio officer for the headquarters company. On the afternoon of July 2 W6UIZ and K8EFQ went to Audubon and put W8VAU on the air on 75 meters. This station was active continuously until July 8. On July 3, W8VAU put out a call for mobiles and operators. Some 70 amateurs responded from Iowa and Nebraska and worked with search parties, with the National Guard at crossroads and intersections, with Red Cross field units and with the county sheriff. Twelve nets operated in the area on 0, 10 and 75 meters. The National Guard (K8DLV, rameodding) estimated from 3,000 to 4,000 formal and informal messages were handled by the amateurs. Officials of Des Moines, Omaha, Webster City and several others had the highest praise for the work of the amateurs in this emergency. W8VAU submits the following additional list of those known to have participated in the emergency work: K9s AEM AHU BDZ BPR BBB JIN DQD C1W CQX CQU E6H ERP EXN GNY IVP JDI KJY MOB NWX NPA RRM RGG SGP TUE XEX YLT ZTW WSJ WBJ YCP YZW XHY RXS YXY PFF LGC DQ FEG EDE EIO KFR GRN HXI HIC MIZT NYS OLAI ONY OPK PZO RND SUE SLC ZBM VDK, K9s AEY DXS CFZ CLP EQK EBJ BXJ GXY ITQ FEO IEA IDW IGX LJD IQR ILE JIG JIE KGR LBY LYO MDP MBM BFM APX AFB REC BJS CRG CRC CBC CVT DGX DYE EJZ KZQ KKV GHI GLH ITO JIU MBS MBB TNC ANK RDS EUV, E5KUC/E, E5KDA/A, W7BEBX/A, W8JSQ/A. Thanks to W8VAU and K8DLV for this info.

The AREC of Longueil, Que., went into action on July 6 when areas in St. Lambert, near Montreal, were inundated by high water. When St. Lambert police were unable to handle all the incoming calls, the e.d. director called out the amateurs organized under EC VE2KG. VE2KG and VE2BI put VE2ADX, the station e.d., headquarters, on the air. Calls for help relayed by the St. Lambert police were investigated by mobiles, which then reported the situation and a rescue truck was dispatched if necessary. The mobiles were run by VE2BI IK and SC. Every call was answered, the amateurs working from 0600 to 2300 to perform this public service. — VE2KG, EC St. Lambert, Que.

On July 13, two teen-aged mountain climbers suffered a fall while attempting to scale Mt. Jefferson in Oregon. The Mountain Safety and Rescue Council formed a rescue operation and amateurs connected with that organization were asked to assist with communications. A net was formed on October 1958 93
we got it from ODCM. We were able to correct a couple of
are ou file. Alaska also has a territorial plan. We don't see
to date, we wish to publish here the complete list of
exampie, each town has its own plan, while in New Jersey
of RACES coverage therein. Much depends on how the
Texas, E. Bay, Ala., Santa Clara Valley, Mont, E. Pa.,
reporting for 1958; Western Florida. The June record beats
with flood conditions along the Brandywine and other small
creeks in the area. Mobiles checked on stream conditions,
with flood conditions at danger points and helped reroute traffic. They also supplied
contact between headquarters and a rescue team searching
for a missing boy. Amateurs participating were W7s
VXJ DBL DBN ZAT CFS EVV, KSs BFP D.JO ATX.—
W3OBL, RO Chester Co., Pa.

June reports were received from 25 SECs representing
6528 AREC members. We welcome another new section reporting for 1958: Western Florida. The June report starts June of 1957 all hollow, when we had 16 reports representing
5285 AREC members. Other sections reporting: W. N. Y.,
Jacinto Valley, N. M., Colo., Wash., Santa Barbara, S.
Texas, E. Bay, Ala., Santa Clara Valley, Mont., E. Pa.,
Wis., Maritime, Md.-Del.-D. C.

This brings us to the mid-year point and we find that the following sections have reported 100 or so: Ala., San
Joseph Valley, New Mexico, Colo., NYC-LI, E. Fla.,
Ga., N. Texas, Conn., E. Bay, Santa Clara Valley, Md.
Del.-D. C., Wis., a total of 13 100%-ers compared with 11
last year. The following chart will also show that mid-year
1958 exceeds any mid-year point so far reached since we
started keeping these records in 1953. Let's hope that the
progress will continue. We're encouraged!

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Reports</th>
<th>Diff. Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1953</td>
<td>103</td>
<td>28</td>
</tr>
<tr>
<td>1954</td>
<td>147</td>
<td>38</td>
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<td>1955</td>
<td>133</td>
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<td>1956</td>
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<td>1957</td>
<td>77</td>
<td>21</td>
</tr>
<tr>
<td>1958</td>
<td>105</td>
<td>25</td>
</tr>
</tbody>
</table>

**RACES News**

Information from ODCM indicates that as of July, 1958,
there were 1039 RACES plans on file at that agency. All 48
states are included, plus Alaska (which will soon be the
49th) and the District of Columbia. The number of plans in each state ranges all
the way from Massachusetts with 245 to several with only one (presumably a
state plan), such as Idaho, Mississippi, North Dakota, South Dakota and West
Virginia. Other states with a high number of plans are California with 89,
Connecticut with 76, New York with 61, and Massachusetts with 52. However, it
must be remembered that the number of RACES plans within a state is not necessarily proportional to the extent of
RACES coverage thereon. More than one state is organized and the area covered by each RACES
authorisation in Massachusetts and Connecticut, for example, each town has its own plan, while in New Jersey and
New York the RACES plans are by counties. Some
states have a simple plan to cover the entire state and do
not provide for local RACES plans at all.

We note that 47 of the 48 states now have state RACES
plans. The only one lacking as of 1958, in which 10 local plans are on file, Alaska also has a territorial plan. We don't see
Hawaii on the revised list. In order to keep all concerned up
to date, we wish to publish herein the complete list of names and calls of state radio officers, where known, just as
we got it from ODCM. We were able to correct a couple of
minor errors and fill in some call letters from personal
knowledge. If you see others, let us know so we can correct,
but blame ODCM, not us.

<table>
<thead>
<tr>
<th>State</th>
<th>Radio Officer</th>
<th>Call</th>
</tr>
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<tbody>
<tr>
<td>Alabama</td>
<td>Lawrence J. Smyth</td>
<td>W4SX</td>
</tr>
<tr>
<td>Alaska</td>
<td>James R. Heay</td>
<td>KL7TI</td>
</tr>
<tr>
<td>Arizona</td>
<td>Aaron Friend</td>
<td>W7DRG</td>
</tr>
<tr>
<td>Arkansas</td>
<td>Herman G. Stermer</td>
<td>W5AUU</td>
</tr>
<tr>
<td>California</td>
<td>James H. Gribbs</td>
<td>W6VYE</td>
</tr>
<tr>
<td>Colorado</td>
<td>Quentin H. Fuller</td>
<td>W8W1R</td>
</tr>
<tr>
<td>Connecticut</td>
<td>Thomas E. Hooper</td>
<td>W1FLK</td>
</tr>
<tr>
<td>Delaware</td>
<td>Roy A. Behair</td>
<td>W3LYE</td>
</tr>
<tr>
<td>D. C.</td>
<td>Walter C. Lockhart, Jr.</td>
<td>W3HPW</td>
</tr>
<tr>
<td>Florida</td>
<td>Arthur R. Melvin</td>
<td>W4UHY</td>
</tr>
<tr>
<td>Georgia</td>
<td>Andrew J. Farr</td>
<td>W4TJS</td>
</tr>
<tr>
<td>Idaho</td>
<td>William D. Meyers</td>
<td>W7MKS</td>
</tr>
<tr>
<td>Illinois</td>
<td>Jack W. Stanton</td>
<td>W9SPS</td>
</tr>
<tr>
<td>Indiana</td>
<td>William O. Nelson, Jr.</td>
<td>W0ZXX</td>
</tr>
<tr>
<td>Iowa</td>
<td>Charles J. Neel</td>
<td>W3ZUG</td>
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<tr>
<td>Kansas</td>
<td>Safford D. Thacher</td>
<td>W5QV</td>
</tr>
<tr>
<td>Kentucky</td>
<td>William L. Grieb</td>
<td>W4BEJ</td>
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<tr>
<td>Louisiana</td>
<td>Richard T. Purkey</td>
<td>W5VAR</td>
</tr>
<tr>
<td>Maine</td>
<td>Donald W. Dean</td>
<td>W1BYK</td>
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<td>Maryland</td>
<td>Cecil Harrison</td>
<td>W3CBW</td>
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<tr>
<td>Massachusetts</td>
<td>Ray E. Boardman</td>
<td>W1BL</td>
</tr>
<tr>
<td>Michigan</td>
<td>Jerome H. Hemmway</td>
<td>W5RDN</td>
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<tr>
<td>Minnesota</td>
<td>Arthur D. Laine</td>
<td>W2DKN</td>
</tr>
<tr>
<td>Mississippi</td>
<td>A. R. Cortese</td>
<td>W3OTD</td>
</tr>
<tr>
<td>Missouri</td>
<td>Joseph H. Carmichael</td>
<td>W5OVL</td>
</tr>
<tr>
<td>Montana</td>
<td>Benjamin K. Rush</td>
<td>W7GPT</td>
</tr>
<tr>
<td>Nebraska</td>
<td>Francis B. Johnson</td>
<td>W8L7J</td>
</tr>
<tr>
<td>Nevada</td>
<td>George B. Crittner</td>
<td>W7ZT</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>William E. Goldsmith</td>
<td>W1XHU</td>
</tr>
<tr>
<td>New Jersey</td>
<td>Lloyd J. Mammon</td>
<td>W2VQR</td>
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<td>New Mexico</td>
<td>Francis J. Gormley</td>
<td>W5KVR</td>
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<tr>
<td>New York</td>
<td>Vincent T. Kennery</td>
<td>W2B4Q</td>
</tr>
<tr>
<td>North Carolina</td>
<td>Max J. Silvers</td>
<td>W4H7U</td>
</tr>
<tr>
<td>North Dakota</td>
<td>Alvin L. Anderson</td>
<td>W5VAZ</td>
</tr>
<tr>
<td>Ohio</td>
<td>George T. Young</td>
<td>W8ZQX</td>
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<tr>
<td>Oklahoma</td>
<td>Edne Black</td>
<td>W0ZAB</td>
</tr>
<tr>
<td>Oregon</td>
<td>Leo A. White</td>
<td>W7AGS</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Robert A. Blackburn</td>
<td>W3MPD</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>Tom C. McCormick</td>
<td>W1PAZ</td>
</tr>
<tr>
<td>South Carolina</td>
<td>Carlton R. Commander</td>
<td>W4ZRH</td>
</tr>
<tr>
<td>South Dakota</td>
<td>Myron C. Jones</td>
<td>W9OXC</td>
</tr>
</tbody>
</table>

The Chester County Emergency Net (Pa.) was called
into action on July 27 to assist in communications connected
with flood conditions along the Brandywine and other small
creeks in the area. Mobiles checked on stream conditions,
with flood conditions at danger points and helped reroute traffic. They also supplied
contact between headquarters and a rescue team searching
for a missing boy. Amateurs participating were W7s
VXJ DBL DBN ZAT CFS EVV, KSs BFP D.JO ATX.—
W3OBL, RO Chester Co., Pa.

W7WVG was on the scene of the mountain rescue opera-
tion near Breitenbush Lake, Oregon, relaying rescue
information to Portland via W7PZF at the
Détroit Ranger Station.
**TRAFFIC TOPICS**

This month's words of wisdom are as follows: Got your net registered yet? We'd like to have all amateur public service nets registered, so if yours has yet been entered, see this column in September QST for instructions and get that net of yours in the record.

Hope we saw you at the National Convention. As this is being written, we are just in the throes of preparing to attend it and take a couple of weeks vacation afterward. Comments on the convention, and particularly the "Communications Meeting," next month.

**Net reports.** For no good excuse that we can dream up, the report of the Interstate Sideband Net for June was omitted last month. Sorry, fellows. Their June report showed 30 sessions averaging 63 minutes, a traffic count of 628 and 1230 call inters. In July they had 31 sessions averaging 44 minutes, traffic count of 532 and 1302 call inters. North Texas, Oklahoma, and Illinois nets had 31 sessions, a traffic count of 302, 988 check-ins. Transcontinental Phone Net incomplete report for July shows 1st Call Area, 1315; 2nd Call Area, 494; 4th, 5th, 8th, 9th and 10th Call Areas, 527; total, 2782.

Some missing net reports may be caused by our getting this copy in a bit early this month so we can grab a couple weeks vacation after the National Convention. We'll latelast any that we missed in the above.

Getting so that most net managers just submit report figures and have little or nothing to say. Naturally, we'd like to have some news, but lack of comments usually means that things are going along normally. W9DO says it raised 38 times in July, as QRN was CAN's lot most of the time. W6PLG still reporting for absent K01FYX on PAN—doing a swell job, too. Take a look at 3RN's rate and traffic total—but Lindy says Pennsylvania attendance still dropping off. RN6 would welcome seven-day operation if it were made NTS standard. W6CMA has resigned as RN6 manager and the Pacific Area NTS Staff will recommend a successor; meanwhile, KG6XA sends in reports. RN7 reports some gain in effectiveness even during the summer. W1KFW asks for replacement as manager, says there is plenty of good material. PVC maintains its contact with Maritime Section by special schedule on 7 Me.

**National Traffic System.** All NTS nets are reminded that the Simulated Emergency Test, coming up on October 11-12 of this month, usually produces a big stack of traffic addressed to ARRL headquarters. Far from being " junk," this is bad news that should be given your best handling. In addition to ARRL traffic, there may be considerable for your local traffic station. For instance, the one July report for July shows Ist Call Area, 1315; 2nd Call Area, 494; 4th, 5th, 8th, 9th and 10th Call Areas, 527; total, 2782.

Early Bird Transcontinental Net had 31 sessions and showed 30 sessions averaging 53 minutes, a traffic count of 1519. Percent success was 90.0.

**Out-of-Net traffic.** Getting so that most net managers just submit report figures and have little or nothing to say. Naturally, we'd like to have some news, but lack of comments usually means that things are going along normally. W9DO says it raised 38 times in July, as QRN was CAN's lot most of the time.

The TCC roster: Central Area (W9BDR, Dir.) — W9CXY, W7a 1BR LCX LGC SCA, Pacific Area (W6BPT, Dir.) — W5DBB, W7a 907 ADB PLG VZT HC ELQ UTW, K6a DXC EQY BRL GES GID, W7a GMC ZB, W7a EQQ W4K.

**WIAW OPERATING NOTE**

The WIAW summer schedule which appeared on page 100 of May QST will be maintained through October 25. The W1AW fall schedule, effective October 26 with the return to standard time, will be carried in next month's issue.

**October 1958**

95
RESULTS, JULY CD PARTIES

Here are the highest claimed scores of ARRL appointees and officials during the parties of July 19 to 26 and 27. Figures indicate score, contacts, and number of ARRL Sections worked. Final and complete results will appear in the October CD Bulletin.

C.W.

W6YAI0D... 381,085-663-07
W4MJ/6... 303,845-503-07
W6ZYQ... 260,576-511-03
K6NHX... 254,675-419-07
W3TMI/7... 190,320-524-59
W6MSR... 185,745-603-61
K6QGJC... 181,440-315-54
W6YHY/6... 173,670-234-58
W6RAN... 167,325-329-59
W6ISG... 153,290-238-57
K5GDI... 151,890-495-61
W9YT/1... 149,270-509-59
W4PNIK... 146,190-522-56
K4BAI... 141,075-480-57
K2KIR... 137,400-137-60
W7RLG... 130,030-241-56
K6CAZ/6... 138,590-451-56
W1WEP/6... 129,085-945-56
W4RKX/8... 128,375-121-51
W2PGB/8... 123,415-269-57
W4AKC... 123,405-262-57
W81JMN... 119,770-460-58
K4DAS... 118,225-426-56
W1A/3... 117,600-113-56
W56KDI... 115,640-392-59
W1HQ/6... 113,680-358-57
K5BZB... 112,983-378-59
V23BZB... 110,989-358-56
K2PIIF/6... 106,110-386-54
K4EZL/2... 106,000-325-56
W4WI/6... 105,830-202-56
W1TBC... 102,380-100-51
K2DXY/6... 103,460-371-55
W3GHL... 100,920-342-58
K6ELT... 100,800-350-67

W6ZM... 62,720-251-49
W1JYH... 62,660-234-52
W5EK/2... 60,946-231-54
V7FA/6... 60,816-144-47
K4VUY/7... 60,720-567-50
W1KGI/6... 60,720-259-46
W6HPE/2... 60,155-233-53
K6ERH... 59,925-249-47
K3K/6... 57,610-214-53
W8SRL/S/6... 56,300-235-67
W1AQE... 55,100-255-41
K4QES... 55,800-202-54
W4NH... 55,650-204-53
K5/JC... 55,350-204-54

W1HKA... 54,880-241-49
K8CCY/6... 54,430-241-48
W3EIS/6... 64,230-211-50
W3EM/6... 64,320-233-18
K2UTV... 64,225-237-45
W6DLG... 63,900-215-49
K2TVT... 62,920-249-42
K9BLY... 61,935-218-47
K3VYF/6... 61,920-231-42
W1FJJ/1... 61,700-229-44
K5ESW/5... 61,500-203-50
W2VR/2... 61,120-207-48
W6VEE/6... 60,900-70-24

PHONE

W3TMI/7... 27,555-107-33
W4NOH/6... 27,090-130-40
K2HF/8... 21,735-154-52
W1DGL/2... 19,140-127-29
W9YT/1... 17,550-111-30
W1FYF/2... 16,000-128-25
W3GK/5... 15,125-76-57
W3NF/2... 12,875-96-25
W3JFY/2... 9,690-78-23
W4VK/2... 9,500-70-24

96 QST for
The A-1 Operator Club has been designed to recognize and promote good operating, phone, c.w. or other modes of work, in any or all the amateur bands. To become a member one must be nominated for membership by at least two operators who already belong. We are pleased to announce at this time the following additions to earlier ARRL A-1 Operator Club rosters.

**CLASS B — Unit and Individual Portables**

<table>
<thead>
<tr>
<th>Call</th>
<th>QSOs</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>KGO1/8</td>
<td>4725</td>
<td>K5DR/5</td>
</tr>
<tr>
<td>KQD18/9</td>
<td>3909</td>
<td>W8IX/6</td>
</tr>
<tr>
<td>W3AMR/8</td>
<td>3643</td>
<td>W8M5A/8</td>
</tr>
<tr>
<td>W3IBQ/2</td>
<td>2041</td>
<td>W8PM/7</td>
</tr>
<tr>
<td>K5DCP/5</td>
<td>3310</td>
<td>W5NXX/5</td>
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<tr>
<td>W3BH/6</td>
<td>2406</td>
<td>W7CAF/7</td>
</tr>
<tr>
<td>K12/9</td>
<td>2417</td>
<td>W8YTX/9</td>
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<td>K1TJZ/7</td>
<td>2448</td>
<td>W8TLN/4</td>
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<tr>
<td>KN2LP/1</td>
<td>2444</td>
<td>K2UTV/2</td>
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**CLASS C — Mobiles**

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<tr>
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<tbody>
<tr>
<td>WSPV/C/8</td>
<td>5036</td>
<td>W8QAV/8</td>
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<tr>
<td>K2TOM/0</td>
<td>4361</td>
<td>W8MWE/8</td>
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<tr>
<td>K65CP/5</td>
<td>3212</td>
<td>W8AKU/8</td>
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<tr>
<td>W3LR/5</td>
<td>2528</td>
<td>W8QXG/8</td>
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<tr>
<td>W8GK/18</td>
<td>2484</td>
<td>W8NYX/8</td>
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**CLASS D — Emergency-Powered Home Stations**

<table>
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<tr>
<th>Call</th>
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<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>K3CT/2</td>
<td>495</td>
<td>W5RIN</td>
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**CLASS E — Commercial-Powered Home Stations**

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>W4UPB/4</td>
<td>319</td>
<td>W3YWU/3</td>
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<tr>
<td>W4WQK</td>
<td>298</td>
<td>W0BZW</td>
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<td>K2EJ/1</td>
<td>185</td>
<td>W9NH</td>
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<tr>
<td>W4KTC</td>
<td>184</td>
<td>W1AW</td>
</tr>
</tbody>
</table>

**A-1 OPERATOR CLUB**

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**Notes:**

- **CLASS B** — Unit and Individual Portables
  - QSOs: Number of contact QSOs.
  - Notes: Call sign.
- **CLASS C** — Mobiles
  - QSOs: Number of contact QSOs.
  - Notes: Call sign.
- **CLASS D** — Emergency-Powered Home Stations
  - QSOs: Number of contact QSOs.
  - Notes: Call sign.
- **CLASS E** — Commercial-Powered Home Stations
  - QSOs: Number of contact QSOs.
  - Notes: Call sign.

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  - Notes: Call sign.
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  - QSOs: Number of contact QSOs.
  - Notes: Call sign.
- **CLASS E** — Commercial-Powered Home Stations
  - QSOs: Number of contact QSOs.
  - Notes: Call sign.
A.R.R.L. ACTIVITIES CALENDAR

Sept. 20-21: V.H.F. QSO Party
Oct. 1: CP Qualifying Run — W60WP
Oct. 11-12; Simulated Emergency Test
Oct. 17: CP Qualifying Run — W1AW
Oct. 18-19; CD QSO Party (c.w.)
Oct. 25-26; CD QSO Party (phone)
Nov. 6: CP Qualifying Run — W60WP
Nov. 8-9; 15-16; Sweepstakes Contest
Nov. 17: CP Qualifying Run — W1AW
Dec. 3: CP Qualifying Run — W60WP
Dec. 23: CP Qualifying Run — W1AW
Jan. 8: CP Qualifying Run — W60WP
Jan. 10-11: V.H.F. Sweepstakes
Jan. 17-18; CD QSO Party (c.w.)
Jan. 21: CP Qualifying Run — W1AW
Jan. 24-25; CD QSO Party (phone)

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of QST issue in which more details appear.

Sept. 26-28, Oct. 3-5: Cleveland SS, Cleveland Convention (p. 106, last month).
Sept. 27-28: VE/W Contest, Montreal Amateur Radio Club (p. 48, last month).
Oct. 1-5: VK/ZL DX Contest (phone), NZART (p. 75, last month).
Oct. 11-12, VK/ZL DX Contest (c.w.), NZART (p. 75, last month).
Oct. 11-12; Pan American Contest (phone), Radio Club Peruano (p. 65, this issue).
Oct. 18-19: Pan American Contest (c.w.), Radio Club Peruano (p. 65, this issue).
Nov. 19-20: YLRL Anniversary Party (c.w.), YLRL (next month).

CODE PROFICIENCY PROGRAM

 Twice each month special transmissions are made to enable you to qualify for the A.R.R.L. Code Proficiency Certificate. The next qualifying run from W1AW will be made on Oct. 17 at 2130 Eastern Daylight Saving Time. Identical texts will be sent simultaneously by automatic transmitters on 3555, 7080, 14,100, 21,010, 28,000, 50,000, and 145,600 kc. The next qualifying run from W1WP only will be transmitted on Oct. 1 at 2100 PDST on 3590 and 7128 kc.

Any person can apply. Neither A.R.R.L. membership nor an amateur license is required. Send copies of all qualifying runs for A.R.R.L. 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 EDT (until October 26 with the return to 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 test sometimes is reversed. To improve your fist, hook up your own key and audio oscillator and attempt to send in step with W1AW.

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for July traffic:

<table>
<thead>
<tr>
<th>Call</th>
<th>Ord.</th>
<th>Recd.</th>
<th>Rel.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
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<td>407</td>
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More-Than-One-Operator Stations

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<td>K6RUMA</td>
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BPL for 100 or more originating-plus-duplicate QSO’s

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<td>W6DFM</td>
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BPL medals are issued to all amateurs in the United States, Canada, Cuba, and U.S. possessions who report to their SCM a message total of 500 or more, or 100 or more originating plus deliveries for any calendar month. All messages must be handled on amateur frequencies within 4 hours of receipt in standard A.R.R.L. form.

Date Subject of Practice Test from August QST
Oct. 6: Mobile Converter — Ho B Plus, p. 16
Oct. 9: Keeping Equipment Cool, p. 18
Oct. 14: 40-Meter Loading Without Harmonics, p. 21
Oct. 15: Filtering . . . the Station Receiver, p. 27
Oct. 21: Safe Tower for a City Lot, p. 30
Oct. 27: Another Peak at PPI, p. 35
Oct. 30: Hands Across the Sea, p. 57

These three members of the NTS Fifth Regional Net live within 25 miles of each other, but in three different states. Left is W5RCF, present RNS manager (Tenn.); center is W4OGG, past RNS manager (Tenn.); and right is W5BJY (Ark.).
## Section Emergency Coordinators of the Amateur Radio Emergency Corps

The Section Emergency Coordinator is appointed by the SCM to take charge of the promotion of the Amateur Radio Emergency Corps organization throughout the Section. He acts as the SCM's executive in the furthering of provisions for emergency amateur radio communications in every community likely to suffer in case of a communications emergency. One of the duties of the SEC is to recommend the appointment of Emergency Coordinators for the various communities in his Section. Does your town have an EC? If not, recommend the name of a likely prospect to the SEC. The SEC invites your questions concerning the status of the AREC in your Section.

| Eastern Pennsylvania | Atlantic Division | Philadelphia 11 |
| Maryland-Delaware-D.C. | | Haddonfield, N.J. |
| Southern New Jersey | | Davenport, Iowa |
| Western New York | | Nashville, Tenn. |
| Western Pennsylvania | | Knoxville, Tenn. |
| Vermont | | Chattanooga, Tenn. |
| New York | | New York City |
| New Jersey | | Paterson, N.J. |
| Massachusetts | | Boston, Mass. |
| Rhode Island | | Providence, R.I. |
| Connecticut | | Waterbury, Conn. |
| New York | | Buffalo, N.Y. |
| New Jersey | | Trenton, N.J. |
| Delaware | | Dover, Del. |
| Maryland | | Baltimore, Md. |
| West Virginia | | Charleston, W.Va. |
| Pennsylvania | | Altoona, Pa. |
| Ohio | | Columbus, Ohio |
| Michigan | | Detroit, Mich. |
| Indiana | | Indianapolis, Ind. |
| Illinois | | Chicago, Ill. |
| Wisconsin | | Milwaukee, Wis. |
| Missouri | | St. Louis, Mo. |
| Arkansas | | Little Rock, Ark. |
| Texas | | Dallas, Tex. |
| Louisiana | | New Orleans, La. |
| Oklahoma | | Oklahoma City, Okla. |
| Arkansas | | Fort Smith, Ark. |
| Louisiana | | Baton Rouge, La. |
| Texas | | Houston, Tex. |
| Missouri | | Kansas City, Mo. |
| Arkansas | | Little Rock, Ark. |
| Louisiana | | Baton Rouge, La. |
| Texas | | Houston, Tex. |
| Oklahoma | | Oklahoma City, Okla. |

| Great Lakes Division | | Great Lakes Division |
| Illinois | | Chicago, Ill. |
| Wisconsin | | Milwaukee, Wis. |
| Indiana | | Indianapolis, Ind. |
| Michigan | | Detroit, Mich. |
| Ohio | | Cleveland, Ohio |
| Michigan | | Detroit, Mich. |
| Wisconsin | | Milwaukee, Wis. |
| Indiana | | Indianapolis, Ind. |
| Illinois | | Chicago, Ill. |

| Western Division | | Western Division |
| California | | Los Angeles, Calif. |
| Oregon | | Portland, Ore. |
| Nevada | | Las Vegas, Nev. |
| Washington | | Seattle, Wash. |
| Arizona | | Phoenix, Ariz. |
| Colorado | | Denver, Colo. |
| New Mexico | | Albuquerque, N.M. |
| Texas | | Dallas, Tex. |
| Louisiana | | New Orleans, La. |
| Mississippi | | Jackson, Miss. |
| Arkansas | | Little Rock, Ark. |
| Oklahoma | | Oklahoma City, Okla. |
| New Mexico | | Albuquerque, N.M. |
| Texas | | Dallas, Tex. |
| Louisiana | | New Orleans, La. |
| Mississippi | | Jackson, Miss. |
| Arkansas | | Little Rock, Ark. |
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| New Mexico | | Albuquerque, N.M. |
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| New Mexico | | Albuquerque, N.M. |
| Texas | | Dallas, Tex. |
| Louisiana | | New Orleans, La. |
| Mississippi | | Jackson, Miss. |
| Arkansas | | Little Rock, Ark. |
| Oklahoma | | Oklahoma City, Okla. |
| New Mexico | | Albuquerque, N.M. |
| Texas | | Dallas, Tex. |
**ELECTION RESULTS**

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

- **Louisiana** Thomas J. Mrozewski, W5FAMO June 10, 1958
- **North Dakota** Harold A. Wengel, W7HVA Aug. 11, 1958
- **Montana** Vernon L. Phillips, W7NPV/WXI Sept. 1, 1958
- **Nebraska** Ralph E. Harvey, KZ5RV Oct. 1, 1958
- **Nevada** Charles A. Rihmes, W7YIU Oct. 10, 1958

In the Western Pennsylvania Section of the Atlantic Division, Mr. Anthony J. Mrozewski, W3UN, and Mr. Erwin Lange, W3MVW, were nominated. Mr. Mrozewski received 251 votes and Mr. Lange received 226 votes. Mr. Mrozewski's term of office began August 7, 1958.

In the Kentucky Section of the Great Lakes Division, Mr. Robert A. Thomason, W8SD, and Mr. Albert M. Barnes, W8KWW, were nominated. Mr. Thomason received 121 votes and Mr. Barnes received 119 votes. Mr. Thomason's term of office began August 16, 1958.

In the Wyoming Section of the Rocky Mountain Division, Mr. L. D. Branson, W7AMU, and Mr. Wayne M. Moore, W7CQL, were nominated. Mr. Branson received 31 votes and Mr. Moore received 29 votes. Mr. Branson's term of office began August 22, 1958.

**Registered Your Net?**

To make sure your net appears in the net listings scheduled for upcoming QSTs and for the printed, cross-indexed available later this year, be sure to furnish the Communications Dept. with all necessary information as shown in the sample form on page 82 of last month's QST. If you do not have this issue, write ARRL for form CD-85 which contains spaces for all data needed to assure registration of your net.

W0PME sent us this shot of some Missouri "brass" taken at a club picnic in Springfield last fall. Seated at the table are W0OUD (RM and former SCM), W0GBJ (another former SCM) and W0HUI (EC and former SEC).

Standing behind them is W0EDE.

**MEET THE SCMs**

The Reverend Francis A. Peterson, W7RKL, SCM of Idaho, was licensed in 1951 after an interest of several years in the art.

While busy week ends do not permit Father Peterson to indulge in contests, he occasionally manages to get on for rag-chewing and experimenting with transistors and different circuits and equipment designs. SCM Peterson formerly was NOS and published the newsletter Hambone for the FARM Net.

W7RKL's transmitting equipment includes a Viking I, a linear (616 and 811) and an s.s.b. filter exciter as well as several low-power transmitters. All rigs but the Viking are completely homemade. Bands covered are 100 to 6 meters but 75 is most used. Receiving equipment consists of an NC-173 plus a Q-5-er and a Q multiplier. The antenna is an all-band doublet 120 feet long.

His hobbies are photography, classical music, writing (he writes practical radio articles for magazines) and organ-playing. His favorite sports are football and basketball.

**ELECTION NOTICE**

(To all ARRL members residing in the Sections listed below)

You are hereby notified that an election for Section Communications Manager is about to be held in your respective Section. The notice superseded previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be in West Hartford, Conn., on or before noon on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, there is no time to return invalid or missing for additions, a petition may be found invalid by reason of expiring memberships, individual signatures uncertain or ignorant of their membership status, etc.

The following nomination form is suggested. (Signers will please add city and street addresses to facilitate checking membership.)

Communications Manager, ARRL, 38 LaSalle Road, West Hartford, Conn.

We, the undersigned full members of the, hereby nominate, as candidate the Section Communications Manager for this Section for the next two-year term of office.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates.

You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

<table>
<thead>
<tr>
<th>Section</th>
<th>Closing Date</th>
<th>SCM</th>
<th>Term Ends</th>
</tr>
</thead>
</table>
National RTTY Calling and Working Functions

3620 kc. 7140 kc.

These frequencies are employed throughout the United States by amateurs using RTTY.
ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, Richard B. Metzger, W3NG—SEC; DVB, EM; PDM; PAM; TFEJ. The E. Pa. Net meets Mon. through Fri. at 1830 on 3610 kc, PFN meets Mon. through Fri. at 1800 on 3610 kc. New appointments: UTUt and K3ALD as SCM's; D'B. KFQ.

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IDENTIFICATION—
LOGS AND SSB

For the past two or three years there have been various conflicting views among the SSB contingent on station identification and log keeping as they apply to SSB roundtables.

In regard to identification in roundtables, the ideas on what it takes to satisfy F.C.C. requirements range from “This is W9XXX transmitting,” or “W9ZZZ and the group, this is W9XXX,” to the cumbersome listing of every station in the roundtable, followed by “This is W9XXX.”

Keeping the station log in large roundtables is another long standing problem. In an attempt to find solutions, these points were discussed with a member of the F.C.C.’s Washington staff during the recent 1958 National ARRL Convention. The following is understood to be correct:

1. Station identification, which must be made at least once every ten minutes in an established roundtable, need not list every station in the group, but “This is W9XXX” is not sufficient. “W9ZZZ and the group, this is W9XXX” was indicated as a short identification procedure which completely satisfies the legal requirements.

2. The station log must include the time the station enters the roundtable, the time of leaving the roundtable, and the calls of stations actually called or contacted. Therefore, in a roundtable of seven stations, if W9XXX calls or contacts a total of only five of these stations, it is necessary that only these five be listed. In addition, if various stations sign in and out of the roundtable while W9XXX is operating, it is not required that W9XXX list the times of their entry and departure. The only times which must be listed are the times of entry and departure of the station keeping the log.

It is hoped that the issuance of this information will help a little toward clearing up the uncertainty which presently exists on these questions.

— Tom Stuart W9REP

Advertisement
These new Viking "Matchboxes" provide completely integrated antenna matching and switching systems for kilowatt or 275-watt transmitters. Units are complete with built-in directional coupler and indicator providing continuous monitoring of either incident or reflected transmission line power. Bandswitching 80, 40, 20, 15, and 11-10 meters and completely front panel controlled, these versatile "Matchboxes" quickly and easily match the transmitter to balanced or unbalanced lines over a wide range of antenna impedances. In addition, units are capable of tuning out large amounts of capacitive or inductive reactance. Revolutionary circuit design does away with the annoying use of "plug-in" coils and completely eliminates "load-tapping" necessary in other antenna couplers.

"Matchboxes" are also designed to provide separate matching of the antenna system to receiver. Self-contained, heavy duty change-over relay switches antenna from receiver to transmitter, grounding the receiver antenna terminal and muting the receiver while transmitting. Units are supplied wired and pre-tested only—complete instructions included.

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<td>Balanced Line: 50 to 1500 Unbalanced Line: 50 to 2000</td>
</tr>
<tr>
<td>250-30-3</td>
<td>1000</td>
<td>Balanced Line: 50 to 1500 Unbalanced Line: 50 to 2000</td>
</tr>
</tbody>
</table>

275 WATT "MATCHBOX"—For transmitters with a maximum power input of 275 watts.
Cat. No. 250-23-3 With built-in Directional Coupler & Indicator. $86.50
250-23 Less built-in Directional Coupler & Indicator. $54.95

KILOWATT "MATCHBOX"—For transmitters with a maximum power input of 1000 watts. Antenna change-over system includes time delay circuit for relay, providing "fast make—slow break" action.
Cat. No. 250-30-3 With built-in Directional Coupler & Indicator $149.50
250-30 Less built-in Directional Coupler & Indicator $124.50
VIKING "NAVIGATOR" TRANSMITTER/EXCITER
More than a novice transmitter—also serves as a flexible VFO-Exciter delivering enough RF power to excite most high powered amplifiers on CW and AM! 40 watts CW input—6146 final amplifier tube—wide range pi-network output. Built-in VFO or crystal control—bandswitching 160 through 10 meters. Timed sequence keying. TVI suppressed and filtered. Complete with tubes, less crystals.
Cat. No. 240-126-1...KIt...........................Amateur Net $149.50
Cat. No. 240-126-2...Wired and tested. .Amateur Net $199.50

VIKING "ADVENTURER" TRANSMITTER
Perfect for the novice or experienced amateur! 50 watts CW input—bandswitching 80 through 10 meters. Crystal or external VFO control. Rugged 807 final amplifier tube—wide range pi-network output. Clean, crisp keying. TVI suppressed. Complete with tubes, less crystals.
Cat. No. 240-181-1...KIt. ......................Amateur Net $129.50
Cat. No. 240-181-2...Wired. ..................Amateur Net $169.50

VIKING "6N2" TRANSMITTER
This compact VHF transmitter punches your signal out with 150 watts CW and 100 watts phone input. Instant bandswitching 6 and 2 meters. Completely shielded and TVI suppressed. Complété with tubes, less crystals.
Cat. No. 240-201-1...Kit. ......................Amateur Net $129.50
Cat. No. 240-201-2...Wired. ..................Amateur Net $169.50

VIKING "THUNDERBOLT" AMPLIFIER
Rated at 2000 watts P.E.P.* input SSB; 1000 watts CW; 500 watts AM linear! Continuous coverage 3.5 to 30 mcs.—instant bandswitching. May be driven by the Viking "Ranger," "Pacemaker," or other unit of comparable output. Drive requirements: approx. 10 watts Class AB2 linear, 20 watts Class C continuous wave. Employs two 4-400A tetrodes in parallel—wide range pi-network output. With tubes.
Cat. No. 240-353-1...Kit. ......................Amateur Net $524.50
Cat. No. 240-353-2...Wired. ..................Amateur Net $589.50

VIKING "COURIER" AMPLIFIER
This power-packed Class B linear amplifier is rated 500 watts P.E.P. input with aux. SSB exciter—900 watts CW and 200 watts AM! Continuous coverage 3.5 to 30 mcs. May be driven by the Viking "Ranger," "Pacemaker" or other unit of comparable output. Drive requirements: 5 to 35 watts. Employs two 811A triodes in parallel—wide range pi-network output. Fully TVI suppressed. Complete with tubes.
Cat. No. 240-332-1...Kit. ......................$244.50
Cat. No. 240-332-2...Wired. ..................$289.50

VIKING "FIVE HUNDRED" TRANSMITTER
Rated 600 watts CW input . . . 500 watts phone and SSB (P.E.P. with auxiliary SSB exciter)—instant bandswitching 80 through 10 meters! Compact RF unit designed for desk-top operation—power supply/modulator unit may be placed in any convenient location. All exciter stages ganged to VFO tuning. High gain push-to-talk audio system. Operates by crystal control or highly stable, built-in VFO. Class C 4-400A final amplifier provides plate circuit efficiencies in excess of 80% with unequalled broadcast-type high level amplitude modulation. Wide range pi-network output circuit with silver-plated final tank coil will load virtually any antenna system. Low level audio clipping—effectively TVI suppressed and filtered. Complete with tubes, less crystals.
Cat. No. 240-500-1...KIt. ......................$749.50
Cat. No. 240-500-2...Wired. ..................$949.50

VIKING "FIVE HUNDRED" TRANSMITTER
Rated 600 watts CW input . . . 500 watts phone and SSB (P.E.P. with auxiliary SSB exciter)—instant bandswitching 80 through 10 meters! Compact RF unit designed for desk-top operation—power supply/modulator unit may be placed in any convenient location. All exciter stages ganged to VFO tuning. High gain push-to-talk audio system. Operates by crystal control or highly stable, built-in VFO. Class C 4-400A final amplifier provides plate circuit efficiencies in excess of 80% with unequalled broadcast-type high level amplitude modulation. Wide range pi-network output circuit with silver-plated final tank coil will load virtually any antenna system. Low level audio clipping—effectively TVI suppressed and filtered. Complete with tubes, less crystals.
Cat. No. 240-500-1...KIt. ......................$749.50
Cat. No. 240-500-2...Wired. ..................$949.50

VIKING "FOUR HUNDRED" TRANSMITTER
This compact VHF transmitter punches your signal out with 150 watts CW and 100 watts phone input. Instant bandswitching 6 and 2 meters. Completely shielded and TVI suppressed. Complété with tubes, less crystals.
Cat. No. 240-201-1...Kit. ......................$129.50
Cat. No. 240-201-2...Wired. ..................$169.50

More than one-half kilowatt of power and operating convenience!

For full information see your
Johnson Distributor
All of these licensed radio amateurs make important contributions to the Heath line of fine ham kits. In a sense, they are your personal representatives within the company, because their design ideas and performance preferences reflect not only their own "on-the-air" experiences, but those of the amateur fraternity with which they are in constant contact. With this kind of representation in Benton Harbor, you can continue to rely on high-performance Heathkit amateur radio equipment designed by hams, for hams!

If high efficiency at low cost in a CW transmitter interests you, you should be using a DX-20! It employs a single 6DQ6A tube in the final Amplifier stage for plate power input of 50 watts. The oscillator stage is a 6CL6, and the rectifier is a 5U4GB. Single-knob band-switching is featured to cover 80, 40, 20, 15, 11 and 10 meters, and a pi network output circuit matches antenna impedences between 50 and 1000 ohms to reduce harmonic output. Designed for the novice as well as the advanced class CW operator. The transmitter is actually fun to build, even for a beginner, with complete step-by-step instructions and pictorial diagrams. All the parts are top-quality and well rated for their application. "Potted" transformers, copper-plated chassis, and ceramic switch insulation are typical. Mechanical and electrical construction is such that TVI problems are minimized. If you desire a good clean CW signal, this is the transmitter for you! Shpg. Wt. 19 lbs.
HEATHKIT “APACHE” HAM TRANSMITTER KIT

- Newly Designed VFO—Provision For S.S.B. Adapter
- Modern Styling—Rotating Slide Rule Dial

MODEL
TX-1 $229.50

Shipped motor freight unless otherwise specified. $50.00 deposit required on C.O.D. orders.

Fresh out of the Heath Company laboratories, the brand-new “Apache” model TX-1 Ham Transmitter features modern styling and is designed as a handsome companion to the also-new Heathkit “Mohawk” receiver. The “Apache” is a high quality transmitter operating with 150 watt phone input and 180 watt CW input. In addition to CW and phone operation, the “Apache” features built-in switch-selected circuitry providing for single-sideband transmission through the use of a plug-in single-sideband adapter. These Heathkit adapters will be available in the near future. A compact, stable and completely redesigned VFO provides low drift frequency control necessary for single-sideband transmission. An easy-to-read slide rule type illuminated rotating VFO dial with vernier tuning provides ample bandwidth and precise frequency setting. Simple band-switching control allows flip-of-the-wrist selection of the amateur bands on 80, 40, 20, 15 and 10 meters (11 M with crystal control). The “Apache” features adjustable low level speech clipping and a low distortion modulator stage employing two of the new 6CA7/EL-34 tubes in push-pull class AB operation. The final amplifier is completely enclosed in a perforated aluminum shielding for greater TVI protection and transmitter stability. Cabinet comes completely preassembled with top hatch for convenient access without taking chassis out of cabinet. Die-cast aluminum knobs and front panel escutcheons add to the attractive styling of the transmitter. Pi network output coupling matches antenna impedances between 50 and 72 ohms. Incorporates all the refinements necessary with many “plus” features for effective and dependable communications. Shpg. Wt. 115 lbs.

HEATHKIT “MOHAWK” HAM RECEIVER KIT

- All Critical Circuits Prewired and Aligned
- Crystal Controlled Oscillators for Drift-Free Reception

MODEL
RX-1 $274.95

Shipped motor freight unless otherwise specified. $50.00 deposit required on C.O.D. orders.

Outstanding results can be expected with the new “Mohawk” receiver which is designed to combine all the necessary functions required in a high quality communications receiver. A perfect companion for the Heathkit “Apache” transmitter, the “Mohawk” features the same wide-band slide rule type vernier tuning and covers all of the amateur bands from 160 through 10 meters on seven bands with an extra band calibrated to cover 6 and 2 meters using a converter. External receiver powered, accommodations are available for these converters which will be available in Heathkits soon. The “Mohawk” is specially designed for single-sideband reception with crystal controlled oscillators for upper and lower sideband selection. A completely preassembled, wired and aligned front end assures ease of assembly. All critical wiring is done for you insuring top performance. This 15-tube receiver features double conversion with IF’s at 1682 kc and 90 kc. Five selectivity positions from 6 kc to 500 CPS. A bridged T-notch filter is employed for maximum heterodyne rejection. Complete accuracy is obtained with the use of a built-in 100 kc crystal calibrator and the set features 10 db signal-to-noise ratio at less than 1 microvolt input. S-meter and many other fine features built-in for top-notch signal reception. Shpg. Wt. 90 lbs.
HEATHKIT PHONE & CW TRANSMITTER KIT

The DX-40 incorporates the same high quality and stability as the DX-100, but is a lower powered rig for crystal operation, or for use with an external VFO. Plate power input is 75 watts on CW, permitting the novice to utilize maximum power. An efficient, control-carrier modulator for phone operation peaks up to 60 watts, so that the rig has tremendous appeal to the general class operator also. Single-knob switching covers 80, 40, 20, 15, 11 and 10 meters. Pi network output coupling makes for easy antenna loading, and pi network interstage coupling between the buffer and final amplifier improves stability and attenuates harmonics. A line filter is incorporated for power line isolation. The efficient oscillator and buffer circuits provide adequate drive to the 6146 final amplifier from 80 to 10 meters, even with an 80-meter crystal. A drive control adjustment is provided, and the function switch incorporates an extra "tune" position so that the buffer stage can be pretuned before the final is switched on. A switch selects any of three crystals, or a jack for external VFO. High quality D'Arsonval meter for tuning. Shpg. Wt. 26 lbs.

HEATHKIT DX-100 PHONE & CW TRANSMITTER KIT

You get more for your transmitter dollar when you decide on a DX-100 for your ham shack! Recognized as a leader in its power class, the DX-100 offers such features as a built-in VFO, built-in modulator, TVI suppression, pi network output coupling to match a variety of antenna impedances from 50 to 600 ohms, pi network interstage coupling, and high quality materials throughout. Copper plated 16-gauge steel chassis, ceramic switch contacts, etc., are typical of the kind of parts you get, in assembling this fine rig. The DX-100 covers 160, 80, 40, 20, 15, 11 and 10 meters with a single band-switch, and with VFO or crystal operation on all bands. RF output is in excess of 100 watts on phone and 120 watts on CW, with a pair of 6146 tubes in parallel for the final amplifier, modulated by a pair of 1625 tubes in parallel. VFO tuning dial and panel meter are both illuminated for easy reading, even under subdued lighting conditions. Attractive front panel and case styling is completely functional, for operating convenience. Designed exclusively for easy step-by-step assembly. No other transmitter in this power class combines high quality and real economy so effectively. Here is a transmitter that you will be proud to own. Time payments are available! Shpg. Wt. 107 lbs.

HEATHKIT GRID DIP METER KIT

A Grid Dip Meter is basically an RF Oscillator used to determine the frequency of other Oscillators, or tuned circuits. Numerous other applications such as pretuning, neutralization, locating parasitics, correcting TVI, adjusting antennas, designing new coils, etc., are typical of the kind of parts you get, in assembling this fine rig. Has sensitivity control and a phone jack for listening to the "Zero-Beat". Will also double as an absorption-type wave meter. Shpg. Wt. 1 lb. No. 341-A $3.00

more fine ham gear from the pioneer

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HEATH COMPANY
A Subsidiary of Daystrom, Inc.
BENTON HARBOR 9, MICHIGAN
HEATHKIT ALL-BAND COMMUNICATIONS-TYPE RECEIVER KIT

Ideal for the short wave listener or beginning amateur, this Receiver covers 550 KC through 30 MC in four bands. It provides good sensitivity and selectivity, combined with fine image rejection. Amateur bands are clearly marked on the illuminated dial scale. Features transformer type—power supply—electrical band spread—antenna trimmer—separate RF and AF gain controls—noise limiter—internal 5½” speaker—head phone jack and AGC. Has built-in BFO for CW reception. An accessory power socket is also provided for connecting the Heathkit model QF-1 Q Multiplier. Will supply 250 VDC at 15 ma and 12.6 VAC at 300 ma. Shpg. Wt. 12 lbs. Cabinet: Fabric covered cabinet with aluminum panel as shown part 91-15A. Shpg. Wt. 5 lbs. $4.95.

MODEL AR-3

$29.95

HEATHKIT ELECTRONIC VOICE CONTROL KIT

Here is a new and exciting kit that will add greatly to your enjoyment in the ham shack. Allows you to switch from Receiver to Transmitter merely by talking into your microphone. Lets you operate “break-in” with an ordinary AM transmitter. A terminal strip is provided for Receiver and speaker connections and also for a 117 volt antenna relay. Unit is adjustable to all conditions by sensitivity and gain controls provided. Easy to build with complete instructions provided. Requires no transmitter or Receiver alterations to operate. Shpg. Wt. 5 lbs. $23.95.

MODEL VX-1

$23.95

HEATHKIT “Q” MULTIPLIER KIT

This fine Q Multiplier is a worthwhile addition to any communications, or Broadcast Receiver. It provides additional selectivity for separating signals, or will reject one signal and eliminate a heterodyne. Functions with any AM Receiver having an IF frequency between 450 and 460 KC that is not AC-DC type. Operates from your Receiver power supply, and requires only 6.3 VAC at 300 ma (or 12.6 VAC at 150 ma), and 150 to 250 VDC at 2 ma. Simple to connect with cable and plugs supplied. Effective Q of approximately 4000 for sharp “peak” or “null”. A tremendous help on crowded phone or CW bands. Shpg. Wt. 3 lbs. $9.95.

MODEL QF-1

$9.95

NOTE: $10.65 WHEN ORDERED WITH AR-3 BECAUSE OF EXCISE TAX.

HEATHKIT “AUTOMATIC” CONELRAD ALARM KIT

Designed to give instant warning whenever a monitored station goes off the air, the CA-1 automatically cuts the AC power to your transmitter, and lights a red indicator. Works with any radio receiver; AC-DC—transformer operated—battery powered, so long as the receiver has AVC. A manual “reset” button is provided to reacivate the transmitter. Incorporates a heavy-duty 6-ampere relay, a thyratron tube, and its own built-in power supply. A neon lamp shows that the alarm is working. Simple to install and connect with complete instructions provided for assembly and operation. Shpg. Wt. 4 lbs. $13.95.

MODEL CA-1

$13.95

...in do-it-yourself electronics!

109
HEATHKIT VARIABLE FREQUENCY OSCILLATOR KIT

Enjoy the convenience and flexibility of VFO operation by obtaining this fine variable frequency oscillator. It covers 160-80-40-20-15-11 and 10 meters with three basic oscillator frequencies. Better than 10 volt average RF output on fundamentals. Requires 250 volts DC at 15 to 20 ma, and 6.3 VAC at 0.45 a, available on most transmitters. It features voltage regulation for frequency stability, and has illuminated frequency dial. VFO operation allows you to move out from under interference and select the portion of the band you want to use without having to be tied down to only 2 or 3 frequencies through the use of crystals. "Zero in" on the other fellow's signal and return his CQ on his own frequency! Shpg. Wt. 7 lbs.

MODEL VF-1 $19.50

HEATHKIT REFLECTED POWER METER KIT

A necessity in every well equipped ham shack, the model AM-2 lets you check the match of the antenna transmission system, by measuring the forward and reflected power or standing wave ratio. Handles up to one kilowatt of energy on all bands from 160 to 2 meters, and may be left in the antenna system feed line at all times. Input and output impedances for 60 or 75 ohm lines. No external power required for operation. Meter indicates percentage forward and reflected power, and standing wave ratio from 1:1 to 6:1. Shpg. Wt. 3 lbs.

MODEL AM-2 $15.95

HEATHKIT BALUN COIL KIT

This convenient transmitter accessory has the capability of matching unbalanced coax lines, used on most modern transmitters, to balanced lines of either 75 or 300 ohms impedance. Design of the bifilar wound Balun Coils will enable transmitters with unbalanced output to operate into balanced transmission line, such as used with dipoles, folded dipoles or any balanced antenna system. Can be used with transmitters and Receivers without adjustment over the frequency range of 80 through 10 meters. Will handle power inputs up to 200 watts. Shpg. Wt. 4 lbs.

MODEL B-1 $8.95

save ½ or more . . . with HEATHKITS

FREE 1958 Catalog

Send for this Free Informative catalog listing our entire line of kits, with complete schematics and specifications.

□ Rush Free 1958 catalog.
No Time For Repairs

During an Emergency!

For test . . . or for real—it's a secure feeling to know you'll be on the air when an emergency arises. Preventive maintenance with Mallory components is one of the very best forms of insurance you can get. Once an emergency has arisen, it's too late to do those "put-off" repair jobs.

For example, there is no finer filter capacitor than a Mallory FP. Etched cathodes, high temperature ratings, stable capacities, and dependable voltage ratings all contribute toward reliable operation under the toughest conditions.

If you need tubular capacitors, look to Mallory "Gems"—the complete line of moisture-proof, performance-proven replacements. Or for ceramic disc capacitors, the famous line of Mallory-RMC "Discaps"® are now available to the Ham.

Mallory also offers a broad line of carbon controls—conventional or printed circuit types . . . with rotary switches, or new style push-pull switches. The Mallory "Sta-Loc"® line enables your distributor to custom-assemble virtually any combination of dual concentric controls you need from stock components—in just 30 seconds.

Be ready for work or play. See your Mallory Distributor for your replacement and new equipment needs. Ask him for a Mallory Catalog on the components in which you are interested—or write the Mallory Ham Shack, P. R. Mallory & Co. Inc., P.O. Box 1558, Indianapolis 6, Ind.

*Trade Mark

P. R. MALLORY & CO. INC.
P. O. BOX 1558
INDIANAPOLIS 6, INDIANA
Hallicrafters' SSB-VHF Contest offers you another great opportunity to share in more than $14,000 worth of prizes!

To enter this tremendous contest, simply visit one of the participating distributors and see a demonstration of Hallicrafters' latest SSB-VHF equipment.

Enter today! You may win a gift certificate worth $100.00 as a local winner . . . plus a chance to win one of the five grand prizes illustrated above!

**HERE'S HOW YOU ENTER—**

1. Go to one of the distributors listed here—any time during the month of October. See a demonstration of Hallicrafters' latest equipment.

2. Fill out the entry card which your distributor will supply you, including call letters and completion of, in 50 words or less, either of these two statements:
   (a) "I prefer Hallicrafters single sideband equipment because . . . ."
   (b) "I prefer Hallicrafters V.H.F. equipment because . . . ."

3. Turn in card to distributor—do not mail to Hallicrafters. Each distributor will judge his entries and select his local winner. More than 100 such local awards will be made to entrants submitting the best, most sincere and original statements in the opinion of the distributor or other individual(s) he may designate.

4. Each local winner will receive from this distributor a Gift Certificate worth $100.00 toward the purchase of any model of Hallicrafters communications equipment. Decision of the distributors' judges shall be final.

5. Local winners' names and entry statements will be forwarded to the Hallicrafters Company, where a panel of judges will select 1st, 2nd, 3rd, 4th and 5th place Grand Winners. Prizes to be awarded
are illustrated above. Judges decisions shall be final.

6. Entries become the property of the Halli-
crafters Company, and will not be returned. Win-
ing statements may be published by the Halli-
crafters Company and winners identified.

The Hallcrafters Co.
Chicago 24, Illinois
"I am now using the Gotham V80 vertical antenna with only 55 watts, and I am getting fantastic reports from all over the world". VP1SD

ALL-BAND VERTICAL ANTENNAS

Gotham's sensational new vertical antennas give unsurpassed multi-band performance. Each antenna can be assembled in less than two minutes, and requires no special tools or electronic equipment. In the V160, resonance in the 160, 80, 75, and 40 meter bands is secured through use of the proper portion of the loading coil. Yet, when the coil is eliminated or bypassed, the V160 will operate on 20, 15, 10 and 6 meters! The same idea applies to our V80 and V10 multi-band verticals. No guy wires needed: rugged, occupies little space, proven and tested.

Simple design and superior materials give all-band operation, and effective, omni-directional radiation. Gotham verticals are rugged, with low initial cost and no maintenance. Guaranteed Gotham quality at low Gotham prices. Perfect for the novice with five watts or the expert with a kilowatt.

10% PRICE SLASH!
TAKE 10% WHEN ORDERING

Airmail Order Today — We Ship Tomorrow
GOTHAM Dept. QST
1805 PURDY AVE., MIAMI BEACH, FLA.

Enclosed find check or money-order for:
V40 vertical for 40, 20, 15, 10, 6 meters ............... $14.95 □
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters ............. $16.95 □
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters .... $18.95 □

Name........................................................................
Address ....................................................................
City ...................... Zone ........ State .............

QUALITY MATERIAL
Brand new mill stock aluminum alloy tubing with Aluminate finish for protection against corrosion. Loading coils made by Barker & Williamson.

ALL-BAND OPERATION
Switch from one band to another. Operate anywhere from 6 to 160 meters. Work the DX on whatever band is open.

EASY ASSEMBLY
Less than two minutes is all you need to put your vertical together. No special tools or electronic equipment required. Full instructions given.

SIMPLE INSTALLATION
Goes almost anywhere. On the ground, on the roof, or outside your window.

AMAZING PERFORMANCE
Hundreds of reports of exceptional DX operation on both low and high power. You will work wonders with a Gotham vertical.

PROVEN DESIGN
Over a thousand Gotham verticals are on the air—working the world and proving the superiority of Gotham design.

AND THE PRICE IS RIGHT!
"I worked LU3ZS on Half Moon Island in Antarctica on Dec. 26 at 21150 Kc. I was using my Gotham V80 vertical antenna and only 35 watts." KN5GLI

HOW TO ORDER. Send check or money order directly to Gotham or visit your local distributor. Immediate shipment by Railway Express, charges collect. Foreign orders accepted.

WORK THE WORLD

GOTHAM 1805 PURDY AVENUE
MIAMI BEACH 39, FLA.
YOU COULD WORK WONDERS IF YOU HAD A GOTHAM BEAM!

Study these specifications—compare them—and you too will agree, along with thousands of hams, that GOTHAM beams are of the best!

TYPE OF BEAM. All GOTHAM beams are of the full half-wave plumber's delight type; i.e., all metal and grounded at the center. No wood, tuning stubs, baluns, coils, or any other devices are used.

MORE DX CONTACTS

GAIN. GOTHAM beams give the maximum gain obtainable. Our 2-element beams give a power gain of four (equivalent to 6 db.); our 3-element beams give a power gain of seven (8.1 db.); and our 4-element beams give a power gain of nine (9.6 db.).

THOUSANDS IN DAILY USE

MATCHING. Matching of the transmission line to the beam is extremely simple and quick. No electronic equipment or measuring devices are required.

ALCOA QUALITY ALUMINUM

ASSEMBLY AND INSTALLATION. No special tools are required for assembly and installation. Entire assembly can be done by one man in less than an hour. Full instructions are included with each beam.

CONSISTENT PERFORMANCE

MAST. Any GOTHAM beam can be mounted on a simple pipe mast. Diameter of the pipe should be between 3/4” and 1 1/4”.

YOU WILL WORK THE WORLD

STANDARD AND DELUXE BEAMS. Standard beams in the 6, 10 and 15 meter bands use 3/4” and 3/4” tubing elements; the deluxe models for these bands use 1” and 1 1/8”. In 20 meter beams, the standard has a single boom, while the deluxe uses twin booms.

TRIBANDER BEAMS

6-10-15 TRIBANDER ...........................................$39.95
10-15-20 TRIBANDER .................................. 49.95

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, colls, 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.

TWO BANDER BEAMS

6-10 TWO BANDER ...........................................$29.95
10-15 TWO BANDER .................................. 34.95
10-20 TWO BANDER .................................. 36.95
15-20 TWO BANDER .................................. 38.95

Each Two Banders has twin 12’ booms, and full-size half-wave elements. 7/8” and 1 1/8” aluminum alloy tubing, all castings and fittings are supplied. Assembly is easy.

NEW! RUGGEDIZED HI-GAIN 6, 10, 15 METER BEAMS

Each has a TWO BANDER, 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.

<table>
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<th>Beam</th>
<th>Price</th>
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<tr>
<td>R6 (6 Meters, 4-EI)</td>
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<tr>
<td>R10 (10 Meters, 4-EI)</td>
<td>40.95</td>
</tr>
<tr>
<td>R15 (15 Meters, 3-EI)</td>
<td>49.95</td>
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Name ..........................................................
Address .........................................................
City ......................................................... Zone State

Airmail Order Today—We Ship Tomorrow

GOTHAM Dept. GSS
1805 PURDY AVE., MIAMI BEACH, FLA.

Enclosed find check or money order for:

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10% PRICE SLASH!

YOU COULD WORK WONDERS IF YOU HAD A GOTHAM BEAM!

10% PRICE SLASH!

PUT AMERICA BACK TO WORK!

TAKE 10% OFF WHEN ORDERING

YOU WILL WORK THE WORLD
**Globe Hi-Bander**

- Complete transmitter, bandswitching 80-10M.
- Min. 45db carrier suppression. 2-stage RF section, pi-net, speech clipping. Inverse neg. feedback. Ceramic hand and function switches. Narrow bandwidth. Forward Look.

**Globe's VOX Model 10**

For voice operated control, with extra contacts for auxiliary circuits. Plug in socket at rear of DSB Xmttr. Adaptable for other Xmttrs.

**Globe Scout 680A**

- For 160-10M output. Vener drive with short absorbing features, Self-contained, well-filtered power supply with voltage regulation.
- Model 666 for 6M. W/T only. $49.95

**Power Attenuator PA-1**

Use with Xmttr. up to 70w input: for swapping drive to linear amplifiers. Three power reduction positions. Coax input and output. W/T: $10.95

**Antenna Tuner with VSWR Bridge**

- For Xmttr. with final RF input up to 600w, 80-10M. Fixed link coupling in input. Coax input, 2-wire balanced output. Monitor SWR between Tuner and Xmttr.
- W/T: $79.50
- Kit: $49.95

**Globe Linear LA-1**

- Complete with well-filtered, power supply. 200w input (AM Class D, 300w DC on 420-10M input) Class B (400-250w on 40-10M section, pi-net) Speech clipping. Inverse neg. feedback. Ceramic hand and function switches. Narrow bandwidth. Forward Look.

**Versatile Modulator Plate Modulator UM-1**

- Modulates RF. Input 80-100w. W/T: $49.95
- For use with Globe Chief. Permits radio-telephone operation, etc.
- Supplies 4-wire audio supplies. Supplied. Self-contained. Con-tinuous, instructions, printed circuits, etc.

**6-Meter Converter**

- Kit: $19.95

**Code Oscillator Kit**


**Peak Limiting Pre-Amplifier Speech Booster FCL-1**

- Perfect for Scout, Hi-Bander & other Xmttrs. Clips and filters speech. Frequency control of pre-set amplitude. Response: 200-3000 cycles increases modulation intensity. W/T: $34.95
- Kit: $18.95

**Write, Wire or Phone for Prompt HARVEY Service!**

**Established 1927**
**Insutrap**

These streamline hy-gain traps are small (3" diameter) and light weight. Capacitor dielectric and coil form molded high impact styron. Each designed to take 1 KW AM, 2000 watts P.E.P. (as much as higher priced tribanders; more than 3-times the power handling capabilities of others. No need to limit your present or future power to 300 watts!) Individually factory resonated for maximum frequency accuracy. Completely weather sealed, water proof and airtight (do not breathe) for years of stable operation. Carbon activated polyethylene covers. Guarantted for the life of the beam. HI-Q coils well-removed from any metal mean highest efficiency of isolation action.

**Gain & F/B Ratio:**

Hy-Gain's Mini-Tribanders have been carefully tuned for maximum gain and F/B ratio, giving its array Hy-Gain guarantees as much or more gain as any other two and three element split dipole fed 3-band Beam regardless of price.

**Construction**

Boom is 1 1/4" dia. by .065" wall thickness, hot dipped galvanized steel. Elements are 6061T6 high strength aluminum alloy. Telescoping sections of 1", 1 1/2", 3/4" sizes are used. Heavily plated 10 Ga. steel channels attach all elements to boom and boom/mast with positive grip. High quality, galvanized and iridite treated hardware used throughout.

**Split Insulated Dipole**

Split Insulated Dipole Feed with coaxial choke results in SWR of less than 1:1 on all bands with exceptional bandwidth. No adjustments needed; simply attach 52 ohm feedline to dipole terminals. Heavy 12 Ga. hot dipped galvanized steel channel and polyethylene insulated U-bolts support hy-gain's driven element.

**WITH THE COMPLETE HY-GAIN LINE IN STOCK! ASK FOR BROCHURE.**

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HARVEY is known the world over, wherever Hams operate, as a reliable source for Ham Equipment. All orders shipped same day received.
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build your own linear amplifier from the outstanding
LA-400-C KIT

More For Your Money
With Top Quality Parts

Puts out an outstanding signal. Free of parasitic and harmonic radiations, unit permits operation in fringe TV areas.

Operates 75 thru 10 meters, 300 to 500 watts SSB, AM, PM, CW input from 20A; DX20, 35, 40, and all other 10-20 watt exciters or transmitters.

Easy to assemble, clear instructions. Complete with:

• Heavy-duty well-filtered 300 watt CCS, 500 watt ICAS power supply with two 816 mercury vapor rectifiers
• Four 837 tubes in grounded grid operating Class B
• Three-element variable pi-network output puts more power into the antenna: correctly matches output impedances from 25-300 ohms
• Low impedance untuned input of 50-70 ohms
• Three-element variable pi-network output puts more power into the antenna: correctly matches output impedances from 25-300 ohms
• Three-position meter reads: 1. RF drive voltage (tune output), 2. Final plate current, 3. RF power into the antenna: correctly matches output impedances from 25-300 ohms
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• Low impedance untuned input of 50-70 ohms

RF CHOSES

Hi power Model 160-6 has max rating of 5000 watts DC at 2.5 amps. Inductance 162 uh at 5 kc, Heavy-duty well-filtered 300 watt CCS, 500 watt ICAS power supply with two 816 mercury vapor rectifiers

Eighty 75 thru 10 meters, 300 to 500 watts SSB, AM, PM, CW input from 20A; DX20, 35, 40, and all other 10-20 watt exciters or transmitters.

Easy to as-
semble, clear instructions. Complete with:

Choice of gray table model (14x8+10+2x8+6 in.) or gray or black rack models. Ship. wt. 50 lbs.

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Six Meter Transmitting Converter

Model 60A Complete, less Power Supply $49.95
Model 60A Power Supply for above $39.95
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See your distributor or write:
P & H ELECTRONICS, INC.
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TA-32 Jr. two-element rotary beam antenna.
10 - 15 - 20 M.
Rated to 300W.

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It's as easy as "ABC" to enter and win
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Hallicrafters' Contest this month. Just
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you don't even have to mail in the lid off
your neighbor's $100.00 certificate
winners will be drawn from each of the
stores entries. The grand prizes will be
awarded by Hallicrafters from the local
winners' entry blanks.

ENTIRE HALICRAFTERS LINE AVAILABLE
ON RADIO SHACK's "EASY-PAY-PLAN"

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JOB OPENINGS AT RADIO SHACK!
Our current expansion has opened interesting and important positions for Hams in all departments — Sales * Advertising * Merchandising * Warehouse * Stock * Clerical * Office. All inquiries will be held as strictly confidential. Contact Personnel Dept., Radio Shack Corporation, 730 Commonwealth Ave., Boston 17, Mass. Regent 4-1000

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* Ham Gear * Parts, Kits

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omni-directional radiation
Shakespeare WONDEROD

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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.

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<th>Style</th>
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Special 40 & 60 meter bumper mount antennas in 8' lengths — $21.

*marked for intermediate frequencies.

Amateur net

COLUMBIA PRODUCTS CO.
Box 5207, Columbia, S. C.

Subsidiary of the Shakespeare Co.

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Radio amateurs designed and built this versatile VHF converter. Specifically designed to extend the range of any communications receiver through the 6, 2 and 1½ meter amateur bands.

The VHF 126 is an independent receiver with its own power supply utilizing the low-frequency IF stages and audio of your present receiver. Simple to install, it requires no circuit modification to select either VHF or standard communication ranges.

Here’s Why You get “Top-of-the-Hill” Performance

- Extends effective usefulness of any receiver to 225 megacycles
- Performance equals that of costly astronomy receivers
- Dual Conversion eliminates images
- Dual-speed tuning: 1 to 1, 75 to 1
- Heavy, steel cabinet
- Complete shielding reduces spurious radiation below FCC requirements

Range: 48.4 to 54.2 MC; 143.4 to 149.2 MC; 219.4 to 225.2 MC.
Noise Figure: 50 MC—2.5 db; 144 MC—4.0 db; 220 MC—6.0 db.
Calibration: Direct, MC subdivided in 100 KC divisions.
Panel Controls: Antenna changeover switch, band selector, tuning control, line switch.
Dimensions: 16½” wide, 10” deep, 10” high.
Weight: 32 pounds.

YOURS NOW FOR THE FINEST VHF RECEPTION. $239, Amateur Net!

GET THE FACTS about RME equipment—built by Hams, for Hams. Write Dept. Q810 for Bulletin 244. See your RME-Electro-Voice Dealer.
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YOU CAN WIN ONE OF 5 GRAND PRIZES!

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from CARTON to CONTACT in 47 minutes!

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HY-GAIN TRAP VERTICALS

MODEL

14-AV

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Model LC-80 loading coil adds 80-meter operation to the 14-AV Vertical. Only $2.95 Ham Net.

Combination mast and radial roof mounting kit complete with hardware, $9.95 Ham Net.

MULTI-BAND OPERATION

Complete assembly pre-arranged with further adjustments at factory, eliminates band by band. Hy-Gain Trap Vertical maintains SWR of 2 to 1 or less across the whole of each band for which they are designed. (52-ohm coaxial feed line). True "X" wave performance on each band makes possible low "X" loss DX radiating for 6*, 10, 15, 20 & 40 M.

INSU-TRAP

Acting as an insulator at resonant frequencies, but allowing rapid entry of other frequencies to pass freely the Hy-Gain Insu-Traps becomes an automatic electronic switch which isolates various sections of the vertical to make it the proper length for each band. Hy-Gain Traps are exclusive design-fully adjustable condenser plates and are individually factory resonated, maintaining SWR of 2 to 1 or less across all bands. Hy-Gain Insu-Traps are completely weatherproof and shielded. No water or condensation can ever enter. Enclosed in carbon activated polyethylene cover and cap assembly the Hy-Gain Insu-Traps is rated to take the full maximum legal input power. Traps are only 2½" weighing just 8 oz. each.

the Self Supporting

14-AV

$27.95

for 6*, 10, 15, 20 & 40 M

the Self Supporting

12-AV

$19.95

for 6*, 10, 15 & 20 M

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(Continued on page 198)

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JOINTS
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See Page 128
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MILWAUKEE
AMATEUR ELECTRONIC SUPPLY

the fine work you are doing, Earl. We would like a lot more hams in this section to send in activity reports for the column. Traffic: K4JOP, W5AG, KSHZ 92, KS1LS 16, KS3YY 10, KS5HO 9.

LOUISIANA — SCM, Thomas J. Morelli, W5FPM. At a recent examination, check dinner and ham meeting in the Westside ARC installed YTI pres.; VUH, vice-pres.; BUK, secy.; K5KEF, treas.; and INL, act. nur. For the fourth year the club awarded a plaque to JCG as the most valuable member and a certificate to K5ISO as the member who made the most progress from Novice to General Class in one year. DXC, CEW, who has 144 countries worked and 233 confirmed, has been reappointed PAM. K5MDMA had eyewall Q5Os all the way to Florida and back. MAO blanks out trouble and a new ear for the low traffic round, CEZ installed an air conditioner in the shack to help increase the life of power transformers. K5MDA is bucking for an O8 appointment and installed a new ground-plane antenna for 20 meters. K5DAV reports activity in Field Day, K5MMP reports that the WRECS council had an attention of over 150, K3GDL, running 300 watts, has 151 countries worked and 142 confirmed. 14V operates all bands with a B6W and sideband adapter and an HQ-140 receiver. USN’s OHS certificate has been endorsed. All transmissions are on tape, Mon. and Fri. on 7100 and 3750 kc. at 1225 and 1925 CST; Tues., Wed. and Thurs. on 7100 kc. at 1225 CST. Sat. and Sun. on 3750 and 7100 kc. at 1925 CST. The hurricane season is here. Check into one of the phone or c.w. nets and get lined up to help in case of emergency. Check your mobile and emergency gear. Check on your ARRL official appointments, too, and send certificates to the SCM for endorsement. Please send reports only. Traffic: W5CEZ 356, MXQ 9, K5MDA 8.

TENNESSEE — SCM, K. W. Ingram, WA10U— SEC: K5JW, K4Q, NHT, PAM; K5OZ, K5FZ and K40H. The Oak Ridge Club reports 164 hams (including 47 hams) registered at the very first Crossville Picnic. The Chattanooga Choo Choo Hamfest was a big success with approximately 350 present including many celebrities. Congratulations to N6G, O6, on his Frequency Measurement Test report of 4.8 parts per million. The Johnson City Radio Association is a new ARRL affiliated club. The Cookeville Club announces reorganization with PVD as president, K4XO is working 14-meter DX with a new DX-100. TDZ reports that he is looking for 6-meter skeds in Kentucky, Mississippi and Louisiana. The summer slump must have lutt. our trallie totals but we still find 8CHF on the BPL list. Traffic: (July) W5RCF 699, W4CXY 85, W5AA 81, K5MMP 60, K5CHM 48, K4QHZ 44, K4CRB 44, K4CNY 29, K5KLA 14, W4MAG 10, UO 15, PFP 14, PAH 14, K5BFB 13, K5FRO 10, LTA 10, W4IVM 4. (June) K4QOS 81.

GREAT LAKES DIVISION

KENTUCKY — SCM, Albert M. Barnes, W4KKW— SEC: JSH, RAI; K4JL, PA4; W40UD, OGY, K4ECL and LOA. I am glad to be the first to congratulate our new SCM, SUD, and wish Bob the greatest success in his new responsibilities. I hope every ham in Kentucky will cooperate to make this possible. B4KIO is top traffic man with 190 but still is having electronic bug trouble. K4KOP wants to dispose of a Viking Venture antenna. K4KIO reports that he is a new O8B. W4RAZ was appointed a committee of one to organize the Kentucky Council of Clubs. (All club secretaries please note.) K4KOP and K4ULT are using a new L-1375E and K4HZ is now EC for Northern Kentucky. CDA is building a v.f.o. exciter. K4PNA is moving to a new O6K. K4FF is having transmitter trouble. K4QVQ vacancied at Miami Beach. K4W put up a new antenna and can now catch channel 27 in Lexington. K4KOP is active on KPN from Louisville. SCM reports KPN cleared 128 in 30 sessions with OGY, K4QK, K4MMW, K4WBG, K4KAG, K4CLN and JFII as OCS. K4AIR reports KPN cleared 107 in 31 sessions with K4AIS, K4KOP, K4UP, K4KOP, K4PST, K5T and K4KOP as OCS. O5S, Q5C and K4SPJ made 67 contacts while portable 8 in Dayton, Ohio, and has 16 stations confirmed on 10 meters. W4QZ is QRL work. NRCII sends OES, and the BOM for endorsement. Please send reports early. Traffic report of 4.9 parts per million. The Johnson City Radio Association is a new ARRL affiliated club. The Cookeville Club announces reorganization with PVD as president. K4XO is working 14-meter DX with a new DX-100. TDZ reports that he is looking for 6-meter skeds in Kentucky, Mississippi and Louisiana. The summer slump must have lutt. our trallie totals but we still find 8CHF on the BPL list. Traffic: (July) W5RCF 699, W4CXY 85, W5AA 81, K5MMP 60, K5CHM 48, K4QHZ 44, K4CRB 44, K4CNY 29, K5KLA 14, W4MAG 10, UO 15, PFP 14, PAH 14, K5BFB 13, K5FRO 10, LTA 10, W4IVM 4. (June) K4QOS 81.
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Power Input: Maximum 30 watts
Tube Line-Up: Oscillator-Buffer 12BY7
Final: 2E26
Heater Power: 6 Volts
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Crystal: 12MC Fundamental (8MC Fundamental Crystal may be used)
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with RF Gain Control to Reduce Mixer Overloading
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NEWS
FROM TRIAD

W2QDM returned home after a 7-month around-the-world maritime-mobile trip on which 10 meters provided his base of operations. Officers of the V.H.F. Institute, Institute of Radio Engineers, W2SNX, pres.; W2JCI, vice-pres.; W2AUP, treas.; K2-UIH, rec. sec.; and W2KQL, corr. sec., The Lenior RC, K2YRM, is only a few states away from W2RR. His RQG is on 40 meters with a vertical antenna. The Central Queens RC, W242HY, is getting a 6-meter walkie-talkie project from W2KNW. W2DUNES received the CCA Award for phone. W211QU and his XYL, KNZ4AU, welcomed the arrival of their first harmonic with the proper license. W2RTE joined the married group. New stations reported by K2AZT as active on 6 meters are K2DIT, K2ECC, K2QOM, K2PEC, K2QVD and K2YMB. Remember the Hudson Division Convention at Albany. Hope to see you there.


NORTHERN NEW JERSEY—SCM, Lloyd H. Mannmon, W2AG—SEC; W2HN PAM; W2YDE, V.H.F. PA; K2KVR, RM; W2HRY, W2CGG and W2KED, K2VAV made a fine showing in his first CD Party. Tex made over 38,000 points on c.w. W2BVE made BPL for the third time running. W2RDN has added a Viking II to his list of equipment. W2CQP is a new member of the GCARA. W2FZMW visited with W2DLV while on active duty in SF. Redman, K2QHP has a new rig with a pair of 80s in the final, W2QHD is back from a summer at camp. The New Jersey Phone Net held its annual picnic at the estate of K2GTX, K2QZT missed the K2ZK exam. K2ZGO is a regular in NJN and 2N. W2VMX is operating on six meters. NJN activity for July shows 29 sessions held with an attendance of 416 and a traffic total of 203. W2XRXL was the QN1 champ with 27 out of a possible 29. K2ZHH has joined the Section Net certificate. K2QIF is working on an all-band rig, a pair for the N.J. Six-Meter Traffic Net logged 105 stations during the July sessions. W2YDE is expected back on 40 meters soon. The Jersey City ARC will hold a hamfest in the fall. K2GZP has built a new electronic key. W2GUW went back to the 30-year-old Vibroplex after a try at a new electronic key. W2TAW is the new manager of 2N. W2HID, mgr. of NJN, has issued a real fine directory of NJN stations. K2OQU gave an interesting talk on transistors at a recent TCARA meeting. W2TBP was followed at a later meeting with a talk on sweep generators. The Net of Central N.J. held its semi-annual emergency drill in Seaside Heights. K2HHK is the net manager. K2AY has just received his new HT-32 and SX-101. W2RTX has a new crank-up tower. K5UJL, ex-W2TX, is on 20-meter c.w., looking for Middlesex County contacts. The new QTH is Asbury Park. K2QZT has departed for Arkansas, where he will operate as a W5T while at school. K2UIQ is on the air with a broken rib or two after an fall. Her daughter, Nora, has just received her Novice call and is now known as K2NQDQ. Look for them on 40-meter c.w. for a few days. The State for a permanent home in Seattle, Wash. W2QPF is on 6 meters with a net Genet III. K2QSP is a new Transistor Class breeder. He's got a pair of K2QBU. K2DQU is on 15 meters. K2QG is on 2 meters with a new Genet. K2AHQ is burning up 40-meter c.w. with his new antenna. K2QAV is going for the Technician Class license. K2AVZ is on DX-10 with a DX-10. W2AV-32 is active on 40 meters with a homemade 6-matter. K2QNMJ is active on 6 meters. K2QUSQ and K2ZPMB have a new five-element beam on 6 meters. K2QSQ and K2DQQ are expanding for the office of president of the RHSAARC. W2MLX is now a General Class. K2KFP is mobile on all bands 80 through 10 meters. K2DMM put on a demonstration of RACES operation at the opening of the new municipal building in Sayerville. W2AMX assisted with the arrangements. W2JJK is mobile on 2 meters. K2DIE has asked to be considered for a new license. Monmouth County RACES is looking for them on 40-meter c.w. K2KPR will take over. W2GUM and W2PFX attended the National Convention in Washington. K2POO was a summer resident at

Towers
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See Page 128
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- No Tuning or Adjusting
- 61 ST6 Aluminum
- Weight 2 pounds
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MIDWEST DIVISION

IOWA—SCM, Russell B. Marquis, W6BDR. The Burlington Club has received its RACES license. The TLCN is going on winter schedule Oct. 6. NGS, 75-Meter Phone Net manager, spent a cool week in Wisconsin fishing. SCA, LGG and HDR received notice from 4RCM, who was en route to Alaska. The Sioux City Club is developing portable 6-meter gear for c.w. work. KEITF received an OES appointment. AUU is the newest TLCN member. CQU rates BFL for his traffic work in the food area near Audubon. TIJ finally got WAC. Doe and his XYL, operators of KROA, went out to the woods at a picnic at Baird, attended by 41 persons. K5-KUC/0, formerly of Texas, received an SX-101 as a gift from her father-in-law. Ann is quite active on the hosts at a picnic at Baird, attended by 4.1 persons. K5-the Jersey Shore. Traffic: W2B'TE 248, W2RXL 149, W2-MLEW 82, K5QYI 72, W2RZU 68, K5QUS 57, K5QUS 49, W2RZO 34, K5QUS 22, W2RFR 21, W2RGN 14, W2EZW 9, K5QJ 7, W2CIX 6, W2CWC 4, K5QTYU 2, W2VMX 2, K5QWZ 1.

MISSOURI—SCM, James W. Hoover, W6GEP. Net reports: MFN, 12 sessions; QNI 372, QTC 18; NCS, VPQ 4, DWX 5, OHC 3, MON, 33 set, DWX 5, OHC 3. W0S, QTC 122; NCS, OUD 34, RTW 4, GBJ 4, VD 1. Two new stations in West Plains are K5QGQ and K5QGM. QNO in active again and can be found 1700 to 1730 CST. New officers of the Daniel Boone Radio Club, Columbia, are YOR, pres.; K5KXE, vice-pres.; K5LUA, secy. Columbia mobiles were called on several times during May and June to relay weather conditions to the Weather Bureau. K5KWX works 75 and 40 meters. He needs Arizona and Montana for WAS. Just to prove that anything can happen—XYLs of the St. Louis Amateur Radio Club membership gave the OMs a 12-hour stack and matching speaker for the club HQ-102. New officers of the Bandhoppers Radio Club are NTE, pres.; JHL, vice pres.; TRB, secy.; FXX, treas. Hurricane, 60QX (ex-9KSA), who was well known by the prewar 160-meter gang in Kansas City, visited OMM in Independence, K5KGC is NCS for the Kansas Novice Net (SN1) which operates on 7185 kc. at 2000 CST. Anyone with traffic is invited to check in. K5KQK is a new call in Oskosh. K5KVTF has a new Hy-Gain vertical on 15 meters. K5KWX has a new Viking II. K5KEX has a new bandswitching kw. with a 4-1000A final on all bands, 80 through 4 meters. K5HTY moved to New Mexico for a vacation. Traffic: (July) W6CPI 947, VPQ 110, K7K 89, OUD 88, GBJ 71, VD 69, 0MM 48, OYV 37, RTW 34, K5KXC 19, W2ARO 16, RUL 12, QXX 13, GBV 10, K5LRL 8, COX 7, ONK 7, K5KRP 7, K5QYW 5, K5KQ 4, K5QZ 3, W6RCA 3, K5KLQ 2. K5QYI 2, K5KCR 1, QKF 1. (June) K5KXE 12, K5QGQ 10, K5QW 10, K5KX 8, K5QK 5, K5KJ 4, K5QP 1, K5QJ 1. (May) K5KJ 1, QXX 11, K5KQ 10, W6RCA 14.

NEBRASKA—SCM, Charles E. McNeel, W6EXP—The Nebraska 75-Meter Emergency Phone Net had QNI 433 and QTC 54 with 31 stations on roll call during July, as reported by MAO. K5QDGW reports the Morning Phone Net on 2960 kc. daily, had QNI 507 and QTC 231. K5QGW has been appointed net manager for the year for the Morning Net. NIK reports the Western Nebraska Net on 3850 kc. daily, had QNI 555 and QTC 302. K5KJ received a nice letter from K7BAX (ex-W7BAX) of Tucson, Ariz., formerly of Omaha, Guy, at one time the net control station for the Nebraska Phone Net. He will be on 75 meters this fall and would like to contact some of the Nebraska boys. ZWG reports a fine picnic was held at Seward with about 70 in attendance and all had a fine time. MAO has completed a new v.f.o., with the dial calibrated in Braille for K0N0. Traffic: K5QDGW 178, JLY 134, W6NIK 72, K5QGW 58, W6MIA 50, ZJP 4, ZIGZ 38, W2BQ 29, W6VEA 22, SPK 21, K5KUA 19, W5QGQ 16, ZOU 15, UOM 12, K5ELU 10, W6PDJ 10, K5LKS 9, K5LJ 8, W6QIE 7, W6KLU 6, W6QZD 5, W6QDW 4, OKO 4, VGW 4, VDZ 4, ZWF 4, K5QKP 1, W8MTT 1.

NEW ENGLAND DIVISION

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HQ-170
For the amateur who wants the very finest in SSB receivers. Contains all the functions necessary for solid contact in today's crowded bands. 17-Tube superheterodyne. Dual and triple conversion. Separate vernier tuning. Adjustable 60 db notch filter. 6, 10, 15, 20, 40, 80 and 160 meter amateur bands.
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You could pay twice as much, and get no more than the general-coverage HQ-160 quality. Dual conversion. 540 KCS to 31 MCS. SSB. Q-Multiplier. Electrical bandspread. Separate stabilized BFO. Crystal calibrator. Adjustable 60 db notch filter. 13-Tube superheterodyne. Crystal-controlled 2nd IF.
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**C.W.A. ELEVENTH ANNUAL CONNECTICUT QSO PARTY**  
**OCTOBER 4-5, 1958**

All Connecticut amateurs are cordially invited to take part in the 11th Annual Connecticut QSO Party sponsored by the Connecticut Wireless Assn., Inc.

Rules: (1) The party will begin at 5:00 p.m. EDST October 4 and end at 11:00 p.m. EDST October 5. (2) Any and all amateur bands may be used, and either phone, c.w., or both. C.w.-to-phone and cross-band contacts are permitted, but no extra credit is allowed for such QSOs. (3) The general call will be “CQ CN” on c.w. and “CQ Connecticut” on phone. (4) The same station may be counted but once regardless of band. Mobile, portable and home stations covered by the same station license will constitute the same station. (5) Exchange names of town areas. (6) Score one point per contact; multiply contact points by number of town areas worked for final score. (7) Reports must show band, times of QSO, call of stations worked, town area of station worked. All reports must be postmarked no later than November 15 and should be sent to John H. Thompson, W1BIH, P.O. Box 1, Torrington, Conn. (8) Special recognition to the high scorers, the v.h.f. leader, and the top-scoring Novice. All decisions of the C.W.A. Contest Committee will be final.

Here is an opportunity to see how many Connecticut stations you can work in a 30-hour period. Get on the air this October weekend and meet the gang in your section!

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MAINE—SCM, John Fearon. W1LEP—SEC: QJA. PAM: VTA. V.H.F, PAM; JMN. RM: EFR. New appointees: FNT as GPS. Sea Gull Net certificates were awarded to BRU, FNI, FQM and KIBQT. KNIHUB is a new Novice in Belfast. ZHN has an 80-meter linear final working FB. AUR is on s.s.h. with an excellent signal, 50KW/1 is working portable at the Maine Music Camp at Oakland. FBJ is active on 15-meter. (Continued on page 128)
A Card to Address on Lower Panel
Will Bring All The Dope
The Scout Xmttr., housed in the Forward Look cabinet, TVI-shielding, is bandwidthing 6-80M, with high-in power supply. High level modulation maintained. Pi-net output on 10-80M; Llnk-Couplcd on 6M, matching into 30-150 ohms. 52 Pi-Link coupled Meter for monitoring final plate current also indicates approx. RF voltage, 30-150 ohms. 52 Pi-Link coupled Meter for monitoring final plate current also indicates approx. RF voltage, 30-150 ohms.

Grounded Grid Linear Amplifier

Complete with Well-Filtered Power Supply

Kit: $9995
W/T: $12450

The VFO 755A

Highest Output . . Sideband Stability!

Kit: $5995
W/T: $4995

Covera 10-160M, with output on 40 and 100M. Improved vernier dial drive with shock absorption 2¾:1 tuning ratio. Voltage regulation. Approx. 50V RF output: will drive oscillator stage of any Xmttr. on market; plugs into XMTL. socket. Temperature compensated for stability by SSR or DSB. Calibrated switch for zero beating. New Forward Look.

Globe Scout 680-A

6-80M Xmttr.
65w CW, 50w AM, Plate Modulated

Kit: $1495
W/T: $2195

THE LATEST...THE GREATEST...
FROM
GLOBE electronics, inc.
Power Booster PB-1
Ideal for Use with the Scout!

The PB-1 allows straight through operation of the 680-A at 80% more power output, while attenuating harmonics and further suppressing TVI.

Stocking Distributors of all top lines of Ham Radio and Industrial Electronic Parts and Equipment.

ELMAR ELECTRONICS
140-11th St. at Madison
Hlgate 4-7011
Oakland 7, California

(Continued on page 140)
La Insu-Trap
De estabilidad meccánica y eléctrica, la Insu-Trap está ensayada en una caja de polietileno completamente impermeable. Bobinas Hi-Q. No hay dieléctrico de aire.

Triaxial Gamma Match
El sistema de acoplo Triaxial Gamma Match, con precisión coaxial incorporada para cancelar la reactancia, permite una relación de ondas estacionarias de 1:1. Pre-ajustado.

Antenas Verticales con Trampa
Utilizando las Insu-Traps (trampas aisladoras) estos verticales vienen también con el base de nylon para un soporte. Incluye el conjunto de "Capacity Hat" (sombrero condensador) para aumentar la eficiencia de emisión. Relación de ondas estacionarias menor de 2:1 en todas las bandas. Para cables coaxiales de 50 ohm.

- 20-AV para 2 y 4 metros $16.95
- 12-AV para 20 y 30 metros $9.95
- 14-AV para 10-40 metros $27.95
- 16-AV para 30-60 metros $69.50
- 14-AV Juego de material de montaje $8.95

Antenas Doubler para Cuatro y Cinco Bandas
Empieza circuitos Hi-Q, con Insu-Trap y extremos de antena de precisión. Insu-Traps para 10-80 metros $12.50

- 12-AV para 20 y 30 metros $19.95
- 14-AV para 10-40 metros $27.95
- 16-AV para 30-60 metros $69.50
- 14-AV Juego de materiales de montaje $9.95

Antenas Direccionales VHF
He aquí pensado para las bandas VHF de 114, 2 y 6 metros. Construcción sólida en todas sus partes. Utilidad adicional puede conseguirse al montarlos uno por encima del otro. El nuevo sistema "Gammaxial" permite relación de ondas estacionarias de 1:1.

- Model 1M de 3 Elementos ........................................ $15.95
- Model 2M de 8 Elementos ........................................ $26.95
- Model 3M de 10 Elementos ..................................... $6.95
- Model 4M de 10 Elementos ..................................... $9.95
- Model 5M de 10 Elementos ..................................... $10.95

Los fabricantes más importantes del mundo para antenas de comunicaciones para los radio aficionados,

1135 NO. 22nd ST. LINCOLN, NEBRASKA EE. UU.

**En Cualquier Idioma**

**OFFERS THE MOST!**

Las Antenas **Hy-gain** de banda multiple, con trampa

Antenas de Tres Elementos, de Tamaño Entero
Se han vendido más antenas Hy-Gain de tres elementos que todas las demás antenas directacionales juntas. Incluye el sobresaliente Insu-Trap (trampa aisladora) infalible que, con su acción de interrupción automática, aísla efectivamente la resistencia de la antena direccional. El nuevo sistema de acoplo Triaxial Gamma Match permite una relación de ondas estacionarias de 1:1. Construcción sólida en todas sus partes.

Tribander de dos elementos $69.50
Tribander de tres elementos $99.75
Champion de cinco elementos $49.00

Antenas Miniatura de Tres Elementos
El tamaño mínimo practico al cual las Tri-banders pueden reducirse para un funcionamiento eficiente. Posee indicios de fácil rotación; pre-sintonizadas en fabrica, con dimensiones para armado rápido. Radio de giro aproximadamente 1½. Insu-Traps especiales y alimentación de dipolo. Mini-Tribander de tres elementos $49.95
Mini-Tribander de dos elementos $34.95

El Roto-Brake
Por fin, un conjunto rotativo completo, que girar, sujete e indique ... y det que uno se puede tomar, fijar, rotar siempre motor de arranque, de alto momento torsional, que desarrolla 750 lb. en 10,000 rpm, su poder de frena. Gran Mano Circular de Pace con indicador, con luminosa manivela de 10½ de ancho en el perimetro, indica el ángulo y la dirección de la antena direccional.

Rotor con Freno y Indicador de Mapa $149.95

**INDICADOR DE MAPA**

**ROTOR CON FRENO**
HERE'S YOUR CHANCE
to get a B&W SIOO-B TRANSMUTER
CERTIFIED BY FCCA
ITEM NO. T-32

- Covers All Bands from 80-10 Meters
- Permits VFO or Crystal Control on All Frequencies
- Provides Versatility for AM, CW and SSB with the 51SB-B
  - Features Built-in TVI Suppression
  - Has Components Conservatively Rated for Maximum Output
  - And . . . All at the Lowest Cost for Comparative Value

5100-B $525.00

There isn't a transmitter on the market that gives you more versatility than the B&W 5100-B . . . regardless of price. In spite of superb performance, the 5100-B is as competitive in cost and often under many comparable units.

Designed for discriminating hams, the 5100-B is engineered to the highest degree by professionals. Layout and circuitry are skillfully designed to assure a minimum of harmonics and distortion.

As a basic for novice or oldtimer the 5100-B is perfect for future addition of SSB by plugging in a B&W 51SB-B. If you're ready for maximum power you can add the B&W L-1000-A Grounded Grid Linear Amplifier. This addition will give you 1000 watts peak envelope SSB-875 watts CW and 375 watts linear AM phone.

Here's your chance to get on the air with a top-quality signal. Buy a B&W Model 5100-B transmitter today. If you want additional information, before you buy, see your favorite "ham" dealer or write the factory direct.

Complete assembly
5100-B, 51SB-B

Barker & Williamson, Inc.
Canal Street and Beaver Dam Road • Bristol, Penna.
eties wired and tested ready to operate
Available in any converter output desired
Tube lineup: Receiver . . . International
For fixed or mobile operation
High gain mike input for xtal or other
Transmitter plate modulated by 6AQ5 for
Tuning meter eliminates mysteries of
Uses 6 or 12 volts for filaments, ac or dc
Converter is crystal controlled for maxi-
Sockets for two crystals with selector
Uses 25 me crystals for transmitter
1 with your receiver power supply
7-11 me for communications receiver
Transmitter . . . 6AU6 Speech, 6AQ5
high impedance mike
real punch
(100 ma. what is happening inside
Crystal FCV-2
8JGD was a recent visitor. K7A1
"is a new DO in Oregon
activity on all bands. It is expected that activity will be
renewed with the coming of fall and cooler weather.
July and the result was a bad curtailing of amateur ac-
tivity in AK. We still need QCs and also OHSs. Does YOUR club have reports
hearing quite a few wrong harmonies in Shoshone County.
The Big Springs Hamfest was well attended and
gave the following a chance to meet each other, too. Boise
also is holding successful outings. The FARM Net still is
functional with traffic lovers. In it's simplest form, VQG
Mocroe very quiet with school out, WHZ reports the
Shoshone County Club is very active and still getting
2-meter users. Posselt also has some signals on 6 meters. Any more around the State? AOL has a new Va-
lant. Your ARRL membership is important to you and
thers. Be sure Novices understand that. Traffic: W7-
WHZ 18, VQC 6.

IDAHO—SCM, Rev. Francis A.; Peterson, WZRIK—
About 50 new appointments are being made, including 40
ECs. Perhaps that will start more interest and activity
in ARRL matters. We still need OCS and also OHSs. Does YOUR club have reports

10 watt transmitter using 5763
Uses 25 mc crystals for transmitter
Sockets for two crystals with selector switch for QSY—one crystal supplied
Converter is crystal controlled for max-
imum stability
Uses 6 or 12 volts for filaments, ac or dc
Tuning meter eliminates mysteries of
what is happening inside
Power required: 150 v @ 65 ma. to 250 v
@ 90 ma.
Transmitter plate modulated by 6AQS for
real punch
High gain mike input for xtal or other
high impedance mike
For fixed or mobile operation
Tube lineup: Receiver ... International
Crystal FCV-2
Transmitter . . . 6AU6 Speech, 6AQS
mod, 6ULs osc & doub, 5763 out
Available in any converter output desired
7-11 mc for communications receiver
.5-1.5 mc for broadcast receiver (car radio)
or what do you want?
Comes wired and tested ready to operate
with your receiver power supply
Standard time payments

J. WILBUR BABB
ELECTRONICS
Dept. QST-10
202 W. SEMINOLE, McALESTER, OKLA.
Transistor Power Supplies* and Components

D SERIES (Standard)
Continuous operation at 30 watts. Selective taps at 200, 250 and 300 volts; intermediate voltage at 1/2 selective taps. Both voltages can be drawn simultaneously if total power does not exceed continuous ratings. Positive or negative ground operation. Input and output filtering included except for intermediate tap.
Size: 4 1/4" x 3 1/2" x 1 1/4" Wt.: 10 oz. 6- or 12-V Input: $39.95 24-V Input: $61.95

DA SERIES
Continuous operation at 45 watts. 450 volts and 225 volts simultaneous if total power does not exceed continuous ratings. Intermittent duty to 90 watts, 450 volts at 150 MA, 225 volts at 100 MA (5 min. on, 20 min. off). Positive or negative ground operation. Input (primary voltage) filtering; partial high voltage filtering provided.
Size: 4 1/4" x 3 1/2" x 1 1/4" Wt.: 14 oz 12-V Input: $57.50 24-V Input: $79.50

Toroid Transformers for Transistor Power Supply Application

H SERIES
H-6-450-1 Input: 6-VDC, Output: 450-VAC center tapped . . . 450 and 225 VDC from bridge rectifier . . . 45 watts.
H-14-450-12 Input: 12/14-VDC, Output: 450-VAC center tapped . . . 450 and 225 VDC from bridge rectifier . . . 55 watts.
H-6-100-125-150-D Input: 6-VDC, Output: Voltage doubler configuration. Secondary tapped for either 100, 125 or 150-VAC, DC Output: 200, 250 or 300-V at 10 MA.
H-12-100-125-150-D Input: 12/14-VDC, Output: Voltage doubler configuration. Secondary tapped for either 100, 125 or 150-VAC, DC Output: 200, 250 or 300-V at 125 MA.
H-24-100-125-150-D Input: 24/28-VDC, Output: Voltage doubler configuration. Secondary tapped for either 100, 125 or 150-VAC, DC Output: 200, 250 or 300-V at 150 MA.
Without Encapsulation (2 ozs.). 1-10 units: $16.00 ea. With Encapsulation (3 ozs.). 1-10 units: $18.50 ea.

HD SERIES — 2000 CPS
HD-14-225-300-3-D Input: 12/14-VDC, Output: Voltage doubler configuration. Secondary tapped for either 225 or 300-VAC, DC Output: 450 or 600-V at 200 MA.
HD-28-225-300-3-D Input: 24/28-VDC, Output: Voltage doubler configuration. Secondary tapped for either 225 or 300-VAC, DC Output: 450 or 600-V at 200 MA.
Without Encapsulation (3 ozs.). 1-10 units: $18.50 ea. With Encapsulation (4 1/2 ozs.). 1-10 units: $21.50 ea.

HDS SERIES — 2000 CPS
HDS-14-225-300-3-D Input: 12/14-VDC, Output: Voltage doubler configuration. Secondary tapped for either 225 or 300-VAC, DC Output: 450 or 600-V at 300 MA.
HDS-28-225-300-3-D Input: 24/28-VDC, Output: Voltage doubler configuration. Secondary tapped for either 225 or 300-VAC, DC Output: 450 or 600-V at 300 MA.

400 CYCLE SERIES
14-115-1.5-400 Input: 12/14-VDC, Output: 115-V at 1.5 amp.
24-115-1.5-400 Input: 24/28-VDC, Output: 115-V at 1.5 amp.
Dim: 3" dia. x 1" thick. Without Encapsulation (12 ozs.). With Encapsulation (16 ozs.). Per Unit: $76.00.

OEM Prices on Request
All fully performance tested, 100% guaranteed. Manufactured by makers of world-famous SUNAIR H.F. Aviation Transceivers.

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Broward County International Airport
Fort Lauderdale, Florida, U.S.A.
Only Waters ribbed ceramic coil forms... are designed for TRIPLE-TIGHT SLUG TUNING!

1. NO LOOSE LEADS! Exclusive ribbed construction lets you bring leads under windings to lugs.

2. NO LOOSE LUGS! High-temperature epoxy cemented lug retaining rings will not loosen when leads are soldered to lugs.

3. NO LOOSE PARTS! New permanent tension device holds parts firmly in place under extreme shock and vibration conditions.

COMPLETE LINE! Waters Ribbed Ceramic Slug-Tuned Coil Forms are available with standard bushings or retractable cores for single or double tuning... , for frequency ranges from Audio to 250 M.C. and above.

Terminal lug rings are available in silver-plated beryllium copper or silicone-fiberglass rings with up to 4 contact lugs per ring.

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Eastern Radio Corp., 312 Clifton Ave., Clifton, New Jersey • Electrical Supply Corp., 205 Alewive Brook Parkway, Cambridge 38, Mass. • General Radio Supply Co., 600 Penn St., Camden, New Jersey • Newark Electric Co., 223 W. Madison St., Chicago 6, Ill. • Wholesale Radio Parts Co. Inc., 308-310 Redland St., Baltimore 1, Md. • (Branches in York, Lancaster and Harrisburg, Pennsylvania)

Contact your local distributor first... or write to Waters at Wayland


WASHINGTON—SCM, Robert R. Thurston, WTPGY—SEC: PQT, RM: AIB, PAM: BBT and PPG, Washington traffic nets: WSN, 2575 kc. 1900 PST Mon. through Fri. WARTS, 2079 kc. 1800 PST Mon. through Fri. New officers of the Washington Amateur Radio Traffic System (WARTS) are JW3, mgr.; KAIVT, asst. mgr.; QGP, secretary-treas.; PGY Northwest, DIX Central, EKQ Southwest, VLW Southeast, chairman of the board DZX. FIX is experimenting with automatic timers for better output on MARA frequencies, AIB is shipping for a new beam, EWW has a TCS mobile rig, LFA has a new harmonic and a new QTH. The Walla Walla Valley Amateur Radio Club held its 12th Annual Picnic and Banquet Sept. 14 at Wilkerson Field. WA has seven years of consecutive BPL but is having to ship dial as the doctor says no more four days for him, TMO is moving to a new QTH. New appointments are WWY and YFO as ECS, EKQ and US as OPs, BBT as PLC, ETT is experimenting with a new super loop antenna on 15 meters with good reports being received, PXX received his Plumber's Certificates for working 10 meters net in 10 meters from Miami and vicinity, AIB is encouraging all qualified c.w. operators to apply for ORS appointment. AMC is QTL painting. The Ribbed Ceramic Slug-Tuned Coil Forms are available with standard bushings or retractable cores for single or double tuning... , for frequency ranges from Audio to 250 M.C. and above.

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**New**

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**New MORADGCO**

**SINGLE SIDEBAND MINIATURIZED 50 WATT TRANSMITTER**

**4 1/8” x 11 1/2” x 7 1/4”**

---

**Model SBT for Fixed or Mobile Use**

---

**Coverage:** 3.8-4.0, 7.1-7.3, 14.1-14.3, 21.200-21.400, 28.5-28.7 MC.

**Calibration:** VFO Calibrated, 0-200 Kc (add to frequency shown on band switch).

**Filter:** Uses a Mechanical Filter for Long Term Maximum Suppression of Unwanted Sideband.

**Emission:** Upper or Lower Sideband. CW-AM (SSB with Carrier Added).

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**STREAMLINE DESIGN PROVES MONTHS OF MORROW RESEARCH**

- Change bands, set drive and peak final, null carrier in about 30 seconds.
- Excellent voice-operated control system (VOX). Anti-trip of new, improved design, plus push-to-talk.
- Semi-automatic loading when changing bands—designed for 50-70 ohms.
- Antenna (VOX) relay built in.

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Power Supply Unit designed especially for the SBT Transmitter; regulates all the important voltages. Also supplies voltages for the receiver. This unit operates from 6 or 12 volts DC, or from 117 volts, 60 cycles. One cable and plug makes all the connections and changes from 6 to 12 volts.

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**By changing plugs in the universal power supply unit, the SBT operates as an exciter at about 10 watts output, or as a barefoot transmitter at about 50 watts output.**

**Controls grouped for ease of operation.**

**Same cabinet dimensions as MB6 and MB565: 4 1/8” x 11 1/8” x 7 1/4”.**

**Plug-in connections for easy removal from car.**

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SEE YOUR DEALER... or write Morrow Radio Mfg. Co. for full information on the SBT Transmitter.

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MORROW radio manufacturing company

P. O. Box 1627

Salem, Oregon
HAM HEADQUARTERS FOR THE ROCKY MOUNTAIN EMPIRE

10% Down; Up to 18 mos. to Pay

W6JQF operated a portable 6-meter station near Hood River Ore. W6LBF won first prize at the SCARC BAR-RAQ. W6NWI came home with the pre-registration prize. W6WNI has a new key in operation. W6ATO, the guiding light of the TVI committee in San Francisco, and W6ND is back in Santa Clara Valley section. K6HGW was re-elected secretary of MTN in June. K6BGC, K6W2B and K6TJ are new members of the SCARS, of Redwood City. On Field Day the SCARS made 617 contacts for a score of 4500 points. W6AEK, formerly of Chico, now in Redwood City, is owner of a new EQ-1B. W6JWY is now working for Enmac in San Bruno. The San Mateo Radio Club reports 544 contacts for 1995 points in Field Day. W6COF is now working for General Electric. W6EKM, W6CW and K6PM are new members of the SCM. W6D2I is working from his new 6-meter QTH in San Jose. W6DDT is on the air.

"HAM HEADQUARTERS FOR THE ROCKY MOUNTAIN EMPIRE"

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Rogers Radio Company

"HAM HEADQUARTERS FOR THE ROCKY MOUNTAIN EMPIRE"

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22nd & LEHIGH AVE., PHILADELPHIA 32, PA.
KWM-1, K6USV is heard on 2 meters with a 522. W5QFR has a new HT-32, W6PC has a pair of 304TLs in his ear on 73 meters. What kind of an antenna holds up under these conditions? K6ROY is working for the Forestry Service during the summer. K6QDJ is working lots of DX on 40-meter c.w. W6EUE is having some V.F.O. problems. W6ARC is on 75-meter mobile, K6WVF is a new mobile bound around Februay 25. K6LRW has a knack for finding hidden mobile stations on 73 meters. K6EKE claims his SSB can separate the stations but can’t find them. W6ULW has some grumbles in his 32V-2 and after a treatment he reports everything is OK. Don’t forget to support your local c.d. nets. Traffic: W6AK 49, K6USV 11, K6NA 9, W6AWE 4, K6RLX 2.

ROANOKE DIVISION

NORTH CAROLINA—SCM, B. Riley Fowler, W4RRH—SEC; HUL, PAM; HUR, VAIJ; PATM, N. C. Fellows, the Amateur Radio Club in Ashevile, N. C., held a very successful two-day hamfest, July 4 and 5. Director Anderson was there, as was Mason Southworth, of ARRHL IGY section. The club is at present planning to hold the Division Convention next year. As this develops more will be written here about it so begin making your plans to attend the Roanoke Division Convention in Asheville next year. RTTY activity is picking up in the section with the following on the air: CVU, GHX, K4RRG, RRH, RYH, K4HS and TLA. OFY has a marine and soon will be on the air. VQX (rumer has it) has found a supply of junkers. If that is so we’ve got HF. Sorry to hear that the State NCN C.W. Net has folded up. MARS activity in the State is picking up and activity on 2 meters in District One will continue from the shoulders of August. Listen on the MARS assigned frequency of 166.250 Mc. for the Slave Station. Reports heard on the air indicate that the Winchester Club has now completed its large mobile station, a very nice piece of equipment. Catawba County is adding more 2-meter equipment to its AEC-RACES program along with V.F.S, EC and Radio Officer. Congratulations to these two Forsyth and Catawba Counties. Watch the leaders, listen and enjoy. GXR and DSO were the top traffic-handlers for July.

SOUTH CAROLINA—SCM, Dr. J. O. Dunlap. W4GQQ—SEC; K4IPE, PAM; YOS, RMJ; ACK, K4PLA and RLF have earned certificates on the C.W. Net. Net, BNN, DX, CAL, GQQ, HAQ, VIP, OAK, YLT and K4RCF have been endorsed as ECs for their respective local nets. Congratulations to the Mike and Key Club of Barnwell for its fine club paper, Cross-Talk. K4QZA is writing a column of “DX Talk” and K4IPE on the “Secretary’s Corner” for SPARC. A new Novice at Folly Beach is K4QEZL, the son of BTP and SOD, JCP, K4QFX and K4BNE are doing fine jobs as CWS on the phone net, along with DX, MPR and BHZ, who have been the mainstays on 3050 kc. for many years. The S.S.B. Net, on 3050 kc., “spickspliced” by K4QEZ, YLT and V4OM, is developing into the finest such net in the south with 420 stations checking in for July. Congratulations to K4AVU, H4Q and P4D for all 30 15-meter contacts in the same month (Alava). The O.G.S. are all doing fine jobs on the phone net frequencies of 3765, 3010 and 3050 kc. Remember the Rock Hill Hamfest, the Try-It Club, K4WCZ 324, GAT 144, W4AKC 95, K4AVT 415, W4DIW 346, PHF 35, K4LBF 34, INT 19, W4CIT 18, K6PB (6/4 4).

VIRGINIA—SCM, John Carl Morgan, W4KX, K4JIKK succeeds AFM, who has resigned because of the press of school work, as manager of VN. K4M has extended VN 7 nights per week, and reports very gratifying response. Deming, day-long rain failed to dampen the SWARC— 8th Annual Hamfest. A record crowd of hams and visitors attended the affair, which was moved under shelter in front of the Pine. K4LJZ, Arlington County EC, reports the new AREC net “NORVA” growing, and TVX submitted a RACES plan for the county. J4B says the paramount amateur station now under construction at the Norfolk Destroyer Submarine pier, will have hams on ship and would like to hear that the Winston-Salem Club has about finished its large mobile station, a very nice piece of equipment. Catawba County is adding more 2-meter equipment to its AEC-RACES program along with V.F.S, EC and Radio Officer. Congratulations to these two Forsyth and Catawba Counties. Watch the leaders, listen and enjoy.

YOU can see the other Hammarlund re- arate stabilized BFO; crystal controlled 2nd IF; crystal calibrator; adjustable 60db notch filter; 13 tubes.

And you can see the other Hammarlund receivers, the HQ-170 Super Ham model, and the HQ-100 and HQ-110 popular-price models. They’re all here.

Be you Novice or Old-Timer, there’s someone here at Terminal who talks your language—OM’s like W2FZ, W2AQ, W2BUS, W2JBA, W2MKH, K2VVV (!), K2VBD.

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Worth 4-3311 - Cable TERMTRADIO
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NEW HEAVY DUTY MOBILE SPRINGS

PROTECTS YOUR MOBILE ANTENNA

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MMW-7HC Heavy Cad. plated Extra Protection $5.50
MMW-7SS Deluxe Stain. Steel........ $8.95

No. 321 BODY MOUNT
Swivel base body mount, less spring. Specially constructed diagonal ball joint for maximum strength. Amateur Net $7.95

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New Plug-in type coils for the Ham, designed to operate with a standard 3' base section and standard 5' whip

THE ARISTOCRAT

- Rigidly tested and engineered—found to have "W" type factor
- Handles 50W Watts input
- Operates into a 52-ohms cable
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- Factory pre-tuned—no adjustments needed

THE VICTORY

No. 999
10-15-20-40-75 METERS

Now! 2 New Coils...just plug in and presto! your coil is ready for operation on the desired band! No switches, no sliding contacts, no loose connections. Built and pre-factory tested in Master Mobile's own laboratories.

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NEW SLIM-JIM ALL-BAND BASE LOADING ANTENNA COIL

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40
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METERS

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SIZE 1 1/4" X 18"

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WHIP

BUMPER MOUNTS WITH NEW X-HEAVY DUTY CHAINS

Positive action; just slide whip in or out to leading point and lock nut into position.

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No. 445 $7.95
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NINETEEN FIFTY-SEVEN

CM3 CONELRAD MONITOR and BROADCAST RECEIVER

Complete Unit
NO INTERFERENCE WITH PRESENT EQUIPMENT

Plugs into 110-volt line in your ham shack, living room, or bedroom. Loud, 1000-cycle tone will wake you out of a sound sleep if an emergency warning comes through. Choice of colors: Russet mahogany, African ivory, or gray harmonitone.

WRITE for descriptive folder.

PRICE ... $39.95

MORROW radio manufacturing company
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SALEM, OREGON

NEW MORADCO

WEST VIRGINIA—SCM, Albert H. Hargrave, WSPBD—Asst. SCM; Fred E. Orthouse, 8 FZ; SEC; KXZ; PAM; FGB; RZA; PBO and VYR. A number of lamas in the Kanawha Co. Area did a fine job in providing emergency communications during the recent flood in the area. The Kanawha Radio Club had a nice turnout at the picnic despite the rain. KICQX/3 is located as Morgantown in the Math Dept. at the University. He is a new O0 appointee, DJP is on s.s.b. with a 30-a doing a fine job. VY7 and GCQ have new beams on 80 meters. Both have received their 100 certificates for s.s.b. operation. IRN received his WAZ certificate. CBG is making big plans for the sweepstakes. BLR is very active on 10 meters, and WB9W and W0KP are building the W. Va. Air National Guard, will be on soon. GBD did a fine job as usual in the last Frequency Measurement Test. ZOJ is recovering nicely from an auto accident. KBEAB is very active on 40 and 20 meters, while K8TTO is on phone. She recently passed her General Class exam. CR5 is on 80 and 20 meters. HSK still is having trouble getting back on but expects to return soon. KNRG is a new ham at Nitro. HBD is back on from a new QTH. Trtífe: (July) W3BPO 83, VY9 46, BWK 25, HBI 15, CHM 7. (June) W5RPQ 95.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, B. Eugene Spousemore, WDM—NTT; RMs: K0P; and 1A, PAM; RZ, PAB; UW, P4C; CM; KXW, OBS; K9BTH, OP8s; L9; FA, NYX, CXW, TH, K8DXF and KBBCQ. OBSs: SGG, 1A and KQD, OBSs: KRB, K9CLJ and W0VY, K0CQF and K9MWPUP is a new ham in the Greeley Area. KBXLX is a new father. Ex-K9KCE now is K7CWT. UPS is the cleanup center, besting K9HDY. We understand the prize was four dozen cherry pies. ZFM and K9KTX are avid rock-hounds. LK9 paid a visit to Greeley. According to the K-F Calendar there are two 10/4s, K7AV and WB7 in the Western Slopes Radio Club, FZ7, QWW, DGA and QEL provided communications for the Sleep Box Derby held July 20. Thirty lamas in the Broomfield Area were on hand, including two XYLs, to assist in watching the Great Western Reservoir Dam during the near catastrophe. The LCL-YL Net meets Al on 9630 MHz at 7:355 kc. In one session there were 24 check-ins. There has been a total of 65 different XYLs checking in. KRCQ has been in 24, Joseph's Hospital. We all wish her a speedy recovery. Among those from the Denver Area making the ARRL meeting in Santa Fe were LO, EXR, IC, QCX, QXY, TBY, GAA and ACA. NTT is home from summer school. K8EWM and family visited with friends in Pueblo. K8APA is a guest of Uncle Sam in the Air Force. Trtífe: (July) W7QWH 297, KB7 302, W0CBI 44, W0WMK 296.

UTAH—SCM, Thomas H. Miller, W7QWH—asst. SCM; John H. Sampson, 70CX, SEC; FSC; PAM; BBN, VB, T, PAM; SP, R3, PAB; UW, P4C; CM; KXW, OBS; K9BTH, OP8s; L9; FA, NYX, CXW, TH, K8DXF and KBBCQ. OBSs: SGG, 1A and KQD, OBSs: KRB, K9CLJ and W0VY, K0CQF and K9MWPUP

Plugs into 110-volt line in your ham shack, living room, or bedroom. Loud, 1000-cycle tone will wake you out of a sound sleep if an emergency warning comes through. Choice of colors: Russet mahogany, African ivory, or gray harmonitone.

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PRICE ... $39.95

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(Continued on page 153)
The air dux® Balun is used for impedance matching in both transmitters and receivers without adjustment from 10 through 80 meters.

The air dux® Balun is complete and versatile line of air wound coils for the amateur. For use in pi networks, interstage, oscillator, and LC tank circuits. Manufactured from the finest materials, and crafted with expert workmanship. Available in a wide range of diameters from ½ inch to 3 inches, and lengths from 2 inches to 10 inches.

The widest selection of plastics for electronics use. Sheets, rods, and tubing in acrylic, polystyrene, polyethylene, phenolic, Teflon, Nylon, and Kel-F; all in a large choice of sizes. Easy to cut and fabricate for an endless number of uses.

Spially cut polyethylene tubing for easy cable harnessing and a multitude of other uses. Available in various lengths in ⅛” and ⅜” O.D. both expandable up to 2”. Four different colors for color coding. Spiral Wrap is available in other materials for hi-heat applications. Inexpensive and easy to use.

SILVER U-LINE®
½" spaced open-wire transmission line. Solid copper wire with pure silver sheath and FORMVAR coated. Exclusive OUT-OF-FIELD spacer cuts losses by keeping dirt and moisture out of maximum field. The ideal LADDER LINE® for all RF frequencies. Other types of LADDER LINE® are also available...Price 6.3 cents per foot.

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LIKE your radio "on the move"? Then don't be without this useful and informative guide to mobile radio. It is a collection of many articles on tried and tested equipment, pre-
The specs are the proof... now your best buy in ham equipment is EICO.

Conservative, highly efficient design plus stability, safety, and excellent parts quality. Covers 80 thru 40, 15, 11, 10 meters (popular operating bands) with one knob band-switching. 6146 final amplifier for full "clean" 90 W input, protected by clamper tube circuit. 6C16 Colpitts oscillator, 6AQ5 clamper, 6AQ5 buffer-multiplier, GZ34 rectifier. "Novice limit" calibration on meter keeps novice inside the FCC-required 75W limit. No shock hazard at key. Wide range, hi-efficiency pi-network matches antennas 50 to 1000 ohms, minimizes harmonics. EXT plate modulation terminals for AM phone modulation with 65W input. Excellent as basic exciter to drive a power amplifier stage to maximum allowable input of 1KW. Very effective TVI suppression. Ingenious new "low silhouette" design for complete shielding and "living room" attractiveness. Finest quality, conservatively rated parts, copper-plated chassis, ceramic switch insulation. 5" H, 15" W, 9½" D.

NEW UNIVERSAL MODULATOR-DRIVER . . . #730
KIT $49.95 WIRED $79.95
Conservative, truly versatile modulator at low cost. Can deliver 50 watts of undistorted audio signal for phone operation, more than sufficient to modulate 100%. The EICO #720 CW Transmitter or any xmitter whose RF amplifier has a plate input power of up to 100W. Multi-match output xfrm matches most loads between 500-10,000 ohms. Unique over-modulation indicator permits easy monitoring, precludes need for plate meter. Low level speech clipping and filtering with peak speech frequency range circuitry. Low distortion feedback circuit, premium quality audio power pentodes, indirectly heated rectifier filament. Balance & bias adjust controls. Inputs for crystal or dynamic mikes, phone patch, etc. Excellent deluxe driver for high-power class B modulation. ECC83/12AX7 speech amplifier, 6AL5 speech clipper, 6AN8 amplifier driver, 2-EL34/6CA7 power output, GZ34 over-modulation indicator, E184. Finest quality, conservatively rated parts, copper-plated chassis. 6" H, 14" W, 8" D.

NEW GRID DIP METER . . . . . . . #710
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Exceptionally versatile, stable, rugged, compact. Basically a VFO with a microammeter in its grid circuit: determines frequency of other oscillators or tuned circuits; sensitivity control and phone jack facilitate "zero beat" listening. Also excellent absorption wave meter, Ham uses: protuning and neutralizing xmitters, power indication, locating parasitic oscillations, antenna adj., correcting TVI, general de-bugging with xmitter power off, determining C, L, Q. Electronic servicing uses: alignment of traps, filters, IF's, peaking compensation networks; as signal or marker generators. Easy to hold & thumb-tune with one hand. Continuous coverage of 400 kc-250 me broadcast, FM, ham, TV bands) in 7 ranges with pre-wound coils of ±0.5% accuracy. 500 ua meter movement. 6AF4(A) or 614 Colpitts oscillator. Xmr-operated selenium rectifier. 2½" H, 2½" W, 6¼" L. Brushed satin deep-etched aluminum panel; grey wrinkle steel case.

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Show me HOW TO SAVE 50% on 60 models of top-quality equipment (in box I have checked here: □ HI-FI □ TEST INSTRUMENTS □ HAM GEAR). Send FREE literature and name of neighborhood EICO dealer.
NW Fla. C.W. Net. The net has a monthly bulletin, *Sparks*, edited by K4CEF. Pensacola: HBK needs only 2 more confirmations for DXCC. ZF2, also is close to 100. JLV has a new vertical beam, over water, and made 70 USSR contacts in a 24-hour period in the Russian DX Contest. The Penascola ARC made about 2000 points in FD, working 4 rigs on all bands, 80-6 meters.

The PARC now has a 2500-watt PA plant and has ordered a Heathkit TX-L. It should be easy to get Psy on 10 meters now; 8 hours have not brought any contacts, with squad, for 29.560 kc. KIVD is looking for more members and an NCS for the 6-meter net. K4LU has ordered a 1200-watt PA whatever beam for U1C. K485 has a new NC-369, F, Walton/Elgin AFB; A new directory of hams in Okaloosa County, with addresses and phone numbers, and include current call signs for RK7 and the Main Radio Club, Traffic: W40D 37.

GEORGIA—SCM, William F. Kennedy, W6CJF—SEC: K4AUM, PAMs: L56 and ACH, RM: 81M, GMC, mem on 3695 kc. at J3E6, EST; QTH: Tifton, Ga. Thurs., and Sat. at 1800 EST, K4OZQ NC. The Tifton Amateur Radio Club elected K4LAX, vice-pres.; K4MAT, vice-pres.; K4EOC, sec-treas.; A new ham in Tifton is K4JBU, K4UUTI passed his Conditional Class exam. KZK now is living in Tifton. The Ga. Cracker Radio Club held its 7th meeting at Macon and elected K4HRN, pres.; K4KAR, vice-pres.; K4IEH, Thurs., night NC; K4BIL, Thurs. night NC: K4HG, sec-treas.; K4LX, historian. The GPYL held a meeting at Macon at the same time. The Augusta Radio Club went all out to have a wonderful hamfest, with approximately 350 in attendance. K4TDX has a DX-100 now and is moving to a new QTH. K4DKM is in another Navy school in Norfolk. HQ2 is out of school in Memphis. K4OJ works for WSEP in Quitman, Ga. K4CQN's NC-369 is waiting for an s.s.b. generator. K4K4J has organized a traffic program for AQL, the Ga. Tech station. K4HOU has put up a new dipole to receive the Woodin. K4DWP is on the air with a power supply in on GSN, I visited with the Chatanooga Radio Club at its hamfest, BSR, Delta Division, and ZD, Southeastern Division Director, as well as members of both divisions, were present. Mike Breschino, of Telrex, gave a line talk, as did BPQY, ZD and your SCM went to Dalton, Ga., and presented the Cherokee Amateur Radio Club with its ARRL affiliation charter. Traffic: K4TDX 143, K2P 127, LVE 91, LBC 75, WABX 56, DXY 33, K4HOU 49, QV4 47, LVE 46, W4AXL 29, K4BAI 16, HOU 10, FCI 8, WFTB 4.

WEST INDIES—SCM, William Werner, KP6DJ—SEC: AAM is Stateside for special AF ROTC training. JM built a 500-watt Class B linear and is waiting for an s.a.b. generator. AMQ (the XYL of JZ), her K4EHP now is on 75 meters direct. K4LEH has organked a traffic program for AQL, the Ga. Tech station. K4HOU has put up a new dipole to receive the Woodin. K4DWP is on the air with a power supply in on GSN, I visited with the Chatanooga Radio Club at its hamfest, BSR, Delta Division, and ZD, Southeastern Division Director, as well as members of both divisions, were present. Mike Breschino, of Telrex, gave a line talk, as did BPQY, ZD and your SCM went to Dalton, Ga., and presented the Cherokee Amateur Radio Club with its ARRL affiliation charter. Traffic: K4TDX 143, K2P 127, LVE 91, LBC 75, WABX 56, DXY 33, K4HOU 49, QV4 47, LVE 46, W4AXL 29, K4BAI 16, HOU 10, FCI 8, WFTB 4.

The 6 & 2 Meter Hi-Bander

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The Self-Contained, Bandswitching Sidebander DSB-100

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The Bandswitching Globe King 500C

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The Bandswitching Globe Scout 680A

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The Bandswitching Globe Chief 90A

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Plus A Complete Line of All Ham Gear!

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1957 AWARD WINNER James E. Harrington, K5BQT, holds some of the 1,500 messages he handled at devastated Cameron, La., during Hurricane Audrey. With Capt. Neal Mabrey, W5VTU, and Sgt. Michael J. McDermott, K5CTQ, both of Lake Charles Air Force Base, Harrington transported radio and emergency power equipment by boat to Cameron, and operated there around the clock for three days.

1958 Edison Award Nominations Invited!

For the seventh consecutive year, the Edison Award for 1958 will acclaim an amateur who has distinguished himself and all radio amateurs by rendering noteworthy public service.

Letters from you and others will be the only source for Award nominations. These nominations will be reviewed by a committee of impartial judges, who then will select the Award winner.

So that no worthy candidate may fail to receive the judges' consideration, your help by choosing and naming a suitable amateur is essential. The rules at right will assist you with your nominating letter. Mail it to Edison Award Committee, General Electric Company, Electronic Components Div., Owensboro, Ky.

RULES OF THE AWARD

WHO IS ELIGIBLE. Any man or woman holding a radio amateur's license issued by the F.C.C., Washington, D. C., who in 1958 performed a meritorious public service in behalf of an individual or group. The service must have been performed while the candidate was pursuing his hobby as an amateur within the continental limits of the U. S.

WINNER OF THE AWARD will receive the Edison trophy in a public ceremony in Washington, D. C. Expenses of his trip to that city will be paid.

$500 GIFT. Winner will be presented with a check for this amount in recognition of the public service he has rendered as a radio amateur.

WHO CAN NOMINATE. Any individual, club, or association familiar with the public service performed.

HOW TO NOMINATE. Include in a letter a full description of the service performed, as well as the candidate's name, address, and call letters. Your letter of nomination must be postmarked not later than January 5, 1959.

BASIS FOR JUDGING. All entries will be reviewed by a group of distinguished and impartial judges. Their decisions will be based on (1) the greatest benefit to an individual or group, (2) the amount of ingenuity and sacrifice displayed in performing the service. The judges will be:

E. ROLAND HARRIMAN, Chairman, The American National Red Cross.

ROSEL H. HYDE, Commissioner, Federal Communications Commission.

GOODWIN L. DOSLAND, President, American Radio Relay League.

Winner of the Award will be announced on or before Thomas A. Edison's birthday, February 11, 1959.

Employees of the General Electric Company may nominate candidates for the Edison Radio Amateur Award, but are not permitted to receive the Award.
the Pacific Sea Anchorage, for a visit with Hutch. HG hauled Hutch out of bed at 2 a.m. that morning when he came out to meet the ship as Boarding Official. WLKU, Fort Lauderdale, Fla., was here July visiting RJ, WZ and his XYL attending the National Convention. We are all pleased with the new Canal Zone meal served in July by the Office of the Coordinator of Amateur Activities, and we thank BB, WZ left these parts for Long Island in August, Olmstead promises to look for a new receiver for powerful "V" beams antenna headed, of course, to the Canal Zone. New hands: RT, CM, CXN and Matt Noltech (operator's license only). Traffic: K2SHO 51, WA 45, WA 54, RM 19.

SOUTHWESTERN DIVISION

LOS ANGELES—SCM, Albert P. Hilm, Jr., WJQCB—SEC; W6LLP, R.M.: W6BHQ and K6HNR, P.AM; W6OMW and K6WBY. The rolling stations made all of their meetings in July: K6MCA, K6CP, K6HNR and W6GTT, Congrats, fellows! Variations have cut into activities. A new ham reporting readings and model of new equipment—tell us what you want... it's all here, ready for immediate shipment. Important: We're trading extra high these days... tell us what you have... and we promise a generous trade-in allowance on factory-built equipment.* tell us what you have... it's all here, ready for immediate shipment. Important: We're trading extra high these days... tell us what you have... and we promise a generous trade-in allowance.

| Q Send latest lists of guaranteed Used Equipment |
| O Rush New Catalog |

WALTER ASHE RADIO CO., Your One-Stop Supermarket specializes in supplying amateur needs—including all necessary parts to build or modify transmitters, receivers and other ham shack equipment!

NOW IS THE TIME TO TRADE!

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OUTPUT CURRENT: 40 ma at 200 v; 135 ma at 400 v
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This special designed POWER SUPPLY used with Transmitters rated to 65W, continuous duty, or 75W, intermittent duty; will also supply a receiver with 200 V. @ 40 MA, continuous duty. Highly recommended for use in all MOBILE TRANSMITTER-RECEIVERS, e.g. automobiles, boats, trucks, motorcycles, aircraft, where power source is 6 or 12 V. Paralleling doubles ratings. $49.50

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157
WEST GULF DIVISION

NORTHERN TEXAS—SCM: Ray A. Thacker, W5TFP—Asst. SCM: C. C. Pool, NFO, SEC; BNG. PAMs: K5AEX and IWQ. RM: ACK. Once again the West Gulf Convention, this year “hosted” by the Oklahoma City group, proved to be another wonderful activity, as has been the case for several years now. In view of the fact that Galveston was granted the National Convention for 1959, we here in Dallas decided that we not bid in order to assure Galveston the West Gulf in conjunction with the National. Hope to see you all there in 1960 as we plan on making the bid next year in Galveston. Since this report is my last as SCM of this section, I want to take the opportunity to thank, for their tireless, hard and devoted effort toward ARRL嚇ies, section-wise, the folks who have held “leadership” appointments—BNG, our SEC (and your new SCM), FOJ and NFO, who have acted as NCG, K5AEX and IWQ as PAMs and AHC, FCX and ACK as our RMs. It has been a real pleasure to have had the opportunity of our club with so many other clubs during the past two and a half years as SCM and I want to thank all for the many, many courtesies shown me and the real, home wooden Texas-style hospitality is something I shall never forget! Traffic: W5BKU 284, SMK 275, K5JFBQ 102, PTV 81, WSAIC 65, K5JZK 39, PTV 35, DNQ 21, ACB 12, W5GHU 12.

OKLAHOMA—SCM, Richard L. Hawkins, W6FEC. SEC: K5KPS, PAMs: MFX and K5INC, RM: JXM. The Oklahoma City group is to be congratulated for an FR convention. K5ETW is the new FC for Comanche County, NS has been working DX with an AT-1, K5GJU did well in the NOAC QSO Party. HCF, W6FXK, K5RJO and ZBO all qualified for Sooner Traffic Net certificates. My congratulations to you all, K5MIB, although blind, had no difficulty in passing the Gen. Class exam. K5KVA is moving to New York, K5QAX and K5YV took the General Class exam at the Convention. By the time this report appears the Sooner-Nooner Net will be in full swing. Help K5INC to make it a success by checking in whenever possible. FKL retired from the Army in July as a full colonel and now will have plenty of time to ham. K5LVG now has a Globe Chief and is putting in a much better signal. K5KOPR and K5BBPW now are General Class, Oklahoma Ham of the Month: K5JCB for his FB traffic work and excellent list. Traffic: K5JCB 328, K5CY 215, INC 72, WSAIC 65, CCF 44, MFX 33, W6FEC 16, MF 16, PNG 16, K5CBA 18, W5GOL 15, EFC 13, K5FRS 12, W5CBA 15, K5BNQ 4, BPF 4, W5BBA 3, LE 2.

CANADIAN DIVISION

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCM: Aaron Solomon, OC, SBC; AEB, New appointments include WZJU/KY as Official Bulletin Station, ABV has worked into W2 and W3 districts on 50 Me. from Nantucket Island, ZK has joined the s.s.b. ranks with a 10M exciter, WL has a new K5WVI transmitter and K5WVI has been working 2-meter mobile with a new 80-meter. Newly-elected officers of the NHARA are: ACJ, pres.; ABZ, 1st vice-pres.; UT, 2nd vice-pres.; K5, secy.-treas.; AAW reports working G5VB on 80 meters with a new Adventurer. Officers of the Keith Rogers Memorial Radio Club are: AC, pres.; GR, secy. and K5 reported the K2Z, VE1M and VE1J at a recent DXpedition to P.E.I. and displayed the original pilot models of the new Heath “Apache” and “Mohawk” at a meeting of the KRMRC, 75-meter mobiles on the Island now include ZM, GR, PE and K5Z (who is using a new homebrew all-band transmitter). F.E. Island amateurs challenge the other Provinces to match their ARRL member percentage (unofficial reports indicate approximately 90%). Traffic: (July) VE1Q 25, AAW 22, ALB 18, AEB 4, June) VE1Q 24.

ONTARIO—SCM, Richard W. Roberts, VE3NG. A news item from the East Coast advises that Bill, VE2U, and Jim, VE2T, announce the addition of John Marshall Simon (aged one year) to their family. Congratulations to you both, and welcome, Johnny. The Hamilton gang is in the swing of the Ontario ARRL Convention to be held in Hamilton Oct. 18. Write CEC, secy., for his sage advice. NG and his XYL, DZA, are maritime mobile at Meatord on weekends. Likewise AJA at the same port. Also in the summer mornings are mobiles ADD, MF, AFB, NG, RM and AE, and fixed stations BIV3, DEX, GH, GJ, EAW and EO. HX has fully recovered from his illness. TL has gone high power on c.w. Unmodulated carriers are prevalent again on the 75-meter band. The D.O.T. is taking action, Be wise, announce your call. DITO is mobile again in the Toronto Area. NT is mobile in the Kingston sector. NW has joined the CBers. CAB sports a 14-element beam on 6 meters. RW made North Bay and back. 2XX visited RW, ADU is transistor mobile. RM was up to Timmins for the

(Continued on page 161)
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160

HAM AFFAIR there. DTB also was at the North Bay 'Fast. The SCM was happy about the trip to North Bay and return. After last year it was a pleasure with no long delays no storms etc. IR still is ill. Traffic: VE2BDR 188, NG 119, NO 86, BZ7 47, DEX 45, DTB 44, DPO 29, DZ/3 26, EAM 28, AM1 22, E8 21, AES 6, DH 5, AVS 2.

QUEBEC—SCM, C. W. Skarstedt, VE2DR. IR is mobilizing in the States. QQ was visited by W4HR. WW still is working on a new seven-element beam. BK is active on 80, using a KWM-1 JR's sailing interests with his s.s.b. NY keeps DX-plugging; now has 200 worked. 179 continued. HQ and AO require only Zone 28 for their WAZ. ANX visited and was entertained by WW, AIO, NV, UY and AYX. AJD is very active on 10 meters. AUH, ANK and UF are working day and night to improve their rigs. AOG keeps Tryck-fixtures in the mobile line. APC has a 40-foot tower erected with a rotor and eight-element beam in place. A61 returned from Ill-aux-Coudes, where he worked his new DX-10. ABO nabbed T19 and 4X4 on 20 meters. ATX had an article on ham radio and personal activities in the French newspaper, Le Petit Journal. SB received same distinction in an English paper, The Gazette. BAA is a newcomer in Montréal. KL also is a newcomer in the Montréal area. FL has a new DX-10 and an Eddy-stone receiver. AZT, LS and YA attended the RAQI Annual Picnic at Cap Sante aux Saltitudes. A6L won the hidden transmitter hunt. A large crowd was on hand with visitors from Gaspe, Hull and the northern States. SCM would like to express sincere thanks to EC and ATL for their faithful support in assisting with regular monthly reports. Traffic: VE2DR 70, EC 52, ATL 1.

BRITISH COLUMBIA—SCM, Peter M. McIntyre, VE7JT—The Nanaimo Club hosted the BCRARA Open Forum Aug. 9 and 10. The meeting was well attended for 40 interested amateurs and visitors. Sorry that the SCM conflicted with the Hunt to Northwest of the Victoria gang as I was looking forward to renewing acquaintances with some and meeting others whom I knew but not only. However, they were ably represented at the Open Forum by KA and AD. Much was said about the formation of a Canadian Amateur radio newsletter or strengthening our Canadian ARRL membership. No definite plans were laid for either plan. ZM gave us quite a few facts and figures re various memberships in all types of amateur associations which gave us all some good food for thought. The C.W. Net (BCEN) under TF has kept going through the summer doldrums with the help of a few stalwarts. He would welcome your presence on 3650 kc; also he is interested in forming an all-Canadian c.w. net like the old Trunk Line. Anyone interested, please contact TF on 3650 kc. Congratulations ALE and AEW for their operating during the B.C. Centennial Mountain Climbing Expedition. Luckily there was no DX to hold them there longer than they stayed. Approximately two hours after they left the location an earth quakie and tidal wave hit leaving no sign of what had been their location. Traffic: KGIDT 306.

SASKATCHEWAN—SCM, Lionel O'Byrne, VE5LU—The Saskatoon gang had a bang-up hamfest with a good crowd and nice weather. No details are available as yet. Those attending from Regina were WG, JK, LU and their XYLs, with ES and his XYL from Weyburn. XX attended the IRE meeting and banquet and has a converter in the car. The Regina boys set up club station NN at the Provincial Exhibition. Let's have some news, fellows.

Helical Element Ground Plane

(Continued from page 82)

the four feet of loose coil on each helix. Glue the
coils to their dowels.

The driven element is harder to tune. First
resonate an eleven- or twelve-turn helix at 28.0
Me. It was found that the tuned end of this
helix can be bent ninety degrees and slipped in
and out of the female coax connector, making
tuning a simple matter. Solder the 15-meter
trap to the 15-meter helix and add five turns for
the 10-meter section. In a similar manner cut
down the 15-meter section until it resonates at
21.3 Me. Two dips can now be obtained, one at
15 and the other at 10 meters. Next add the
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2500 watt (A2512) Shpg. wt. 225 Ibs $325.50
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1500 watt (A1512) Shpg. wt. 115 lbs $225.50
Sizes to 3500 watts. Dual voltage models, automatic
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NEW! ... 60-ft. 4-BAND ANTENNA TUNES 40-20-15-10 METERS

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Tested at 10,000 KV RF. Will handle 2 KW of well over-
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Available for immediate delivery
40M-C 4 band KW coils .......................... $14.95
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All antennas have 88 ft. KW twinline, heavy
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Improved quarter KW 5 band models:
5 BC-F phone coils; SBC-C CW coils .................. $12.50
5 SBA-F phone; SBA-C CW antennas ............. $27.50

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15-meter trap. Instead of using a helix for the
20-meter section, I suggest that you solder a
three-turn coil to this trap and extend the rest of
the wire straight up the dowel to increase the
radiation resistance.

The parallel traps are very critical since chang-
ing the spacing of the turns a quarter inch will
mean the difference between a good or poor
match. Connect the impedance meter to the
antenna and change the turn spacing until a
resistive reading (i.e., a sharp null) can be ob-
tained. I found my best resistances on 10 and 15
meters to be 145 and 100 ohms.

Final checks should be made with an s.w.r.
bridge in the coaxial line. If the s.w.r. is high on
15 meters, very slight changes in the 15-meter
trap will reduce the reflected waves to a minimum.

Finish gluing the sections to the pole and paint
all exposed parts with glyptal.

Most important, get that ground plane in the
air! Happy hunting!

The author would like to acknowledge the
valuable suggestions and assistance of Paul
Brace, K5HXT, Burt Bittner, W5AIG, Earl
Fletcher, W5WRS, and Loren Watkins, W5XO.

2 The bridge should be set up to match the 93-ohm im-
pedance of the RF-62/G.

21-Mc. Converter
(Continued from page 35)

points) on each capacitor that will give an in-
crease in noise, one near minimum capacitance
(plates unmeshed) and the other with more ca-
pacitance. The setting at the greater capacitance
point is 21 Me. while the lesser is 28 Me. Adjust
the converter for maximum noise at 21 Me. and
tune your receiver across the band. If the band is
open — and don’t forget that sometimes it’s as
dead as the famous doornail — you should hear
signals. Tune in one and peak it up by tuning C1
and C2 of the converter. Each control should give
a definite peak. Pretty nice to know that your
receiving front end is lined up, isn’t it? And it is,
you know; you align it when you peak the two
controls. Your receiver is now working as a tun-
able i.f. and the only adjustment required is to
peak the antenna trimmer (if you have one) for
maximum signal.

You’ll probably find that if you peak the con-
verter in the center of the Novice band you’ll be
able to cover all of the band without readjusting.

That’s about the story. If you are a Novice
who has never listened on 21 Mc, you’re in for a
real treat. When the band is open — and this
is the rule rather than the exception — you’ll
start drooling over the rare and juicy DX that
will be coming in. Anyone for WAC or DXCC?2

2 WAC stands for "Worked All Continents" and is
awarded to amateurs submitting QSLs confirming contacts
with the six different continents. DXCC is the "DX Con-
tinent Club" and membership is awarded to any amateur
submitting QSLs showing contacts with 100 different
countries in the ARRL countries list. For more complete
rules write ARRL or see the article on awards in July,
1957. QST.

162
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Fully the equal of keys selling at almost twice the price! 7 adjustments for speed and comfort, so important in developing the right timing when using a "bug". Heavily weighted with solid steel block in base. Speed adjustable 10 wpm to as high as desired. 1/8" silver contacts; weight scale for reproducible speed settings. A real bargain for radio amateurs and professional CW operators! 61/2" long x 3" wide x 21/2" high, exclusive of knobs and feet. Shpg. wt., 3 1/2 lbs.

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Economical and practical code practice key and buzzer unit for learning code. Telegraph key chrome and nickel plated with both adjustable spring tension and contact clearance. The high frequency buzzer has frequency adjustment with locknut to keep tone constant. Screw type pin jack terminals for headphone connection. Works with inexpensive 1/2 volt battery. Heavy black molded phenolic base and buzzer housing. Base 6 1/2" x 2 1/2" overall depth. Black pointer, highly damped meter; responds to average level of voice and music. Impedance 10,000 ohms; calibrated 20 db attenuators. Ideal for complex audio wave-forms. Standard VU meter damping.

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The high frequency buzzer has frequency adjustment with locknut to keep tone constant. Screw type pin jack terminals for headphone connection. Works with inexpensive 1/2 volt battery. Heavy black molded phenolic base and buzzer housing. Base 6 1/2" x 2 1/2" overall depth. Black pointer, highly damped meter; responds to average level of voice and music. Impedance 10,000 ohms; calibrated 20 db attenuators. Ideal for complex audio wave-forms. Standard VU meter damping.

NEW! STEREO BALANCE METER

ído VU METER

Internal calibration in Volume Units and percent, with 20 db variable attenuator. Ideal for setting output level in pagers and music systems; removes guesswork when used as record level indicator with tape recorders. Highly damped meter; responds to average level of voice and music. Impedance 10,000 ohms; calibrated 20 db attenuators. Ideal for complex audio wave-forms. Standard VU meter damping.

NEW! ILLUMINATED SCALE VU METER

A high-quality precision built unit, only 3 1/2" square, 2 5/16" x 3 1/2" silvered dial face, 1 1/16" overall depth. Black pointer, highly legible black calibrations. Clear optical glass front. "B" scale, has 0-100% on upper scale, -20 to -3 VU on lower scale. Beads 99% of applied VU in 0.3 secs., with overshoot between 1-1 1/2%. Calibrated for 0 VU when 1.228 volts sine wave AC applied through an external 3600 ohm series resistor from a 600 ohm source with 600 ohm load. 6-8 volt scale illuminating lamp. Shpg. wt., 1 lb. A terrific buy in a hand-held, compact, light, accurate, completely wired instrument. Has a 30 µA movement, 1% precision resistors and simple selector switch with calibration markings protected against wear. Scales: Volts DC and AC, 0-5, 25, 100, 500, 1000; Ohms 0-6K-60K Meg DC Current; 0-50 µA-50-500 MA; Decibels -20 to +94 in 5 ranges. Size 4 1/2" x 2 7/8" x 1 1/2". Shpg. wt., 1 lb. Complete with batteries and test leads. Imported to save you money.

NEW! MINIATURE HIGH SENSITIVITY MULTITESTER

20,000 OHMS PER VOLT DC - 10,000 OHMS PER VOLT AC

A terrific buy in a hand-held, compact, light, accurate, completely wired instrument. Has a 30 µA movement, 1% precision resistors and simple selector switch with calibration markings protected against wear. Scales: Volts DC and AC, 0-5-25, 100, 500, 1000; Ohms 0-6K-60K Meg DC Current; 0-50 µA-50-500 MA; Decibels -20 to +94 in 5 ranges. Size 4 1/2" x 2 7/8" x 1 1/2". Shpg. wt., 1 lb. Complete with batteries and test leads. Imported to save you money.

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Collins 75A-4 SSB Receiver ............... $ 695.00
Collins KWS-1 SSB Transmitter .......... $2,095.00
Collins KWM-1 SSB Mobile/Fixed Station Transceiver ............... $ 820.00

C & G RADIO SUPPLY COMPANY
2502 Jefferson • Tacoma, Wash.
Phone BR 2-3181
AUTHORIZED FACTORY SERVICE for COLLINS AMATEUR EQUIPMENT

50-Mc. Transmitter
(Continued from page 80)

with the power level of a 2E26. There is no advantage in going to a 6146 in the final stage unless an input in excess of 25 watts is to be run.

Final operating conditions for the transmitter will depend on the supply voltage and final tube used. With a 300-volt supply the oscillator plate current will run about 10 ma., with the oscillator operating properly, and 17 ma. with the crystal out of oscillation. The doubler plate-screen current is about 12 ma. Amplifier grid current will be at least 3 ma. without plate and screen voltage, and around 2.5 ma. with the amplifier operating under load. These values will be slightly lower with a 250-volt supply. Plate-screen current to the amplifier will depend on the power level and tube. With a 2E26 at 300 volts the current will be about 20 ma. at resonance, with no load, and 95 ma. off resonance. Loaded for maximum efficiency the 2E26 plate and screen current will be about 60 ma. With a 6146 at 450 volts the loaded plate and screen current will be about 120 ma.

Voice Key
(Continued from page 87)

cause the relay contacts to close for the period the sound is impressed on the microphone. Thus I had, in theory at least, a design of a workable voice key. My dad, as promised, built this circuit and after a few minor adjustments, much to my delight it produced readable code when actuated by my voice.

With the help of this equipment, and encouragement from an understanding RI, I was able to pass the code test for the long-sought-after amateur radio license. The greatest problems had been solved but there were more to follow. Now that I was licensed, the physical act of operating still confronted me. To control a send-receive switch with my hand, while possible, was very haphazard.

Fortunately, I was able to adapt a foot switch I had used in my s.w.l. days for controlling the receiver B-plus. This is now connected to the push-to-talk circuit of the transmitter, which also controls the receiver. How this is to be done will vary with different installations, but the foot-switch idea should be usable with any push-to-talk installation. In fact, it need not be limited to foot operation. The switch could be actuated by pressure exerted by any part of the body, in case the operator lacks use of his feet or legs. As the photograph shows, my foot switch is an ordinary headlight dimmer floor switch.

I hope these suggestions will give encouragement to those who are interested in amateur radio, but cannot see their way clear to dig in a little deeper and overcome those seemingly insurmountable obstacles. Believe me, it is most rewarding.
### 6M for VHF

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>6M, 5E</td>
<td>$15.95</td>
<td></td>
</tr>
<tr>
<td>6M, 8E</td>
<td>$26.95</td>
<td></td>
</tr>
</tbody>
</table>

New, pre-calibrated (GAMMAXIAL) Gamma Match assembly with coaxially formed resistance cancelling capacitor built in, makes possible for the first time a VHF Vertical that gives extreme performance at reasonable cost. Elements are constructed from eight-inch 6061-T6 alloy aluminum rod for high Q resulting in tremendous efficiency. The booms are ½" heavy wall aluminum tubing. All hardware is hot-dipped galvanized steel treated for maximum weatherability. Extremely easy to put up and into operation, these beams may be stacked for additional gain. Stacking harnesses for all VHF beams (specify model number) $4.95 additional.

### THE huy-gain

**VHF Antennas**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>2M, 5E</td>
<td>$6.95</td>
<td></td>
</tr>
<tr>
<td>2M, 10E</td>
<td>$12.95</td>
<td></td>
</tr>
</tbody>
</table>

New, doublet taper dielectric loaded VSWR 1 wave resonance maintaining efficient operation for the 2 and 6 meter bands. Overall height 5', 52 ohm coax feed. Net weight 34 oz. Complete with 2 band tubing ground plane and nylon base insulating assembly.

### Additional Information

- **1⅛ M**
- **⅓ M**
- **⅔ M**

These high-gain VHF Antennas have OPTIMUM SPACED for maximum forward gain. Their elements are constructed from eight-inch 6061-T6 alloy aluminum rod for high Q resulting in tremendous efficiency. The booms are ½" heavy wall aluminum tubing. All hardware is hot-dipped galvanized steel treated for maximum weatherability. Extremely easy to put up and into operation, these beams may be stacked for additional gain. Stacking harnesses for all VHF beams (specify model number) $4.95 additional.

---

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Easy Monthly Terms • Personalized Service

LEO I. MEYERSON, W9QFO

165
The World Above 50 Mc.

(Continued from page 93)

220 and Up

In August QST we asked fellows working on 220 Mc. and higher bands to send in their operating schedules, in order to coordinate activity. Here are two responses: K6GKX, 110 Argonne Ave., Long Beach, Cal. is on 220 nightly, 1900 to 2300 PST; K6OPD, P.O. Box 1152, Lancaster, Cal. is available from 1900 to 2200 Monday Wednesday evenings, and from 1900 to 2100 Thursday and Friday nights. K6GKX says that 220-Mc. activity continues to grow in Southern California, 50 new stations having been worked thus far in 1953, for a total of 136. Ralph would like to see polarization standardization between Northern and Southern California, as an aid to long-distance schedule work.

WYVQ, East Hartford, Conn, has evidence that high power and big antennas are not required when conditions are good on 220. Art is using only 5 watts input, and his antenna is only a 5-beam beam, but he worked K2JRI, W2HYL, W2D7W and W3YIR during a tropospheric opening the night of Aug. 5. W3YIR is about 170 miles away; the others around 100 miles.

As the pictures taken by WS6LQ show, amateur TV reception in Toledo, Ohio, is not confined to local signals. The three patterns shown are all from the Detroit area, 60 to 75 miles away. WS6LQ uses a 417A r.f. amplifier, a 8BC4 amplifier, both trough lines, and an ASD-5 receiver as a converter, working into a TV receiver set on Channel 2. WS6QI and WS6YQ, also of Toledo, have had similar results in reception of W3XH, W8LIE and W8RMM.

DX Contest Results

(Continued from page 69)

Ireland

NORTH AMERICA

I1511... 55,140- 40-102- A-22

Both

KLC7DF... 5676- 22- 88- C-5

I1AM1... 81,576- 46-619- A-16

L1JET... 20,538- 32-582- A-

HTC... 60- 5- A-1

No. 4 — COMPLETE AMATEUR RADIO THEORY COURSE.
A complete, simplified home study theory course in radio covering the Novice, Technician, Conditional and General classes — all under one cover — with nearly four hundred typical F.C.C. type questions to prepare you for license exam. No technical background required. You also get, FREE, a guide to setting up your own ham station. All for the amazing low price of $3.95

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20, 10 meter coils $2.91 per band. 100 meter coils $3.60.

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MODEL 242 FOR 6 METERS OR 2 METERS—45 WATTS INPUT—6146 FINAL. Complete with crystal. Wt. 30 lbs. STQ.O.S.

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2) Same privileges as now (including six meters) good for 3) Same privileges as now (including six meters) good for 5 years and renewable, but the requirements be a 5-w.p.m. code test and a written exam comparable to that of the Amateur Extra. By taking one of the above steps, it would be possible to preserve the experimenter and do away with the six meter division of the "Video Rangers."

—Charles M. Steinberg, K4RDA

Editor, QST:
I've read the QST correspondence concerning the advisability of Novice and Technician class licenses. I must, too, add my voice with those who would recommend scrapping of these two classes. Only one has to look on page 76 of August QST and make note of five license suspensions. I'm very much afraid that this represents only an infinitesimal sampling of the rule breakers. I have observed, myself, many violations of the rules that are inconsequential. It seems to me that the more difficult (within reason) an exam can be, the more cherished will the license be, and the more responsible the operator will be. The minimum knowledge and code speed requirements for the General Class license seem to me a fine licensing basis. No one can deny the utility of code ability in local or national emergency. If I as a boy of 13 could pass this test it cannot be so difficult as to require a learner's license. As for lending encouragement to would-be amateurs, it is in the general interest. Let us be sure not (Continued on page 170)
WINNER OF THE FIRST AND ONLY WPX (Worked All Prefixes) CERTIFICATE

Insu-Traps
These streamline hy-gain traps are small (6" diameter) and light weight. Capacitor dielectric and coil form molded high impact styron. Each designed to take 1 KW AM, 2000 watts P.E.P. Individually factory resonated for maximum frequency accuracy. Completely weather sealed, water proof and airtight (do not breathe) for years of stable operation. Carbon activated polyethylene covers. Guaranteed for the life of the beam. Hi-Q coils well-removed from any metal mean highest efficiency of isolation action.

Triaxial Gamma Match
Exclusive Triaxial Gamma Match system with coaxially formed reactance cancelling capacitor built-in, makes possible for the first time a perfect 1:1 SWR on a 3-band antenna. Although factory pre-calibrated, it is also adjustable to compensate for variations which may be encountered at each installation site. Exceptional bandwidth maintains low SWR over entire band. Use of this system permits tuning array for maximum gain with no compromise to facilitate matching.

Gain & F/B Ratio:
Hy-Gain's Hi-Q traps result in minimum element loading and true FULL SIZE performance. Longest element of approx. 52' together with full sized 18' boom spacing results in a triband beam with full 3 db gain and 25 db F/B ratio.

Wind Loading:
Streamlined traps (only 6"") together with steel boom construction result in smallest total wind loading area possible in a full sized tribander.

Construction
Hot dipped galvanized steel boom 14'6" in dia. for maximum strength with lowest possible wind loading. Boom braces form rigid angular boom/mast assembly. Heavily plated 10 Ga. steel channels attach all elements to boom and boom/mast with positive grip. Elements are 6061T6 high strength aluminum alloy. 1 3/4", 1", 5/8" and 3/4" sizes are used. All hardware galvanized and iridite treated.

Guarantee:
Hy-Gain is the originator of the One Full Year Written Guarantee.

Two-Element, Full Size Trap Tribander
For full-size performance in limited space, with one Triaxial system on 15, 16 and 20M. Boom length, 96'' Longest element 32'.

Three-Element, Full Size Trap Tribander
There are more 3-Element Trap Tribanders in use than all other 8-band beams combined. Boom length, 144''

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V.H.F. Party Summary
(Continued from page 89)

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New Hampshire
WINIAR 644-4-16-14-AB
W1HUG 11 (10 ops.)
13-340-435-20-ABC
Rhode Island
WIAJ 320-114-22-ABC
WIGF 160-4-14-AB
KI9D 148-3-4-AC
W1HNF 13-45-12-ABC
KIABE (K1AB ABC)
1960-72-15-1A
KIRC (KIRC KNIDK) 668-58-4-AC
667-63-9-AB
Vermont
W1UOK 402-23-14-AB
W1UPR 209-24-13-ABC
W1FTW 80-10-5-A
W1EX...28-7-4-AB

NORTHERN DIVISION

Alaska
K7AUY...K7AEK...K7LZ...K7LF...K7LZ
K7AAD)
K7JRG...A58-11-8-AB

Oregon
W7BOR/7...K7AUX...K7AEK...K7LZ...K7LF...K7LZ
W7HBA...K7ABD...K7BCH...K7VHE...K7AAD
111-101-11-AB
W7QTO (W7N W7N W7QTO
K730...108-11-AB
W7QTO/7 (W7N M7D K7Q)
K730...108-11-AB
ZEW...264-66-4-AB

Washington
W7EM...200-10-12-AB
W7ZV...835-11-11-AB
W7VQ...23-23-1-A

(Continued on page 172)
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SX-101 $395.00 Net

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The sensational SR-34 two and six meter transmitter/receiver for fixed, mobile, or portable communication. SR-34 features transistorized built-in power supply for 6 and 12 volt operation. Unit is designed for either AM or CW. Transmitter crystal-controlled—receiver is a double conversion superhetodyne. One of the world’s finest stations.

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SR-34 (115 volt a.c.) $395.00 Net

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Proven superior—the HT-32 with exclusive high frequency crystal filter system—rejects unwanted side-band at least 50 db. SSB, AM, or CW transmission—80, 40, 20, 15, 11-10 meter bands. 144 watts peak power input. Bridged-Tee modulator—temperature stabilized and compensated. Complete bandswitching. The cleanest signal on the air.

HT-32 $675.00 Net

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New power-packed HT-33A provides more output to antenna than any other amateur linear amplifier on the market today! Unit input is conservatively rated at the maximum legal limit. Complete coverage of 80 thru 10 meter amateur bands. Pi-network—variable output loading—all important circuits metered. Gives you one of the big signals on the band.

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Electronic Technology Series, edited by Alexander Schure. Published by John F. Rider, Publisher, Inc., 480 Canal St., New York 13, N. Y. 5 1/2 by 8 1/2 inches, paper covers. No. 11, Wave Propagation, 64 pages, $1.25; No. 14, Antennas, 88 pages, $1.50; No. 17, Electrostatics, 72 pages, $1.35; No. 21, Vacuum Tube Rectifiers, 72 pages, $1.50; No. 23, Impedance Matching, 128 pages, $2.00.

Earlier volumes in this series were discussed in the October, 1956, November 1956 and April 1957 issues of QST.

In the present group, No. 11 covers basic principles of electromagnetic wave propagation, the effect of the atmosphere and ionosphere on regular modes, atmospheric and ionospheric scatter, and miscellaneous phenomena such as sporadic-E and meteor propagation. The treatment is for the most part descriptive and simple to follow, but there are a few sections that might be difficult for a reader who has no previous knowledge of the subject and lacks background in physics.

In No. 14 the reader will find himself being conducted on the “standard” tour of antennas, most of it already familiar to him through our own Handbook and Antenna Book, but with a bit more on the mechanism of radiation from a dipole and considerably less over-all design data.

No. 17 takes up electrostatics—the nature of electricity, laws of attraction and repulsion, the electric field, potential and the like—in a way that should make this subject interesting to the reader who wants to start at the beginning in learning about electricity. Mathematics is confined to simple algebraic formulas.

No. 23 describes the operation of tube rectifiers in power-supply applications, and discusses various rectifier connections from the simple half-wave type through voltage doublers, full-wave center-tap and bridge, and various three-phase arrangements. Information on filters and typical power supply design problems are included.

No. 23, in implied scope, could include practically the whole of circuit theory since impedance matching, in one guide or another, is the basis and sought in nearly all circuit design. A book of this size could not encompass the entire field, naturally. It is concerned principally with the methods for maximum power transfer and impedance transformation, such as the transformer, cathode follower, resistive pads of various types, and (in the r.f. field) transmission-line sections. In the treatment of transformers the authors chose to use the self-and-mutual-impedances approach, which, while quite general, seems unnecessarily complex and on a more difficult technical level than the applications appear to warrant. Emphasis is chiefly on the audio range; useful design equations and charts are given that are principally of value at such frequencies. R.F. circuits are treated more on a descriptive basis, with little quantitative data and the reader will look in vain for anything on pi, l, and T networks, for example, or on filters. A concluding chapter on transistor coupling circuits summarizes the essentials of this subject in a way that should be useful to the newcomer to the field.

**Practical Radio and Electronics Course**, by M. N. Beitman. Published by Supreme Publications, 1760 Balsam Road, Highland Park, Ill. 628 pages, 8 1/4 by 10 1/2 inches, paper cover. Price, $3.95.

The course consists of 35 lessons divided into three sections, without any bundling, the first section covering fundamental ideas and components, the second complete radio equipment such as receivers, transmitters and test gear, and the third otherwise unclassified equipment such as various kinds of industrial electronic equipment. Each lesson is followed by a series of test questions and problems. A novel feature is a “comment” column—a column, running along each text page, in which are jotted various side notes.
Here is the finest amateur receiver in its price class! The NC-109 is packed with features demanded by discriminating hams everywhere, including provision for SSB reception. Brilliant new years ahead design guarantees top performance!

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- Eleven tubes including rectifier and voltage regulator.

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Antenna input: 50-300 ohms, balanced or unbalanced.
Size: Only 16¼" wide x 10" high x 10½" deep.
Cabinet finish: Handsome two-tone grey wrinkle.
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POSITIONS
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Maximum versatility, 1 to 3 decks, wide range of contact arrangements. Specially impregnated glass melamine wafer. Solder type lugs. Positive indexing.

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and additional explanation such as an instructor might make in class. A separate answer book is available. The course level is designed to give background for service work.


Metallic rectifiers include selenium, copper-oxide, magnesium-copper-sulfide, titanium-dioxide, germanium and silicon types. This book deals principally with what could be called power applications — in contrast to low-current uses as in detectors for r.f., measuring instruments, etc. — and contains a great deal of practical design information covering such diversified equipment as radio receiver power supplies, battery chargers, electroplating apparatus, industrial supplies of various types, and magnetic amplifiers. The theory, so far as it is known, of the various types of metallic rectifiers is also covered, and there is a chapter on some interesting special-purpose circuits such as clamping, gating, reference, and damping circuits, including balanced modulators.


Written for the beginner, this book treats the fundamentals of electricity in descriptive fashion with a minimum of mathematics. The eighteen chapters cover a wide range of subjects in the electrical field, some directly related to radio and some not. Possibly because some of the subjects treated are a bit off the well-worn track followed by most beginning texts, the reader is likely to come out with a broader understanding than he might otherwise get. There are, for example, chapters on generators and motors, electrical wiring, and illumination, all of which should provide useful reference information for those of us who think of electricity mostly in connection with our ham equipment.


One might wonder how it could be possible to use over 200 pages to discuss the meaning and use of circuit symbols: the schematic diagram is after all just a short-hand way of expressing a series of connections. The answer is to be found in the interpretation of the word "read" in the title of this book: the reader who absorbs the ideas will recognize circuit diagrams as he reads them, and thus appreciate some of the basic design points in circuits he may be inspecting. Good for beginners, especially as supplementary material to go with other radio studies.

Electricity and Electronics-Basic, by William B. Steinberg and Walter B. Ford, Published by American Technical Society, 848 East 58th St., Chicago 37, Illinois. 215 pages, including index, 6½ by 9½ inches, cloth cover. Price, $4.50.

Very elementary, sugar-coated, "popular-science" treatment of electricity and some of its familiar applications, including communications. There are 28 subjects or "units" each followed by a set of review questions. An attractive feature of the book is a collection of "Interesting Things to (Continued on page 178)
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**Do** — simple experiments, mostly performed by building gadgets of various sorts, including buzzers, tin-can motors, and carbon microphones, all designed to bring out the points covered in the "theory" part of the text.

Television Interference Handbook, by Philip S. Rand, published by The Nelson Publishing Co., P. O. Box 36, Redding Ridge, Conn. 56 pages. $1.75 by 11, paper cover. Price, $1.75 (foreign, $2.00).

While it is possible to consider Phil Rand's new book on TVI to be a successor to the Remington-Rand book of similar title which he published some years ago, it is definitely not just a revision of the earlier volume. Possessors of the earlier book will remember it as essentially a collection of previously-published articles dealing with various aspects of TVI. The new Televisîon Interference Handbook was written especially for the purpose; it has a connected story to tell and presents in compact form the information and techniques that have filtered down to being currently of most value.

The book is not confined solely to amateur TVI problems but covers the field generally. A list of the chapter headings will give an idea of its scope: 1. Sources and Types of TVI; 2. Locating TVI; 3. The TV Receiver; 4. The Radio Transmitter; 5. Shielding and Filtering; 6. Special V.H.F. Problems; 7. Design and Use of High-Pass Filters; 8. Design and Use of Low-Pass Filters; 9. External Harmonic Generation; 10. Industrial, Medical and Public Utility TVI. These are followed by an Appendix containing an extensive bibliography of QST references on TVI, a list of TVI Committees, tables showing harmonic relationships and TV channels, information on TV standards and channels in foreign countries, and some excerpts from the FCC rules.

The value of a book of this type to the amateur, particularly the newcomer who has not been exposed to the large accumulation of TVI reduction data that was published during the early years of the problem, is of course obvious. The material on TV receivers, and on nonamateur types of interference and methods for identifying the causes and tracking them down, likewise will be highly useful to TV servicemen and to TVI committees. Phil Rand's experience in the field makes it an authoritative presentation.

25 Years Ago

October, 1933

- Much discussion about the Madrid radio conference, with a special letter to Col. Foster by KBW.
- A universal five-band transmitter exciter unit, by James Lamb, using Tritet multiband crystal control.
- Automatic temperature compensation for the frequency meter, by G. F. Lampkin, using a compensating capacitor.
- Some inexpensive individual-band transmitters, by W6FFP, providing convenient four-band operation.
- Reports on 45-Mc. activity.
- A report on the amateur radio convention held at the World's Fair.
- "Midget" transmitters using a pair of type 10s and running 75 watts input, described by VK5FF.
- Results of the Fifth International Relay Competition, with the highest U. S. score being turned in by W3ZD and the highest foreign score by EAR185 (yes, young squirts, that was a legitimate Spanish call sign 25 years ago).
- Hints and Kinks, station descriptions (W3ZD, OKIAW, K7BAQ), international news and DX notes, operating notes, advertisements and Strays rounded out the 80-page issue 25 years ago.
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Volume 2: the components and units (basic building blocks of logical systems; transition from communication electronics to computer electronics; uses of tubes, diodes and magnetic cores; examples combining use of building blocks and elemental circuits).

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What?
See Page 189 !

Do You Want
an A.M. Linear?

From the mail that passes through our Tech-
ical Information Service, it seems obvious that
there is a widespread misunderstanding about the
capabilities of a.m. linear amplifiers. The most
probable reason for this is that the manufac-
turers of linear amplifiers advertise figures for
power input, rather than power output. This
practice of rating a transmitter (or amplifier) in
terms of power input has been followed since the
early days of ham radio, and FCC defines maxi-
mum legal amateur power in these terms.

Up until recent years, this method has been
reasonably satisfactory, since the final amplifiers
in a.m. rigs have nearly always been operated
Class C and plate modulated. They all, therefore,
worked at essentially the same tube plate effi-
ciency — and about 75 per cent. You could figure
that a final tube running at 60 watts input would
deliver an output of about 75 per cent of this
figure, or about 45 watts, to its tank circuit.
You also knew that if you wanted to boost your
carrier power 3 times, to 180 watts, you could
get it by increasing power input 3 times, to 180
watts, and supplying 3 times the audio power
that the old modulator delivered.

However, many of those who have been accu-
stomed to thinking in terms of power input may be
misled when it comes to a.m. amplifiers. From
the figures of rated input, a linear amplifier may
appear to be something that will give a sizable
boost in power without the need for supplying
a high-power modulator. The trouble is that the
linear a.m. amplifier runs at something less than
half the efficiency of a Class C final, and this
makes a big difference. Instead of getting a power
output equal to 75 per cent of the power input as
in the Class C final, the power output of the a.m.
linear is only about 33 per cent of the input. In the
case of an a.m. linear rated at 180 watts input,
only one third of this, or about 60 watts, appears
as output! This is a far cry from the anticipated
3-times boost in power. Furthermore, the power
that doesn't appear in the output is used in
heating the tube. This means that the tube in the
linear must be about three times as big (in terms
of plate dissipation) as required for a 180-watt
Class C final.

Now, let's see what an a.m. linear that actually
gives a 3-times boost in power output would look
like. At a plate efficiency of 33 per cent a power
input of 400 watts, instead of 180 watts, would
be required. That means a considerable increase
in the size and cost of the power supply. The tube
in the linear would have to be rated at 270 watts
plate dissipation instead of 45 watts; it would
take something bigger than a 4-250A, instead of
a 4-65A.

(Continued on page 189)
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These facts are aside from the problem of getting stability and distortion-free output from a linear, which is vastly more difficult for the average amateur to solve than with a Class C job.

For the same carrier output, the over-all cost of an a.m. linear with its larger power supply and tube complement will run essentially the same as the cost of a Class C amplifier with its high-level modulator and a power supply for the modulator. But if you are now operating one of the manufactured phone rigs in the popular 50–75-watt (input) class, an a.m. linear rated at a power input of less than 500 watts (and make sure that this power rating is for a.m. linear service and not s.s.b. operation) is hardly worth while. This will give you an output of about 165 watts. If you want to go whole-hog, the maximum 1-kw. legal input limit will give you a carrier of about 330 watts. When you look at figures for power input to an a.m. linear, remember that the power output will be something less than half of the output that could be obtained from a Class C amplifier running at the same input and using a smaller tube.

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Some of the many readers who’ve been intrigued by Dave Geiser’s article on receiver shielding (“Filtering and Shielding the Station Receiver,” QST, August, 1958) seem to misunderstand the function of a t.r. switch. These devices are intended to prevent damage to the receiver, not to prevent all transmitter signal from reaching the receiver. A t.r. switch can be designed to mute the receiver (by developing a high negative d.c. voltage that can be used for fast a.g.c.) but cutting off the audio output does not mean that some signal will not reach the first stage in the receiver. A duplexing bridge is the only way of theoretically reducing the transmitter signal to zero at the receiver input terminals.

Geiser has a paper on such a bridge in the Proceedings of the 10th Southern Western IRE Conference.

Merrill L. Swan, W6AEE, announces that the RTTY Society of Southern California will hold another RTTY Sweepstakes from 6:00 p.m. EST October 31 to 12:00 midnight EST November 1. Stations will exchange messages consisting of message number, origination station’s call, check or RST report of two or three numbers, ARRL section of originator, local time (0000-2400 preferred), date, and band used. Score one point for a message received and acknowledged by RTTY. For score, multiply total message points by the number of different ARRL sections (see p. 6) worked. Two stations may exchange messages again on a different band for added points, but the section multiplier does not increase when the same section is worked on another band. Each foreign country counted by ARRL for DXCC credit is treated as a new section for RTTY multiplier credit. Suggested congregating frequencies include 3620, 7140, 14,000, 21,000 kc. Logs should be mailed to W6AEE, 372 West Warren Way, Arcadia, California.

We have had a number of letters concerning the Koe clamps mentioned on page 62 of August QST. Everyone agrees that the clamps are handy for quads but that the prices mentioned in the article apply only in Canada. In the States the list prices run about 35% higher.

Strays

New York — All amateurs are invited to attend the 5th Western New York Old Timer’s Nite, Sunday, October 26, at the Sheraton Hotel, East Ave., Rochester, N. Y. Spon-

sored by the Rochester radio clubs, the event will precede the fall meeting of the Institute of Radio Engineers and the Electronic Industry Association. The program will begin at 4:30 p.m. with demonstrations and exhibits and will end at 9:30 p.m. with a beer-and-pretzel party. Master of ceremonies will be David Hull, ex-W1CBU and president of EIA. No reservations needed. Everyone welcome. For further info contact Bruce Kelley, W2ICE, Main St., Holcomb, N. Y.

Hamfest Calendar

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Now! In addition to the superb Boston Gear, double worm and worm gear reducer, tapered bearings and selsyn indication, has been added relays to reduce control wires from 12 to 8. Only two (2) heavy duty wires required. Specifications include 1/6 h.p. S/P 1725, 115-V AC motor reduced to approx. 15 rpm at a torque of better than 1200 lbs of torque and with gearing designed to hold better than 6000 inch-pounds of drive back. Specifications which will allow you to rotate and hold large full sized 10, 15 and 20 meter rotaries even thru 120 mph hurricanes! Guaranteed more torque power and reliability per dollar than ever before! Complete 200RS System only $360.00 f.o.b.

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BOX 185, QST

"It Seems to Us . . ."
(Continued from page 9)
decades appreciated the potential worth and ever-increasing value of radio 'hams' both young and old, available to our country's requirements. Although amateur operations are carried on as a hobby, the result is the creation of a large reservoir of personnel skilled in the art of radio communication. This has proved of value both to the nation in time of war and to industry in time of peace.

In addition to the military applications, I can think of no other hobby that contributes so much to technical advancements, to the welfare of others, to world brotherhood. Amateur radio — truly — exists for the service it renders.

Also at the military session, Rear Admiral Frank Virden, Director of Naval Communications, said, "We look upon you as a group that not only understands military problems from your past and present associations with them, but as a highly dedicated company who will know what to do, how to do it, and will have the stern will to do it when the country has need of you, either in or out of uniform. Your influence is greater than your numbers to the extent that you communicate to your non-ham associates the high principles and patriotic alertness that are essential to preserve the strength of this country in these complicated and often difficult times. . . ."

"From the spark days to satellites the amateurs have kept pace with the progress of communications and contributed greatly to this rapid advancement. They have even kept ahead of it and led the way quite often to new developments. Those of you that are interested in the technical advancements of communications are entering an era of monumental challenge, a challenge far greater than that which confronted those that are now known as old timers. The inspiration and opportunities for new ideas are greater than ever before and the expanding ranks of the radio amateurs . . . are keeping pace with the new look.

"Going forward is the business of the civilian and military experts in the highly complicated fields of communications and electronics. For them the best is never quite good enough. To me, it is gratifying to know that we have so many experienced people and enthusiastic youngsters still probing for better and more efficient ways of improving our way of life and providing greater capabilities for our military equipment. In conclusion: The Navy and amateur radio have had a long and rewarding partnership. You may all rest assured that the Navy will always strongly support your efforts and continued progress."

Brigadier General John B. Bestic, USAF Deputy Director of Communications-Electronics, made it unanimous for the three military branches when he said, "Your Air Force has a many fold interest in the amateur com-

(Continued on page 190)
COGENT REASONS WHY YOU SHOULD USE THE NEW DELUXE
TECRAFT 1¼, 2 and 6 METER CONVERTERS

1 OUTSTANDING PERFORMANCE
Finest engineering — best design techniques — years of experience — all assure you of Tecraft's superior performance.

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Critical comparison of technical features, constructional details, wiring and components reveals Tecraft is your best buy!

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Communications art. It would be hard to single out any one phase of the amateur service particularly deserving of recognition, but I would be remiss in my duties as an Air Force communicator without a word on the services to the military establishment in general and the Air Force in particular rendered by our nation's hams. . . .

"Hams are among the most pleasant people in the world. 'Sincere, well spoken, knowledgeable, companionable and likeable' are some of the adjectives that can be applied to them — but on the other hand hams are the most opinionated, biased and stubborn people all with one track minds. They can always make a military transmitter work better than the manufacturer. I've threatened many times to put a mouse trap inside the transmitter lid to keep you characters out but then the same transmitter would develop troubles defying any normal technician and, alas, with my hat in my hand and the mouse trap removed, once more I'd look for Mr. Ham and offer to hold his flashlight. . . .

"You have all evidenced interest in military or naval communications and share with me my feelings of pride in this partnership. We in the Air Force feel that organized participation by radio amateurs is a high point in patriotic endeavor and a significant contribution to the national defense effort."

190
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It was a solid, arm-chair-copy QSO with a W7—who told me how he had turned ham radio experience into a high-paying career: installing and servicing commercial and public-safety 2-way radios. He said he'd started by answering a Lampkin Laboratories' ad in QST.

After we had passed along our 73's I found the Lampkin QST ad—and filled in the coupon. It brought me my free copy of "HOW TO MAKE MONEY IN MOBILE-RADIO MAINTENANCE". From this booklet I learned of the high income I could earn in this field—and why it is a perfect business for hams.

Now I have contracts that pay me plenty, each month—thanks to a QSO and a coupon!

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Coupled with the savings offered, these bargains in Reconditioned Equipment mean tremendous turnover, nearly 500 pieces each month.

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Who know what they’re talking about.

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That can offer you the latest serial numbers
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(1) Advertising shall pertain to radio and shall be of interest to the amateur radio service. No box or column advertisement shall be placed. All advertising shall be in keeping with the grade or character of the products or services advertised. No advertisement shall be accepted unless accompanied by a check or money order made payable to the publisher. Advertising shall pertain to radio and shall be of commercial in nature. Thus, advertising of bona fide commercially advertised products or services offered for exchange or advertising inquiring for special equipment, take the 30 rate. Address and signatures are charged. An attempt to deal in equipment in the classified section, even if by an individual, is commercial and all advertising so classified takes the 30 rate. Provision of paragraph (1) is effective immediately for cash all types amateur equipment or trade against Michigan. Tel. NOrmandy 8-8262.

(2) Because error is more easily avoided, it is requested that the editors should be notified if any change is desired in any matter after the order has been placed. For this purpose, the order should be accompanied by a request for a quoted price. Advertisements should be made in the currency of the country in which they are placed. The publishers of QST are unable to vouch for their integrity or for the authenticity of the character of the products advertised. Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the authenticity of the character of the products or services advertised.

(3) The Ham-Ad rate is 50 per word, except as noted in paragraph (5).

(4) Remittance in full must accompany copy. Since Ham-Ads are not carried on our books, no cash or check is accepted. All orders for advertisements in the classified section must be accompanied by remittance. The publishers of QST are unable to vouch for their integrity or for the authenticity of the character of the products or services advertised.

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SAVE $100 on new 75A4 #420. Complete with all wiring and manuals. Pake 75A4. J. H. Carpenter, 50 N. H. St., Jersey City, N. J.


CODE Practice tapes. Name your speed. $3.75 each. Bob, W4BJN, 1373 Tucker, W2HLE, 51-10 Little Neck Parkway, Little Neck 62, N. Y.

SALE: HQ-129X for sale. $125, plus transportation. P. F. Williams, 25 Beach Ave., Fort Lauderdale, Fla.

WANTED: Receivers, Transmitters and accessories. Neaf Enter-


HQ-129X factory atigned. all new pastcap condns., speaker, tip top condition. F. O. B. Craig Wilson, 239 West Morgan, Dixon, 111.

S.S.B. Transformers identical and exact as used in W2EVVL exciter. Write for SPECIAL price. W2EVVL, Llps., 1609 Central Ave., Ft. Dodge, lowa.

FOR SALE: DX-100, recent model and in good condition. $45. R. E. W. 20, River Road, Jordan, 111.


HQ-129X with Heathkit mult., axial calibrator: condition perfect. WAS Unusual, $10. Sorry, no shipping. W2WDA, Libby, 1609 West mirror, Hastings-on-Hudson, N. Y.

COLLINS 78A4, 3 ke, mesh filter, brand new condition. Will ship C. O. D. c.w. in original packing. $175 flat. No handling! Frank Fahl-

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SELL; 400 watt, $100. L. A. P. 6, Ocean Ridge, N. Y.

WTS: 10 meter black Widow with AC power supply. Also RME PB-3000 and parts. $75. Bob, W4HBN, 986 Monroe St., Madison, Wis.

POK Sales: B&W 5100 transmitter and spare final tubes. One owner used. Also 150 watt option. $200. Bob Sales take all cash. K0PGE, 330-218 St., Hermitage, Calif.

DUMONT'S" Scope model 251, $70; Gunta 3-X Shortwave converter, $35; Gunta K-200 receiver, $50; Gunta K-360 receiver, $100. 2000 K-2 Ma, $40, Heath VFO $10, WS3HD, 1400 Rossane Drive, Washington 21, D. C.

WANTED: RF, mechanical filter for Collins 78A1 Receiver.

WS2A, 4425 Bordeaux, Dallas, Texas.

SAVE $75 on a Ham station. KEMPE 4000 with speaker, DX-36 and earphones. Also 600 watt transformer. £50 deposit for equipment, remainder to be paid on delivery. 600 watt transformer included. Also 250 watt transformer available. Free delivery. Soviet equipment, identical and exact as used in W2EVVL exciter. Write for SPECIAL price. W2EVVL, Llps., 428 Central Ave., Ft. Dodge, lowa.

HALLICRAFTERS HT-9 transmitter, good cond with colls for $80. This receiver is in very good cond. For details contact: W2KVM, 218 QSLR1 6, 25C, 25, $1.00. Hart, 467 Parke, Birmingham, Mich.


WANTED: Handheld Novice transmitter, key, 4 crystals for 15, 40 and 80 meters. $75. Bob, W4HBN, 986 Monroe St., Madison, Wis.


FOR SALE: 6 meter mobile 13 watt HB with Conset convertor. $20. John M. Matter, DR 10, Brook Dr. West Hfd, Conn.

FOR SALE: 2000 watt power supply. $150. John Marek, 26 Ridgeway Dr., Elmhurst, Ill.

FOR SALE: NG-500A 3 meter, Smith Model. $95.00. John Wilson, 315 E. 110th St., New York, N. Y.

FOR SALE: 2 meter converter, $35.00. Henry Lunt, 3214 N. 25th St., Lincoln, Neb.

FOR SALE: 2400 watts on 50 meter, 300,000 watt on 2 meter. $150.00. James J. Smith, 212 W. 53rd St., New York, N. Y.

FOR SALE: 10 meter rig, Cornes. $350.00. John S. Wilson, 509 W. 115th St., New York, N. Y.

FOR SALE: 3 meter, 1000 watt, 4 tube. $150.00. John E. Smith, 214 W. 53rd St., New York, N. Y.

FOR SALE: 2 meter mobile, Conset convertor, 1000 watts. $125.00. John W. Matter, DR 10, Brook Dr. West Hfd, Conn.

FOR SALE: 2 meter mobile, 2000 watt, 2000 watt. $150.00. John Marek, 26 Ridgeway Dr., Elmhurst, Ill.

FOR SALE: 500 watt radio, uses all new parts. $150.00. John H. Matter, DR 10, Brook Dr. West Hfd, Conn.

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GLOBE Scout t)HO, factory wired, 8 months old, in excellent condition. $75. Ben Woodruff, W9UE. 6140 N. Harding Ave., Chicago 38, Ill.

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Grava Co., A.M. Grava, Hicksville, L. I., N. Y.

HRO-8-TAT for sale, with coils A. H. C. U. D. in excellent condition. Fred F. Thiede, W2X6X, 1894 Buchanan Rd., West Hempstead, L. I., N. Y.

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GLOBE Scout A10, factory wired, 8 months old, in excellent condition, receiver. $75. Ben Woodruff, W9UE. 6140 N. Harding Ave., Chicago 38, Ill.

FOR SALE: Collins 75A3-A receiver (factory converted to 75A3). Best offer over $200. L. J. Hughes, WH0WZ, 5900 Hayes, Apt. D, Darien, Conn.

FOR SALE: Deluxe code instruction equipment especially suitable for a club. 24. A two-column set, $10. W2BEV, 1919 John St., Ogden, Utah.

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FOR SALE: Collins 75A3-A receiver (factory converted to 75A3). Best offer over $200. L. J. Hughes, WH0WZ, 5900 Hayes, Apt. D, Darien, Conn.

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FOR SALE: SX-88 and Viking 111. All accessories. A. J. Latimer, Jr., Virginia Beach, Va.

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Electronics gated compression amplifier, $40. Borry, can’t ship, from kit. Performs perfectly, $200; F.o.b. New Orleans, in original case, for sale, gud condx, $40; Knight VFO, almost new, K9AQV, 125 N. Bassford, La Grange, 111. Tel. FL 2-0669.


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FOR SALE: 10-watt complete kit, 6164 fre, 6 position switch and switch, Triplet meter, 120 watt power supply, bangswitching 80 through 15 meters. $45. For more info write: Mike Wallace, 5015 Knox, Merrick, Kansas.

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See your RCA Tube Distributor for the types you need. For data on any specific RCA rectifier tube, write RCA Commercial Engineering, Section J-37-M, Harrison, New Jersey.