QST
devoted entirely to
amateur radio
## NEW Revolutionary DO-T and DI-T TRANSISTOR TRANSFORMERS
FROM STOCK — Hermetically Sealed to MIL-T-27A Specs.

### DO-T Specifications

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### Transformer Performance

- TYPICAL DI-T PERFORMANCE

- TYPICAL DO-T PERFORMANCE

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† DGMA shown is for single ended usage (under 5% distortion—100MW—1000MW)...
† for push pull, DGMA can be any balanced value taken by 2W transistors (under 5% distortion—100MW—1000MW).
† DGMA & DI-T units designed for transistor application only. Pats. Pend.

* DO-T37 thru DO-T44 newly added to series.
New compact beauty...
New transistorized dependability...
for the Stradivarius of electronic keyers

Again, the “Stradivarius of electronic keyers” advances the art of CW with a clean, compact new design that’s completely transistorized…costs less to own…brings you new technical skill and personal enjoyment whatever your level of experience.

HA-4 Features

- Employs eight transistors and ten semi-conductor diodes. Transformer operated. Employs a high-voltage transistor to key the transmitter.
- Monitor or sidetone may be heard via built-in speaker.
- Semi-automatic position permits manual control of dash length for retention of individual characteristics, or straight key operation.


REAR CHASSIS: Term. strip for key connections; weight (dot duration); hi/lo speed range switch; term. strip for transmitter connection.

The new ideas in communications are born at…

hallicrafters
Chicago 24, Illinois
Canada: Gould Sales Co., Montreal, P.Q.
Why does Collins S/Line provide much better SSB performance?

(Here are 10 good reasons)

1. RF FEEDBACK RF feedback around driver and PA stage improves linearity, reduces distortion products, giving cleanest signal on the air.

2. FREQUENCY STABILITY
Optimum frequency stability is achieved by using a crystal controlled high frequency heterodyning oscillator and a Collins PTO low frequency variable oscillator. Each PTO is individually temperature compensated.

3. MECHANICAL FILTERS
Collins Mechanical Filters provide unsurpassed performance in both transmitter and receiver because both skirts of the Filter are steepsided. S-Line filters are 2.1 kc wide at the 6 db point and 4.2 kc wide at the 60 db point. No other type filter in this service approaches this performance. Clean signals are assured without additional audio filters.

4. LIGHTWEIGHT
Modern, compact, the S/Line is easy to move and assemble, light enough to carry along on a field day, weekend trips, or vacations.

5. ONE KC DIVISION ON ALL BANDS
Now, you can meet anyone on sked without retuning. Quickly legible 1 kc calibrated dial eliminates frequency searching.

6. MORE QSO’S PER KC
The Mechanical Filter limits the bandwidth to that required for good communication.

7. DUAL OR SINGLE PTO CONTROL
A flick of a switch selects a single control for transceiver operation, or separate controls to transmit and receive. Highly stable, permeability-tuned oscillator gives positive indication and the best frequency calibration available.

8. OPERATING AND FRONT PANEL SIMPLICITY
Front panel switching and simplified controls offer an ease of operation and optimum operating efficiency bonus. A gear reduced, 20-ke-per-dial-turn knob allows easy and accurate tuning. This dial lights up for easier reading.

9. AUTOMATIC LOAD CONTROL
Automatically keeps the signal level adjusted to its rated PEP. Result: an increase in average talk power. Makes distortion negligible.

10. COMPLETE STATION COMPATIBILITY
The Collins S/Line equipment, handsomely packaged, comprises a complete amateur station. Individual units on which a system can be built include: 32S-1 Transmitter, 75S-1 Receiver, 30S-1 Linear Amplifier, 516F-2 Power Supply, and a 312B-4 Speaker Console.

These 10 advantages help make Collins S/Line the most advanced system available to amateurs. Your nearest Collins distributor will describe further features of this remarkable system. See him at your earliest convenience.

CREATIVE LEADER IN COMMUNICATION

COLLINS RADIO COMPANY • CEDAR RAPIDS, IOWA • DALLAS, TEXAS • NEWPORT BEACH, CALIFORNIA
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<td>3XH4M</td>
<td>Donald H. Morris</td>
<td>997 South Avenue, N. E.</td>
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<td>William Werner</td>
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<td>Kenneth P. Cole</td>
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<td>M. W. Watson</td>
<td>240 Logan St.</td>
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<tr>
<td>Saskatchewan</td>
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THE TECHNICAL MATERIEL CORPORATION
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THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

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

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

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

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

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HIRAM PERCY MAXIM, W1AW, 1914-1936
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<td>President</td>
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<td>General Manager</td>
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<td>Communications Manager</td>
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<td>Technical Director</td>
<td>GEORGE GRAMMER</td>
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<td>PERRY F. WILLIAMS</td>
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<td>PAUL M. SEGAL</td>
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<td>W9QPI</td>
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Board Meeting Highlights

The Board of Directors of the American Radio Relay League held its 1961 meeting on May 5 at Anaheim, California. It is the second time in League history the meeting has been held on the west coast (San Francisco was the location in 1939). The Board reviewed the progress of the League, studied and discussed reports of the officers and its several committees, and made numerous policy decisions to guide League and amateur affairs during the coming year.

In the regulatory field, the League will seek from FCC a change in rules to permit "slow scan" facsimile/TV in the voice portions of our 10- and 15-meter bands, with band width restricted to that of normal A-3 emission. FCC will also be requested to eliminate the present requirement of double identification when using radioteleprinter emission. The Board endorsed FCC's proposals in Docket 14025, to permit Conditional Class exams for civilians overseas, and in Docket 14026, to permit world-wide maritime-mobile operation on 14 Mc. FCC will be consulted to determine whether mobile logging requirements can be simplified. The Board renewed its stand in favor of obtaining additional privileges in 1800–2000 kc. and also reciprocal amateur licensing agreements. The Board endorsed the provisions of two bills now in the Congress to amend the Communications Act, one to eliminate the requirement of notarization of FCC station license applications, the second to eliminate the present 30-day limit on applications for renewal of station licenses.

On the administrative side, the Board amended the By-Laws to provide that only amateurs holding licenses of General Class or higher are eligible for election to the ARRL Board; to provide that only elected directors may vote on a proposal to hold a special meeting of the Board; to clarify the President's delegation of certain responsibilities to the General Manager; and to establish the Public Relations Committee as a standing committee of the Board. A proposal to make terms of directors four years instead of two was rejected. The Housing Committee was authorized to continue its progress in the construction of a new Headquarters building. A special committee was appointed to study the matter of ARRL legal counsel. Director Denniston was newly elected to the Executive Committee of the League for a one-year term, and Directors Kahn and Meyers was re-elected for a similar term.

The Board made a strong recommendation to all U. S. amateurs to avoid use of the band segment 14.335–14.350 kc. so that single sideband DX might work us successfully there. The Headquarters was instructed to use GMT exclusively in ARRL publications and literature.

The article in each issue of QST adjudged best by the Merit & Awards Committee will henceforth receive a handsome plaque containing the actual printing plate for the cover of that issue. The Membership & Publications Committee will study the possibility of producing a v.h.f. handbook and a 10-year index for QST.

The League will seek a commemorative stamp for amateur radio in 1964, the 50th anniversary of ARRL's founding. The Board commended the Washington, D. C., Foundation of Amateur Radio Clubs on its establishment of a scholarship; Byron Goodman, WIDX, on completion of 25 years on the Hq. staff; Claude M. Maer, W6IC, for long and meritorious service as a director; the Field Engineering & Monitoring Bureau of FCC for continued cooperation with the amateur service; SCMs and appointed officials of the League organizational family for their continued fine efforts; and gave special thanks to Director Meyers and his Southwestern Division organization for warm hospitality to directors and their wives during the Board's visit to southern California.

Minutes of the meeting will appear in July QST.
COMING A.R.R.L. CONVENTIONS

June 16–18 — Rocky Mountain Division, Ogden, Utah.
August 5–6 — Oklahoma State, Tulsa.
August 26–27 — Central Division, Springfield, Ill.
September 15–17 — New York State, Niagara Falls.
September 26–30 — Ontario Province, Windsor, Ontario, Canada.

October 7–8 — Midwest Division, Omaha, Nebraska.
October 13–14 — Great Lakes Division, Cleveland, Ohio.
October 13–15 — West Gulf Division, Kerrville, Texas.
October 28 — Kentucky State, Lexington, Kentucky.

ROCKY MOUNTAIN DIVISION
CONVENTION
Ogden, Utah — June 16–18

The Ogden Amateur Radio Club, assisted by the Utah Amateur Radio Club (Salt Lake City), is sponsoring this year's Rocky Mountain Division ARL Convention on June 16–18 in Ogden at the Ben Lomond Hotel. The FCC, Armed Forces, ODM, MARS, and others are to be represented and will have speakers on the program. It is expected that Thikol will give a presentation on the solid fuel missile engines and the Minuteman. Several special interest meetings are also being scheduled together with activities for the XYLs and YLs.

The theme of the convention is “The Role of the AREC and the Amateur in Civil Defense and Other Emergencies.” Ed Tilton, W1HDQ, QST v.h.f. editor, will be the guest speaker at the banquet Saturday evening.

Accommodations have been arranged for those wishing to stay in Salt Lake City during the convention. Pre-registration is $4.00 ($5.00 at the door), with Saturday night banquet tickets $3.00 ($3.50 at door). Pre-registration closes June 5. Inquiries about the convention and requests for hotel reservation should be sent to Capt. L. B. Blaylock USN Ret., (K7OIP), Municipal Building, Ogden, Utah or Col. J. H. Sampson, USA Ret., (W7OCS), 3615 Mt. Ogden Drive, Ogden, Utah.

OUR COVER

In January QST we ran a picture of an HBR-15 receiver built by K7WD, and we asked that others who had built one of these receivers originated by WinTC send us a QSL. In response to that Stray we have received 67 QSL cards, 3 ordinary postal cards, 1 message via W1AW, 17 photographs, 10 letters, and a couple of phone calls. We know there are many more who built one of these receivers but didn’t bother to write in—so who says amateurs don’t build their own gear any more?

Our cover this month combines some of the QSLs that we received in response to the Stray together with the Eddystone dial version of the HBR-16 built by Alex Stewart and described starting on page 18 of this issue. Alex very kindly shipped his receiver to West Hartford so that we could have our staff photographer make this cover shot.

25 Years Ago
June 1936

... There were two editorials twenty-five years ago. One pointed out that phone was causing a great deal of interference to broadcast reception and thereby giving amateur radio a bad name. The other reported that many amateurs bemoaned the swift rate at which amateur radio was progressing technically, especially since some of the new devices were so complicated as to defy home construction. (No doubt the amateur of 1966 will look back on 1936 as the days when the technical side of ham radio was really easy to master!) — Ed.

... The technical fare twenty-five years ago included a 50-watt audio amplifier/mixer with beam-tube output, a 200-watt, 3-stage transmitter with an improved Tc-Tet oscillator, a high-output crystal oscillator using a 614, doped on adding n.a.e. to the ham superhet, and the usual collection of hints and knocks for the experimenter.

... J. H. Dellinger had further information on high-frequency radio fadeouts.

... There was more information on the work done by amateurs in various natural disasters around the country.

Strays

The Dade Radio Club, which lays claim to being the oldest active amateur radio organization in south Florida, wishes to extend its hospitality to any amateurs passing through Miami. This invitation is extended not only to U.S. amateurs but also and especially to overseas hams. Phone JE8-6314 for information and assistance.

W4RLS (J. Foy Gull, Jr., 500 North Jackson Ave., Russellville, Ala.) would like to compile a list of hams who are also attorneys. After he gets the list compiled, he'll send a copy to anyone who furnishes him with an s.a.s.e.

Ever stop to think what a valuable asset you have in your file of old issues of QST? Not just last year's or the year before, either. Member George Cowperthwait, Ballston Spa, N. Y., writes that he built a capacitance-measuring bridge described in the September, 1930, issue of QST, and he still uses it regularly. Anyone still using an item built from an earlier issue?
The high-power grounded-grid linear in its homemade cabinet. Controls across the top are for the plate tank capacitor, band switch and loading capacitor. Filament and plate-voltage switches flank the grid and plate millimeters below. The construction of the cabinet was described in an earlier issue as footnoted in the text.

A Compact High-Power Linear

BY FLOYD K. PECK,* K6SNO

A Class-B linear amplifier in the kilowatt category, complete with power supply, in a space barely exceeding 1 cubic foot. The grounded-grid configuration is used with four parallel-connected 811As.

HAVING decided to go all the way with single sideband, the old Class-C amplifier and modulator were sacrificed to the junk box. Then it was decided to see what could be salvaged for a linear amplifier that would give the most output with the available parts. We had a couple of 811As in the old modulator, and a couple of spaces, and they were selected for duty as linear amplifiers. Since the exciter was in the 100-watt-output class, it was decided to take maximum advantage of this output and drive the four 811As as grounded-grid amplifiers. The power supply for the old a.m. rig delivered 1250 volts d.c. at 300 ma., so it fitted our requirements pretty well. The complete circuit of the unit is shown in Fig. 1.

Reducing the Size

As first built, the linear was housed in a cabinet 20 inches wide, 13 inches high and 15 inches deep. It was built on a 17 X 13 X 3-inch chassis. In our project to build the compact linear in a cabinet 14 inches wide by 8 inches high and 17 inches deep, the same chassis size was used but the layout was reoriented. The power transformer used is 7 inches high, so it was necessary to submount it since only 5 inches of clearance was available above the chassis. A 5 1/2 X 6-inch opening corresponding to the base dimension of the transformer was cut in the rear, right-hand corner of the chassis, and brackets were made to provide support 2 inches below the chassis. This allows ample clearance for a.c. and high-

* 1352 Koch Lane, San Jose, Calif.
1See Peck, "Homebrew Custom Designing," QST, April, 1961.

voltage terminals below chassis.

The 866A rectifier tubes must also be mounted so that their bases are below chassis level. A 5-inch space for the 866As and 812As is provided when ceramic plate caps are used if the bases are submounted so that only the glass portions of the tubes extend above the chassis. The sockets for the four 811As are mounted on a 6 X 6-inch sheet of 1/4-inch aluminum suspended 1 1/4 inches below the chassis. Eight 1/4-inch holes were drilled in the chassis in a 2-inch circle around each tube position to provide natural convection for cooling the tubes.

Pi-Network Tank Circuit

A conventional pi-network tank circuit is used, and it was built around the Illumitronic 500-watt coil. The markings on the coil indicate tap points for the band switch, so that no calculations are necessary if a 1250- to 1500-volt power supply is used. About half the turns can be removed from the close-wound end of the coil, which allows it to be physically shortened to mount horizontally within a space of 5 inches. The band switch is a very sturdy one obtained from a surplus BC-575E antenna-tuning unit.

The input tuning capacitor C1 is also of the surplus variety, made by Cardwell and having a maximum capacitance of about 500 μf. The output (loading) capacitor is a three-section broadcast-receiver type of 365 μf. per section, with the sections connected in parallel. In the 3.5-Mc. position, the band switch connects a 1500-μf. silver-mica fixed capacitor in parallel with the variable loading capacitor.

June 1961
Fig. 1—Circuit of the high-power grounded-grid linear and its built-in power supply. Capacitors not listed below are disk ceramic, except those marked with polarity which are electrolytic. Resistances are in ohms.

C₁—500-µuf. 2000-volt variable (Johnson 154-3/500E20 or similar—see text).
C — Triple-section broadcast replacement variable, 365 µuf. per section, sections in parallel.
C₃—2500-volt mica.
C₄—Neutralizing capacitor—approx. 6 µuf. 0.06-inch spacing or greater (Bud CE-2028).
C₅—V.h.f. bypass (4-inch length of RG-58/U as connecting lead).
L₁—6.3-volt panel lamp.
J₁, J₂—Coaxial receptacle (SO-239).
J₃—Closed-circuit jack.
L₁, L₂—Pi-network inductor (Illumitronics/PiDux No. 195-1) approx. inductances in use: 0.4, 0.7, 1, 2.2 and 4.5 µh, respectively, for 10–80 meters. L₂ wound with No. 8 wire, L₁ wound with ½-inch copper strap (see text).
L₃—6 turns No. 14, ½-inch diam., close-wound.

Filament Supply
The filament requirements for the 811As are 6.3 volts at 16 amperes. The old transformer from the modulator, designed to handle a single pair of 811As, proved incapable of supplying the required voltage through the filament chokes with four tubes in the circuit. The secondary, which turned out to be wound with No. 16 wire, was removed, the turns being carefully counted as they were unwound. A new secondary was wound with No. 14 wire and the number of turns was increased by 10 per cent. The measured voltage
Components on top of the chassis are easily identified. The power-supply filter choke and submounted high-voltage transformer are at the left-hand end of the chassis. Tubes enclosed in the perforated shield above the four 811As are the 866A rectifiers. To the right are the plate tank capacitor, the pi-network inductor with its switch, and the loading capacitor. The neutralizing connection runs from a stator terminal on the tank capacitor, through a clearance hole in the chassis to the neutralizing capacitor below deck. (Photos by Greg Bethards.)

at the sockets was then 6.4 volts with a line voltage of 117. There were some qualms about the ability of the primary to hold up under these conditions, but the transformer has operated for over two years with no trouble.

**Bias**

The amplifier operates at zero bias, but the control system is set up so that a relay applies about 100 volts of negative bias from the exciter in the stand-by condition to cut off plate current completely. Without the stand-by bias, the idling current for the four tubes will be around 110 ma. Complete cutoff on stand-by allows these tubes to operate easily without forced-air cooling and, incidentally, is good insurance against "diode hash" noise while receiving.

**Stabilizing**

With a parasitic suppressor in the plate lead to each tube, there was no trace of instability in the amplifier, except on 10 meters, without neutralization. To assure yourself that the amplifier is stable, apply the plate voltage without bias, switch from band to band with no load applied and swing the input capacitor through its full travel. There should not be the slightest flicker of either the plate- or grid-current meters with no excitation applied. To correct the instability on 10 meters, a 6-turn coil (L4), ½ in diameter was inserted in one of the common filament leads from the filament choke. A 5-turn coil (L4) of hookup wire was wound over this. With a 0.06 µf variable neutralizing capacitor (C4) from L4 to the plate tank circuit, neutralization on 10 meters was easily obtained.

**Adjustment**

Many articles have been published on the proper loading of linear amplifiers. In nearly all cases, the use of an oscilloscope is recommended. By all means, use a scope for initial tuning if you can possibly get your hands on one. 

This bottom view shows the submounting of the plate transformer, filter choke, and the rectifier and amplifier tubes. The filament choke (enclosed in a metal box), the neutralizing capacitor and neutralizing coils L3 and L4 may be seen in the upper center of the chassis.
Another indispensable piece of equipment is an s.w.r. indicator. In case the scope is not always available, the output indication obtained from the s.w.r. meter can be used to get fairly near to optimum loading.

The following procedure has been checked by a scope to verify the results and was found to be quite satisfactory for this amplifier: Gradually apply carrier from the exciter up to about one half the rated output of the 100-watt-class exciter. Tune the linear-amplifier pi-network input and loading capacitors to obtain maximum indication of output with the s.w.r. indicator in forward position. Increase the exciter output on up to full output and again retune the amplifier for maximum indicated output. Many will say that this is the proper loading point for the amplifier, but this has not been found to be true in all cases.

Having proceeded as stated above, reduce the inserted carrier until the plate current drawn by the four 811As is 200 ma. Then, note the grid current reading and the ratio of the plate-to-grid current. In this case, with 200 ma. of plate current, the grid current was 40 ma. (a ratio of 5 to 1). Then increase excitation to get 300 ma. of plate current, at which point the grid current should be 60 ma. In the event you reach a point where this ratio changes, further load changes in the amplifier will be required. For example, if the plate current goes to 500 ma. and the grid current required is greater than 100 ma., the amplifier is no longer linear. It has been found that both underloading and overloading will cause this condition. Readjust the output capacitance and reresonate the input capacitor until a linear relationship is attained. Then set the audio gain control so the plate meter of the amplifier never indicates more than 50 per cent of the maximum on voice peaks for single-sideband, suppressed-carrier operation. At this point the signal will be as good as the output of the exciter. No amplifier can improve upon that.

While the power supply for this particular amplifier does not allow it to be driven to a full kilowatt p.e.p., there is room for a 1500-volt (d.c.) transformer that will permit greater output. If a 1500-volt transformer is used, another 100-uf. 450-volt electrolytic capacitor and 25K 25-watt bleeder resistor should be put in series with the three shown for the 1250-volt supply.

It should be borne in mind that with a grounded-grid amplifier, the p.e.p. input to the driver must be added to that of the final in determining the legal input. In the case of a 100-watt-class driver, the maximum input level will just about be reached when the four 811As are driven to maximum rated p.e.p. at a plate voltage of 1250 (675 watts).

---Ed.

---Strays---

Boy Scouts in the Los Angeles area had a chance to exhibit Scout lore and Explorer specialties at the 2nd Annual Sports, Vacation, and Travel Show held at the L.A. Sports Arena from March 17 through March 26. Through the efforts of W6QGV, W6QJW, W6MLZ, and the Los Angeles Area Council of Radio Clubs, an electronics exhibit was set up at the show. FCC assigned the special call K6BSA. W6MLZ and W6QJW, ARRL Southwestern Division Director and Vice-Director, obtained the loan of enough equipment to put the station on all bands, all modes. The L.A. Area Council provided enough operators to keep the station on the air 10 hours a day for 10 days. The Aerospace Electrical Society — which has been very active locally in fostering scientific training among young people, in particular having donated over a dozen Genet Communicators for the use of Explorer posts — contributed $200 to help defray various necessary expenses. During the 10-day period of operation, it is estimated that some 200,000 people viewed the exhibit. Over 2000 pieces of literature (from ARRL Hq.) describing amateur radio were handed out, and more than 1000 QSOs were made. The already warm ties between Scouting and amateur radio were improved. In short, thanks to the cooperation given enthusiastically on all sides, the exhibit was a great success.
Noise Factors Affecting V.H.F. Communication

BY JAMES C. McLAUGHLIN,* WSTBZ, AND ROBERT W. HOBBS,** WSPIL

V.h.f. DXers are constantly fighting something even tougher than QRM — noise. The tables in this article will tell you what kind of noise is the limiting factor in your particular situation. The best and worst times of day for cosmic noise are also tabulated. Add to this the information on path attenuation and predicting signal-to-noise ratio, and you have must reading for every v.h.f. enthusiast.

V.H.F. amateur radio communication is limited by several factors not significant at h.f.

These factors include scattering-type propagation, noise generated by the receiver and cosmic noise picked up by the antenna. This article will discuss the noise limitations and should help the amateur to minimize the noise in his receiving system.

Many v.h.f. men have noticed that connecting the antenna to a 6-meter receiver increases the noise output much more than if the same thing is done at 2 meters or above. This means that at 6 meters the noise coming down from the antenna system is more than that generated in a typical receiver; on higher frequencies, the converse is true.

The noise coming from the antenna may be thought of as having three components. One component is proportional to the temperature of and loss in the transmission line. The second component is both generated far from the antenna system. One comes from radiation in the region of the center of the galaxy and will be called the galactic component. The other may be considered an average radiation from many extraterrestrial and upper atmosphere noise generators; this will be called the background component. Together, the galactic and background components make up what is often called cosmic noise.

The galactic component is stronger than the background component, and its source is much more localized in space. This means that an antenna pointing in a certain direction will be receiving only the relatively weak background component most of the time. However, at some time of day (for most bearings) the motion of the earth relative to the "fixed" galaxy will cause the stronger galactic noise source to pass through the antenna beam. When this occurs, the noise is at a maximum for the day, and v.h.f. communication is at its worst. Table I shows the time of day when noise input to the antenna is a maximum as a function of the month and the direction in which the antenna is pointing.

Times are given in EST; they can be converted in the usual way for use in other time

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* Radio Observatory, Dept. of Electrical Engineering, The Ohio State University, Columbus 10, Ohio.
** Warner and Swasey Observatory, Case Institute of Technology, Cleveland, Ohio.

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Table I — Time of Day (EST) When Cosmic Noise Is at a Maximum

<table>
<thead>
<tr>
<th>Antenna Heading</th>
<th>NE</th>
<th>SE</th>
<th>S</th>
<th>SW</th>
<th>W</th>
<th>NW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Month</td>
<td>N</td>
<td>E</td>
<td>N</td>
<td>E</td>
<td>N</td>
<td>E</td>
</tr>
<tr>
<td>Jan.</td>
<td>0330-0600</td>
<td>0500-0800</td>
<td>0630-1000</td>
<td>1000-1400</td>
<td>1300-1600</td>
<td>1500-1900</td>
</tr>
<tr>
<td>Feb.</td>
<td>0410-0600</td>
<td>0530-0900</td>
<td>0700-1100</td>
<td>1030-1430</td>
<td>1330-1730</td>
<td>1530-1930</td>
</tr>
<tr>
<td>Mar.</td>
<td>0450-0700</td>
<td>0610-1000</td>
<td>0830-1230</td>
<td>1200-1600</td>
<td>1500-1900</td>
<td>1700-2100</td>
</tr>
<tr>
<td>Apr.</td>
<td>0530-0730</td>
<td>0650-1050</td>
<td>0910-1350</td>
<td>1280-1710</td>
<td>1580-1980</td>
<td>1880-2280</td>
</tr>
<tr>
<td>May</td>
<td>0610-0830</td>
<td>0750-1150</td>
<td>1030-1510</td>
<td>1380-1850</td>
<td>1680-2130</td>
<td>1980-2430</td>
</tr>
<tr>
<td>June</td>
<td>0650-0910</td>
<td>0830-1250</td>
<td>1120-1690</td>
<td>1490-1970</td>
<td>1790-2350</td>
<td>2090-2850</td>
</tr>
<tr>
<td>July</td>
<td>0730-0950</td>
<td>0910-1350</td>
<td>1220-1810</td>
<td>1600-2250</td>
<td>1900-2750</td>
<td>2200-3350</td>
</tr>
<tr>
<td>Aug.</td>
<td>0810-1030</td>
<td>0990-1430</td>
<td>1320-1950</td>
<td>1740-2390</td>
<td>2140-2990</td>
<td>2540-3790</td>
</tr>
<tr>
<td>Sept.</td>
<td>0850-1110</td>
<td>1030-1530</td>
<td>1520-2170</td>
<td>2000-2770</td>
<td>2400-3470</td>
<td>2800-4270</td>
</tr>
<tr>
<td>Oct.</td>
<td>0930-1150</td>
<td>1110-1650</td>
<td>1820-2490</td>
<td>2300-3290</td>
<td>2800-4190</td>
<td>3200-4990</td>
</tr>
<tr>
<td>Nov.</td>
<td>1010-1230</td>
<td>1190-1730</td>
<td>2130-2850</td>
<td>2800-3850</td>
<td>3300-4850</td>
<td>3800-5650</td>
</tr>
<tr>
<td>Dec.</td>
<td>1090-1310</td>
<td>1270-1830</td>
<td>2440-3170</td>
<td>3200-4370</td>
<td>3900-5570</td>
<td>4500-6570</td>
</tr>
</tbody>
</table>

June 1961 15
zones. These times are for the United States and will be different for places with other latitudes. For mid-latitudes in the United States the maximum noise source never passes across the northern horizon. Hence no times are given.

The background component is not really uniform, since there are regions which are radiating less than other regions. Therefore, times of the day when the noise is at a minimum also exist. Table II indicates when they are.

Both galactic and background components behave the same in that their strengths fall off rapidly with an increase in frequency. Doubling the frequency will decrease the cosmic noise some 5.8 times, so at 144 Mc. the background has shrunk to a small fraction of its value at 50 Mc. Table III gives the noise power density of the extraterrestrial components as a function of frequency. Note that the units used are Watts per c.p.s. Multiplying these values by the bandwidth of the receiver in c.p.s. gives the noise power contribution in watts $\times 10^{-21}$.

Table IV gives the noise contributed by the transmission line as a function of line loss. Since line losses increase with frequency, so does this component of noise. An average temperature of 63 degrees F. is assumed. In winter, with a cold transmission line, these values may be some 10 per cent less.

Table V converts receiver noise figure to the units given in Tables III and IV. Using typical values for noise figure and transmission-line loss it is easy to see that cosmic noise is the limiting noise factor at 6 meters. At 2 meters, on the other hand, receiver noise becomes very important as does, in many cases, noise from the transmission line.

Summing the contributions from Tables III, IV and V will give the noise power which must be overcome by the signal. Then with a knowledge of the path attenuation, transmitter power and receiving and transmitting antenna gains it is possible to make a good estimate of the signal-to-noise ratio of a circuit.

Fig. 1 is presented to give the amateur some idea of the path attenuation he may encounter.

---

**Table II—Time of Day (EST) When Cosmic Noise Is at a Minimum**

<table>
<thead>
<tr>
<th>Month</th>
<th>$N$</th>
<th>$NE$</th>
<th>$E$</th>
<th>$SE$</th>
<th>$S$</th>
<th>$SW$</th>
<th>$W$</th>
<th>$NW$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan.</td>
<td>1030-1430</td>
<td>1530-1930</td>
<td>1830-2200</td>
<td>2130-0000</td>
<td>0000-0330</td>
<td>0300-0545</td>
<td>0530-0730</td>
<td>0930-1000</td>
</tr>
<tr>
<td>Apr.</td>
<td>0430-0830</td>
<td>0630-1330</td>
<td>1230-1600</td>
<td>1530-1800</td>
<td>1400-1630</td>
<td>2100-2345</td>
<td>2330-0130</td>
<td>0330-0400</td>
</tr>
<tr>
<td>May</td>
<td>0230-0630</td>
<td>0730-1130</td>
<td>1030-1400</td>
<td>1330-1600</td>
<td>1200-1430</td>
<td>2100-2145</td>
<td>2330-2320</td>
<td>2230-0290</td>
</tr>
<tr>
<td>June</td>
<td>0930-0430</td>
<td>0530-0930</td>
<td>0830-1200</td>
<td>1130-1400</td>
<td>1000-1230</td>
<td>1700-1945</td>
<td>1930-2130</td>
<td>2030-0400</td>
</tr>
<tr>
<td>July</td>
<td>2230-0230</td>
<td>0330-0730</td>
<td>0630-1000</td>
<td>0930-1200</td>
<td>0800-1030</td>
<td>1500-1745</td>
<td>1730-1930</td>
<td>1830-2230</td>
</tr>
<tr>
<td>Sept.</td>
<td>1830-2230</td>
<td>2330-0330</td>
<td>0230-0600</td>
<td>0530-0800</td>
<td>0400-0630</td>
<td>1100-1345</td>
<td>1330-1545</td>
<td>1430-1800</td>
</tr>
<tr>
<td>Oct.</td>
<td>1530-2130</td>
<td>2130-0130</td>
<td>0030-0400</td>
<td>0330-0600</td>
<td>0200-0430</td>
<td>0900-1145</td>
<td>1130-1330</td>
<td>1230-1600</td>
</tr>
<tr>
<td>Nov.</td>
<td>1430-1830</td>
<td>1930-2330</td>
<td>2230-0200</td>
<td>0130-0400</td>
<td>0000-0230</td>
<td>0700-0945</td>
<td>0930-1130</td>
<td>1030-1400</td>
</tr>
<tr>
<td>Dec.</td>
<td>1230-1630</td>
<td>1730-2130</td>
<td>2030-0000</td>
<td>2330-0200</td>
<td>0290-0500</td>
<td>0500-0745</td>
<td>0730-0930</td>
<td>0830-1200</td>
</tr>
</tbody>
</table>

---

**TABLE III**

<table>
<thead>
<tr>
<th>Frequency (Mc.)</th>
<th>Cosmic Noise Power Density (10$^{-21}$ Watts/C.P.S.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$50$</td>
<td>$84.$</td>
</tr>
<tr>
<td>$144$</td>
<td>$3.7$</td>
</tr>
<tr>
<td>$220$</td>
<td>$2.1$</td>
</tr>
<tr>
<td>$430$</td>
<td>$0.4$</td>
</tr>
<tr>
<td>Average</td>
<td>$50.$</td>
</tr>
<tr>
<td>Maximum</td>
<td>$218.$</td>
</tr>
<tr>
<td>Minimum</td>
<td>$3.3$</td>
</tr>
<tr>
<td></td>
<td>$6.6$</td>
</tr>
<tr>
<td></td>
<td>$1.2$</td>
</tr>
<tr>
<td></td>
<td>$1.2$</td>
</tr>
</tbody>
</table>

---

Fig. 1—Path attenuation as a function of the distance between two isotropic (same field in all directions) antennas 30 feet above ground and separated by smooth terrain. The curve shown is good for 6 and 2 meters.
TABLE IV
Transmission-Line Loss and Equivalent Noise Power Density at 65° F.

<table>
<thead>
<tr>
<th>N.P.D.</th>
<th>(10⁻²¹ Watts/C.P.S.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.09</td>
</tr>
<tr>
<td>0.2</td>
<td>0.18</td>
</tr>
<tr>
<td>0.3</td>
<td>0.27</td>
</tr>
<tr>
<td>0.4</td>
<td>0.35</td>
</tr>
<tr>
<td>0.5</td>
<td>0.44</td>
</tr>
<tr>
<td>0.6</td>
<td>0.52</td>
</tr>
<tr>
<td>0.7</td>
<td>0.60</td>
</tr>
<tr>
<td>0.8</td>
<td>0.67</td>
</tr>
<tr>
<td>0.9</td>
<td>0.75</td>
</tr>
<tr>
<td>1.0</td>
<td>0.82</td>
</tr>
<tr>
<td>2.0</td>
<td>1.48</td>
</tr>
<tr>
<td>3.0</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Of course, many amateurs are not separated by smooth earth, and some stations have antennas more than 30 feet above the ground. To calculate path attenuation for these more general cases, some additional reading will be required.

Consider two 6-meter stations that are separated by smooth ground and have 30-foot high antennas. The rest of the circuit specifications are as follows:

Distance between stations 250 miles
Transmitting antenna gain 9.0 db, over dipole
Line loss 0.3 db.
Receiving antenna gain 12.1 db, over dipole
Line loss 1.0 db.
Receiver noise figure 4 db.
Receiver bandwidth 3000 c.p.s.
Transmitter power output 250 watts

Next, figure the net path attenuation from transmitter to receiver. There are three losses involved: path loss 194 db, from Fig. 1, transmitting transmission line loss 0.3 db, and receiving transmission line loss 1.0 db. The gains are those of the transmitting antenna + 9.0 + 2.2 (2.2 db is the gain of a dipole over an isotropic radiator) db, and the receiving antenna + 12.1 + 2.2 db.

Adding up the losses and the gains and subtracting the gains from the losses gives a net path attenuation of 109.8 db.

Now the transmitter output power must be reduced by the path attenuation to get the signal power at the receiver.

Solving,

\[
\text{Path atten. (db.)} = 10 \log_{10} \frac{\text{Transmitter Power Output}}{\text{Signal Power at Receiver}}
\]

gives 2.61 × 10⁻¹⁶ watts as the signal power at the receiver. The signal-to-noise ratio equals this figure divided by the noise power at the receiver. Therefore,

\[
\text{S.N.R.} = \frac{2.61 \times 10^{-16}}{2.73 \times 10^{-16}} = 0.96 = 9.8 \text{ db}
\]

A major portion of the information given in this paper was derived from Celestial Radio Radiation by Drs. J. D. Kraus and H. C. Ko, published by the Radio Observatory, Dept. of Electrical Engineering, Ohio State University. This work was done while the authors were research assistants at the National Radio Astronomy Observatory. The authors wish to express their appreciation for the encouragement of Dr. John W. Findlay, Chairman of the Research Equipment Development Department and Assistant to the Director at the National Radio Astronomy Observatory.

TABLE V

<table>
<thead>
<tr>
<th>Receiver</th>
<th>Equivalent Noise Power Density (db.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise Figure</td>
<td>(10⁻²¹ Watts/C.P.S.)</td>
</tr>
<tr>
<td>2</td>
<td>2.34</td>
</tr>
<tr>
<td>3</td>
<td>3.98</td>
</tr>
<tr>
<td>4</td>
<td>6.05</td>
</tr>
</tbody>
</table>

First, find and total the noise contributions. From Table III the average cosmic noise power density at 50 Mc. is 84 × 10⁻²¹ watts/c.p.s. The 1.0-db. receiving transmission-line loss converts to 0.82 × 10⁻²¹ watts/c.p.s. with the aid of Table IV. Table V says that a receiver noise figure of 4 db is equivalent to a noise power density of 6.05 × 10⁻²¹ watts/c.p.s. Adding these three figures gives 90.87 × 10⁻²¹ watts/c.p.s.,

\[
1 \text{ See the October 1955 issue of the Proceedings of the IRE, in particular, page 1488. Also, National Bureau of Standards Technical Notes No. 15, Prediction of the Cumulative Distribution with Time of Ground Wave and Tropospheric Wave Transmission Loss, Part I — The Prediction Formula; and No. 12, Transmission Loss in Radio Propagation II. These last are available for $1.50 and $3.00, respectively, from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.}

During June the Third Army MARS training program (Fridays at 1900 EST, 0000 GMT, 5850 kHz) will be devoted to radioteletype.

WA2GWF suggests that those hams who put on too much weight emptying beer cans for a beer-can vertical will be glad to know that Metreal cans also work fine.

Congratulations to Richard S. Morse, W1AIFZ, who was recently nominated by President Kennedy to be Assistant Secretary of the Army for Research and Development.

A new magazine is on the market — TVI! (TV International — world-wide TV news.)
The HBR-16 with an Eddystone Dial

BY ALEX STEWART, ex-4HP *

(With an assist from W6TC)

The substitution of a different tuning dial may seem like a simple thing to do in almost any constructional project. It isn't quite so easy, though, when an Eddystone dial is to be fitted to the HBR-16— not, that is, if the original receiver size and performance are to be maintained. Here's a scheme used by the author with the advice of W6TC.

About two years ago, after an interval of some forty years, I renewed my subscription to QST, just to see what was going on in this former hobby of mine. That did it—I was hooked again.

What a mysterious world I found myself re-entering. The old galena crystal had not only given way to a quartz of a different kind, but receivers had shrunk from table-top size down to wee boxes crammed with all sorts of esoteric components. Gone were those helpful hints on the best kind of oil to use to keep that old 1-kw. condenser from blowing its stack of reclaimed glass photographic plates, or how to mold and cast your own rotary spark gap. Instead, I found myself reading about communications receivers using single conversion, double conversion, and even triple conversion. Notch filters, Q multipliers, and something called "s.s.b." were among other strange items to compound my confusion. Things had surely changed since I last whiffed a sniffful of pure ozone.

With 90 per cent of my old hobby now away over my head, I realized I'd have to start over from scratch. And being the type of person who learns most easily by doing, I decided to build a communications receiver.

Admittedly, rushing pell-mell into any such seemingly difficult task did at first glance seem to be rather ridiculous. But, in a back issue of QST I had run across an article describing the construction of a receiver which the author claimed to be not only very much worthwhile, but well within the construction capabilities of most any Tom, Dick and Harry as well—the "HBR-16 Communications Receiver," described in the October, 1950 issue of QST.1 This was for me.

Meanwhile, an advertisement for the new Eddystone dial had caught my eye, so I noodled up enough courage to write to the creator of the HBR-16, Ted Crosby, W6TC, and casually inquired if it might be possible to incorporate the Eddystone dial into his receiver.

How naive can you get? Little did I realize how complicated (for me) this seemingly simple alteration could actually be. Ted's reply gave me a fast run down on several methods already used by others who had substituted the Eddystone dial, and he carefully detailed for me his objections to each. He further stated that if some way could be found to keep the front-end leads as short and rigid as in the original version of the HBR-16, the Eddystone dial would be a worthwhile improvement.

Several letters and several false starts later, Ted finally came up with what seemed to be the answer—a completely new subchassis-mounted front end which would include all of the components and wiring of that portion of the receiver between the L1 antenna coil and the first-mixer

1 Crosby, "The HBR-16 Communications Receiver," QST, October, 1959.

The drive shaft of the Eddystone dial is high up on the assembly, so the tuning capacitor can no longer sit on the chassis as in the original HBR-16. To make the dial and capacitor line up, the receiver front end is separately mounted on the subchassis shown at the right in this rear view.
section of the 1600-kc. transformer, $T_1$. Not only would such a modification solve the mechanical problems but it would at the same time provide even shorter leads and better front-end isolation than had been possible in the original SCN dial design. On paper, that is, The practical application of the idea still remained to be accomplished.

My cut-and-try efforts toward the completion of the receiver were strung out over a period of about six months, accompanied by a continuous flow of good, solid advice from Ted at every step. I now wonder how he found the time for it, as I have since learned that he was at the same time receiving and answering literally hundreds of letters from other interested parties.

**The Eddystone Dial**

Before proceeding further it should be made clear that the contemplated modifications were to be tailored to the original small Wyco cabinet. Quite a sizeable order, since the dial has an overall height of 5 5/8 inches between the upper edge of its escutcheon and the lower rim of its flywheel. Some way had to be found to fit this 5 5/8 inches of dial between the flange which runs across the top front edge of the cabinet, and the upper surface of the main chassis. In the original HBR-16 design only five inches of vertical panel space is available. In my own receiver, the first half inch of additional space was achieved by dropping the main chassis down onto the floor of the cabinet while the remaining one-quarter inch was secured by filing that much off the cabinet flange.

A better way of doing it has since been worked out, and is recommended. The dial escutcheon should be mounted so that its upper and left-hand edges are one-half inch in from the corresponding two edges of the panel. A slot 2 1/2 inches long by 3/4 inch wide should be cut in the main chassis directly underneath the final location of the flywheel. The flywheel turns in this cutout, protruding about 1/4 inch below the under side of the main chassis. This extra space between escutcheon and the two edges of the panel also makes a decided improvement in the external appearance of the receiver.

As a preliminary, install all of the chassis-mounted parts with the panel off. The hex nuts that secure the panel-operated controls to the chassis proper also serve as spacers when the panel is finally attached. A second set of identical hex nuts is used for fastening the panel to the chassis. The resultant space between the main chassis and the panel accommodates the half-inch flange which extends across the lower front edge of the Wyco cabinet. When inserting the receiver in the cabinet, a slight tilt of the entire assembly to swing the top of the panel forward will keep the upper portion of the Eddystone dial assembly clear while the lower cabinet flange goes in the "slot." As a precaution against binding between the chassis and the cabinet flanges when the forward tilt is attempted, file about 9/6 inch off both side flanges for a distance of four inches from the bottom end. A similar 5/6-inch slot in the upper 11/2-inch section of the left-hand front flange will provide additional clearance for the plastic drive wheel for the dial pointer.

**The Front-End Subchassis**

A 2 x 5 x 7-inch chassis is used as a subchassis for the front end. For best mechanical stability a steel chassis is to be preferred. Study of the accompanying photographs will give the builder a close-enough approximation of the proper parts placement. The subchassis is attached to the main chassis by four 6-32 spade bolts and nuts. Making the four main-chassis holes for these spade bolts slightly oversize will give some leeway in mounting — sometimes of great help when attempting to align the antenna trimmer and 1461-BS capacitor shafts in final assembly. The subchassis should end up mounted 3/8 inch from the left-hand edge and 19 3/8 inches from the front edge of the main chassis. The original three-stud mounting arrangement for the 1461-BS is used, but in this case this capacitor ends up about 1/4 inch above the top surface corner of the subchassis. The antenna trimmer, C16, is mounted in the left-hand corner of the subchassis, giving practically a no-lead connection to the L1 coil socket. The relatively small space available makes the Hammarlund MAPC-15B a "must."

The no-lead connection plus the fact that the MAPC-type variable has no metal frame (which always adds some stray capacitance) explains why it is possible to use one more turn of wire in the secondary winding of the six-meter L1 coil for this receiver than in the original SCN dial model.

The shield between the plug-in coils and the 1461-BS should be 1/2 inch from both coils and capacitor. Closer placement tends to lower the Qs of the coils and increases the minimum capacitance.

The small shield between the first oscillator and first mixer, visible in the underside view, is not essential and should be eliminated.

The 1461-BS should be mounted so its shaft will be 5/8 inches from the left-hand edge of the panel. So mounted, it will line up with the drive shaft of the Eddystone dial, provided the dial has been panel mounted as previously described.

As the tuning ratio of the Eddystone dial is

![Fig. 1 — Suggested modification of the HBR-16 a.v.c. circuit. The 3-position rotary switch selects either fast or slow a.v.c. or "off" (a.v.c. line grounded). Capacitors in the a.v.c. circuit can be tubular paper, 200-volt rating; capacitances are in µf.](image)
The bottom of the subchassis is accessible through a cutout in the main chassis. The general layout of the r.f., mixer and oscillator stages is the same as in the original receiver.

11041. the vernier capacitor in the first-oscillator circuit no longer is needed and has been eliminated.

The 3000-kc. calibration-oscillator tube and crystal sockets are mounted on the main chassis in the space between the subchassis and panel. Place the tube and crystal sockets as close together as possible, so be certain they do not interfere with the shafts for $C_{11}$ and the 1461-BS.

Some Additional Comments

Starting with the second mixer half of $T_1$ and its associated 100-$\mu F$ APC capacitor, the balance of the main-chassis parts are laid out and mounted exactly as in the original receiver.

The new front end necessitated some rearrangement of the panel-mounted controls. I used a rotary off-on switch for the calibration oscillator and mounted it in the position formerly occupied by the antenna trimmer. The former calibration-oscillator switch position was used for a rotary fast-slow a.v.c. control, with the a.v.c. off-on switch being separately mounted. Subsequent builders might well combine these functions by using a single three-position rotary switch as shown in Fig. 1. This calls for some further explanation: In the interests of improved a.v.c. control, only one a.v.c. line is now used, with the r.f. stage ($\frac{1}{2}$) now connected to this "maximum" line rather than to the "partial" line as in the original circuit. With the partial line eliminated, a single one-megohm $\frac{1}{2}$-watt load resistor will suffice for the a.v.c. diode, $V_{10}$. 

To obtain proper b.f.o. injection in the 6BE6 product detector, I found it necessary to use a 75-$\mu F$ silver-mica padder in parallel with the entire 012-M5 b.f.o. coil. Some time ago it was definitely determined that this coil could not be depended upon to tune down to the required 100 kc. unless 75 to 100 $\mu F$ of additional padder was used. Despite the thorough shielding of the b.f.o. there is some slight leakage, and harmonics can get into and beat with the second oscillator. Thus at certain settings of the b.f.o. trimmer there is a weak heterodyne, which many builders have erroneously assumed to be the proper b.f.o. injection. Under these conditions the product detector gives only a poor imitation of its optimum performance underloading on all but the weakest signals. Also, as a precaution against possible parasitics in the b.f.o., insert a 56-ohm $\frac{1}{2}$-watt resistor in the 6BH6 grid lead, as shown in Fig. 2. Parasitics are quite likely to occur unless this precaution is taken.

An additional 10-$\mu F$. NT750 capacitor between Pins 2 and 4 of the $L_2$ coil socket will tend to counteract the frequency drift in the first oscillator chassis wiring, this drift being common to all bands. The additional capacitance may or may not call for a change in the size of the NT750 capacitor used in the $L_2$ coils proper. Try it and see.

One of the bonuses of the front-end modification described here is the success rate of the receiver "barefooted" on six meters. Six-meter coil data are given in the accompanying chart. No band-set capacitors are used in the $L_1$ and $L_2$ coils; instead, these coils are tuned to resonance by adjusting the secondary turns spacing. The secondary inductance of these coils will be too large for use in the original model of the receiver, and one turn less is suggested if the coils are to be so used. The 1$\frac{1}{4}$-turn position of the tap, as well as the over-all length of the secondary, will apply in either case.

The six-meter $L_2$ coil can be used in any 6BR-16 receiver. It is designed so that the first oscillat-
tor covers approximately 24.2 to 25.7 Mc, on its fundamental frequency, with its second-harmonic of 48.4 to 51.4 Mc, providing the necessary 1000-ke. i.f. difference over the 50- to 53-Mc. portion of the band.

The 6th harmonic of a crystal on approximately 8400 kc, when used in the receiver’s calibration oscillator, provides a husky signal for alignment purposes over the lowest portion of the band, where most of the six-meter activity exists.

**Conclusion**

The Eddystone dial version of the receiver is somewhat more involved mechanically than is the original SCN dial model. Some builders will find the additional mounting holes and large cutout for this dial a considerable chore. I used socket punches to make several strategically located openings in the area to be cut out, and completed a rough-edged hole with a hacksaw. Final smoothing of the edges was done with a file. To protect the surface finish of the panel during the more hectic portions of the procedure, use a wooden clamp with a felt liner during the hacking and cutting. The final touches can be given while holding the panel in your lap. Expect a few blisters before the receiver finally is completed!

The more technical portions of this manuscript were “ghost written,” and I hardly think it necessary to identify the “ghost.” I mention this because I feel it important that you go to the proper party with questions of a technical nature.

Drawn-to-scale blueprints of the Eddystone dial version of the receiver, as well as 8 X 10 glossy photographs, will be available from me. A stamped envelope will bring further details. All of the additional information mentioned in the October 1959 article is available also; the “hints and kinks” and large schematic serve for both versions of the receiver. A stamped envelope to Ted will bring you the dope on these items.

Happy landing!

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**HBR-16 Product Detector Circuit**

Fig. 3 on page 37 of the December 1960 issue did not show one change that had been recommended earlier by W6TC. This was the substitution of a new i.f. filter arrangement for the original RC filter. Also, some additional changes in values will improve the 6BE6’s ability to handle large signals. All these are shown in the accompanying circuit, Fig. 1. Concerning the later revisions, W6TC writes, “The tube is no

(Continued on page 134)
Naval Reserve Communications Divisions

The relationship between the Navy and amateur radio has been mutually rewarding for many years. Amateurs have served the Navy well whenever called upon, and the Navy has in turn done much to strengthen the position of radio amateurs in this country. A Naval Reserve activity which existed prior to World War II and which did much to supply a reservoir of trained operators was the Naval Communications Reserve, and many a World War II Reserve communicator was a graduate of this system. It was voluntary, and it provided both communications and military training to many a ham. Its passing after World War II was mourned by many an old-time communicator, but now there is a new Reserve activity which should do much to fill the gap.

The Navy has authorized the organization of a number of Naval Reserve Communications Divisions, and several of these have already been formed. These divisions seek as their primary objective to improve the readiness and the qualifications of attached personnel for active duty with Naval Communications Shore Activities. What this means is that the Navy is looking for communicators or would-be communicators who already are or will be members of the Naval Reserve. These people will train regularly to improve their skills as Naval Communicators.

Who can join one of these divisions? Only those who can join the Naval Reserve and accept Type A mobilization orders. Those reservists who hold Type A mobilization orders are the ones who know ahead of time what their duty station will be in case of national emergency. That is, should the President of the United States declare a state of national emergency, reservists with Type A mobilization orders would proceed immediately to a previously assigned station. In the case of members of a Naval Reserve Communications Division, this duty station would be some Naval Shore Communications activity.

Aside from the educational and training aspects, a member of a Naval Reserve Communications Division usually performs his active duty for training at the naval communications shore activity where he may be assigned in the event of mobilization. This enables him to be entirely familiar with the equipment and the facilities at the station where he would serve in the event of a national emergency.

Hams are playing an important role in this new Naval Reserve Communications Divisions. As an example, the Division which trains at the U.S. Naval Reserve Training Center in Brooklyn, N.Y., has W2KGO as commanding officer, W2MY as electronics officer, and W2SKK as electronics instructor. Members of the division include WA2NWJ, WVRN7QZ, and WV2NZR, while other members of the division are being encouraged to obtain their ham tickets.

The fellow with an amateur license may be able to qualify for special recruiting consideration, since there are two programs by which he may obtain a higher pay grade than can the applicant without a ham ticket.

If you are interested in the operational or technical aspects of Naval Communications, you may obtain further information by contacting the Naval Reserve Liaison section of the Office of Naval Communications. Address your inquiry to Chief of Naval Operation (Op-942N), Rm. 5E780, The Pentagon, Washington 25, D.C.

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Strays

One rainy day W4NJJ (a Reserve commander) was operating his mobile while driving around the Norfolk Naval Air Station, when he noticed a full-dress inspection being held by one of the commands. W4NJJ commented to the fellow he was working that he sure was glad he didn’t belong to an outfit that held full-dress inspections in the rain. When he got to his office on the base, he had a phone call from W4RVW, a chief petty officer in the inspection command. The chief said that W4NJJ’s mobile transmissions had gotten into the p.a. system and that the inspecting captain had heard every word, realized then that it was raining hard, and had promptly secured the inspection. Now, every time that outfit is having an inspection, the c.o. calls up W4NJJ and asks him not to transmit while passing his building. (‘Suppose W4NJJ will ever make captain?)

Phil, K2RCG, and Phyl, W2RLJ, will be married on June 3. They have several things in common — similar first names, same hobbies (ham radio), both have first-class phone tickets, and both are physics majors at Columbia University.

Speak Hungarian? Contact W2RIR, who has told us about the Hungarian Net. This net operates on all bands and specializes in Hungarian-language conversations.

Ever hear the story about the two hams who went out looking for a good Field-Day site? They tramped up hill and down hill through the wilderness all day long, and became thoroughly lost. Finally they stopped and studied their topo maps long and earnestly, and then scanned the horizon. At last one of them decided he had the answer. With his map in one hand, he pointed out across the hills toward the north and said to his companion, “There, do you see that high mountain over there? Well, according to the map, we’re right on top of it.”

22 QST for
Low-Pass Filter for 6-Meter Operation

Effective Network Offering Benefit in Both Transmitting and Receiving

The low-pass filter is enclosed in an aluminum box measuring 2¼ inches square and 5 inches long. The terminal on top is for the ground connection. The hole in the side provides access to the trimmer capacitor, C6.

BY JOHN R. LANGE,* K9ARA

A ham operating in the 6-meter band may be faced with several problems relating to television. The fundamental of his transmitter carrier may overload stages in neighboring TV receivers tuned to Channel 2. Various harmonics of lower frequencies in the oscillator or multiplier stages of his transmitter may fall in one or more of the v.h.f. TV channels. A third difficulty may come up if the ham station happens to be located not far from a Channel 2 transmitter. In such a situation, the ham may find the 6-meter band cluttered with sync buzzes and distorted sound.

Solving the TV receiver overload problem is, of course, a matter of inducing the TV viewer to install a 300-ohm high-pass filter in his TV receiver. A low-pass filter in the feed line of the 6-meter antenna is not only useful in suppressing harmonic output from the transmitter, but is also very effective in suppressing Channel 2 sync buzzes. Before installing the filter to be described, these buzzes were bothersome as far down as 49 Mc. on the author's 6-meter converter.

Values for the low-pass filter whose diagram appears in Fig. 1 were worked out using the m-derived and constant-k equations from the ARRL Handbook. The characteristics are shown in Fig. 2. The filter was designed with a cutoff frequency at 54 Mc. and a frequency of infinite attenuation at 55.25 Mc., which is the Channel 2 picture-carrier frequency.

The filter passes signals up to 51 Mc., with only about a 0.3- to 0.5-db. loss, and attenuates the Channel 2 picture carrier, and other signals on Channel 2 and above, up to over 30 db. Insertion of the filter in the transmission line at K9ARA caused negligible change in the v.s.w.r., and a v.s.w.r. of less than 1.5 was obtained up to 51 Mc. Both 51- and 75-ohm models have been built and used.

Construction

The material cost of the filter is approximately

The filter described in this article not only does a good job in suppressing TVI from harmonics generated in the low-frequency stages of a 50-Mc. exciter, but it will also eliminate spurious signals from a near-by Channel 2 transmitter which often clutter up the band on a 6-meter receiver. It is equally effective in suppressing harmonics from transmitters operating on any of the lower-frequency bands.

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Fig. 1 — Circuit of the 6-meter low-pass filter. See text referring to resonant frequencies. See table on following page for values of inductance and capacitance. For transmitter inputs of 20 watts or less, 600-volt 2-per-cent zero-temperature-coefficient ceramic capacitors (Centralab type TC2) are suitable for all fixed capacitors; for higher power 6000-volt disk capacitors (Centralab DD60), Sprague 60GA, Erie HD6 or similar) should be used. C6 is a 43-μuf. negative-temperature-coefficient ceramic trimmer (Centralab 822BN), J1 and J2 are chassis-mounting coax receptacles (SO-239).

June 1961
$5.00, with the case and connectors being the most expensive items. For transmitters of over 20 watts input, 6000-volt 20-per-cent disk ceramic capacitors were used with no difficulties. One filter was used successfully with a 3000-watt-input transmitter on 6 meters. The filter, of course, can be used also on the lower-frequency bands.

The photos show the construction in a 5 X 2 1/2 X 2 1/4-inch Minibox. The coils are supported by the coax connectors and by the short capacitor leads, one of which is soldered to a ground lug. The only stand-off insulators used were the two vertical, single-lug terminal strips which support the trimmer capacitor and its parallel coil and fixed capacitor. For high powers, ceramic stand-offs will prevent possible insulation breakdown. Leads should be centered in the middle of the holes through the shields and excess solder resin cleaned from capacitor bodies and stand-off insulators.

A 10-32 screw was put on the side of the filter case to attach a suitable ground wire. A 1/4-inch-diameter hole was drilled in the case to admit the tuning tool for a final adjustment with the cover on.

Adjustment

Before the sections are connected together permanently, the coils are preadjusted individually with a g.d.o. to resonate at the frequencies indicated with associated capacitors as follows: $L_1-C_1$; $L_2-C_2-C_3$; $L_3-C_7-C_8$; $L_4-C_7$. Note that $C_8$ is common to both the $L_3$ and $L_4$ circuits. $C_5$ is not connected at this juncture. Coil turns are spread apart or squeezed closer together in adjusting to the resonant frequencies indicated in Fig. 1, which are not too critical. The sections are then all connected together, $C_5$ is added and the final filter adjustment is made with this trimmer capacitor.

Proper operation of the filter requires that the trimmer capacitor $C_5$ adjust the frequency of maximum attenuation to 55.25 Mc. This can be done by using a signal from a Channel 2 TV station, a converter capable of tuning to 55.25 Mc., and a general-coverage receiver equipped with an 8 meter. For the usual converter with 20-meter (14-18 Mc.) i.f. output, the receiver would be tuned to 19.25 Mc. The trimmer capacitor, $C_5$, is then adjusted for a minimum 8-meter reading on the TV signal. A definite null should be tuned through with the capacitor.

If the null occurs with a maximum or minimum capacitor setting, the turns of $L_3$ can be spread out or squeezed closer together.

Capacitance (µf.) and Inductance (µh.) Values for the 6-Meter Low-Pass Filter

<table>
<thead>
<tr>
<th></th>
<th>50 ohms</th>
<th>75 ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_1$, $C_3$, $C_7$</td>
<td>68</td>
<td>47</td>
</tr>
<tr>
<td>$C_2$</td>
<td>82</td>
<td>56</td>
</tr>
<tr>
<td>$C_4$</td>
<td>100</td>
<td>68</td>
</tr>
<tr>
<td>$C_5$</td>
<td>7-45</td>
<td>7-45</td>
</tr>
<tr>
<td>$C_6$</td>
<td>39</td>
<td>25</td>
</tr>
<tr>
<td>$L_1$, $L_4$</td>
<td>0.0825</td>
<td>0.121</td>
</tr>
<tr>
<td>$L_2$</td>
<td>0.3</td>
<td>0.441</td>
</tr>
<tr>
<td>$L_3$</td>
<td>0.0622</td>
<td>0.0915</td>
</tr>
</tbody>
</table>

Coil Dimensions (All No. 16 Wire)

<table>
<thead>
<tr>
<th>$L$ (µh.)</th>
<th>Turns</th>
<th>I.D.</th>
<th>Turns Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.441</td>
<td>7</td>
<td>1/4 inch</td>
<td>3/32 inch</td>
</tr>
<tr>
<td>0.3</td>
<td>5</td>
<td>3/32 inch</td>
<td>3/32 inch</td>
</tr>
<tr>
<td>0.121</td>
<td>4</td>
<td>3/32 inch</td>
<td>5/32 inch</td>
</tr>
<tr>
<td>0.0915</td>
<td>4</td>
<td>1/4 inch</td>
<td>1 turn</td>
</tr>
<tr>
<td>0.0825</td>
<td>4</td>
<td>5/32 inch</td>
<td>1/4 inch</td>
</tr>
<tr>
<td>0.0622</td>
<td>3</td>
<td>5/32 inch</td>
<td>1 turn</td>
</tr>
</tbody>
</table>

The author used the sweep setup shown in Fig. 3A for checking filters. An accurately-calibrated 55.25-Mc. marker is loosely coupled to the crystal-diode r.f. probe shown in B. The maximum-attenuation notch was adjusted to 55.25 Mc. by means of the trimmer capacitor in the filter. Incorrect setting of the trimmer will attenuate 6-meter signals around 51 Mc., or will reduce the attenuation characteristics of the filter on Channel 2.
Fig. 3.—(A) Setup for checking filter response. (B) Circuit of the diode r.f. probe. Capacitances are in μuf, and capacitors are disk or tubular ceramic. Resistances are in ohms and resistors ½ watt. CR₁ and CR₂ are 1N67A, 1N34A, 1N56A or similar. J₁ is a coax receptacle. Input resistance value should match coax line which should be 50 or 75 ohms, depending upon filter design impedance. The signal generator is coupled to the probe by looping the end of the generator output wire around the probe input resistor. The trimmer capacitor in the filter should be adjusted for minimum response at 55.25 Mc.

Precautions

The filter can be placed just outside the coaxial antenna relay if both converter overloading and transmitter harmonics are a problem, or it can be placed in the line close to the transmitter if only transmitter-harmonic reduction is needed.

The v.s.w.r. of the antenna, transmission line, transmit-receive switch, and connecting cables to the transmitter should be measured with and without the filter, using a v.s.w.r. bridge. Without the filter, the v.s.w.r. should be less than 2, and preferably less than 1.5, to avoid excessive filter losses or possible damage to the filter components at high powers. Readjusting the antenna match, eliminating cable splices and odd types of interconnecting cable will minimize the v.s.w.r. that the filter and transmitter will see.

If the v.s.w.r. is higher after the filter is inserted, reduce the transmission-line length one or two feet at a time, noting the length at which a minimum v.s.w.r. is obtained, and recording the inches of line removed. If the cable is cut too short by accident, the next optimum length will be half cable wavelength toward the antenna from the missed point (77 inches for a frequency of 50.5 Mc). Another optimum point will be 77 inches back and this difference could be made up by increasing the length of the line section connecting the transmitter to coaxial relay. A change in the apparent v.s.w.r. when the filter is inserted may indicate that the transmitter has high harmonic output and the filter is just doing its job.¹

¹ This may also be a result of parallel transmission-line current as discussed in the ARRL Antenna Book. — Ed.

• New Apparatus

Bayroy Coaxial Relay

The Bayroy coaxial relay, manufactured by Bay-Roy Electronics, Inc., Cleveland 30, Ohio, should be of special interest to those who would like to switch antennas remotely. This usually involves mounting the relay near the antennas, out in the weather. The Bayroy relay is weatherproof and can therefore be mounted in any convenient spot—even on the antenna mast or tower. The relay is enclosed in a gold anodized drawn aluminum case with the coaxial connectors mounted on the box lid. A rubber gasket is used between the cover and box to insure a weather-tight seal. Connections to the relay coil and auxiliary relay contacts are brought out to a power connector; the mate to this connector is furnished with the relay. The auxiliary contacts can be used to operate signal-light circuitry for indication of which antenna is in use. If the relay is used as transmit-receive switch, the auxiliary contacts can be used for receiver muting purposes. The relay is rated to handle 1000 watts, any mode. Even at 220 Mc, it has a very low insertion loss and v.s.w.r. Several models are available, ranging from the one shown in the photograph, which is the 115-volt a.c. model, to a 6-volt d.c., and 12-volt d.c. model. The mounting base plate is 2½ inches by 4½ inches and has mounting holes spaced so that a standard 1½-inch U bolt can be used to attach the relay to a cylindrical mast or to one leg of an antenna tower.

— R. L. C.
Beginner and Novice —

Construction Techniques

Some Tips for the Novice on Building Gear

BY LEWIS G. McCoy,* WI1CP

The newcomer to ham radio is faced with the problem of whether to buy ready-built radio gear or build his own. If the beginner is anxious to learn something about the technical side of radio, there is no better approach than by building equipment and learning how it works. In this article the right and wrong ways of construction will be discussed with the end view of showing the Novice how to build a piece of equipment and have it work the way it should.

What Tools Do You Need?

Naturally, if you plan on doing your own construction work, there are certain tools you'll need. The basic tools required are listed in Table I. With these tools you should be able to do all the cutting and drilling required to prepare a chassis for wiring. You'll note that no particular type of soldering iron is specified in the table. If you are only going to do an occasional job, a soldering gun might be your best bet. A soldering gun must be turned on for each soldering operation, but it only takes seconds to reach soldering temperature. Some amateurs prefer a constant-heat-type iron. If you prefer the constant-heat type, get one with a 60-watt rating and a ¼-inch tip. Also, this type is lighter and easier to handle.

You can get by with an adjustable hole cutter for making socket holes, but socket punches do a neater and quicker job. Three are required, one each for 7- and 9-pin miniature, and another for octal sockets. For cutting large holes, such as for transformers, the nibbler tool is very handy.

Don't abuse your tools by using them for jobs they were not intended for. A little time and
effort keeping drills sharpened and oiled will keep the tools in good shape. An oil stone can be used to touch up the cutting edges of drills. If the cutting edges of tools get too dull to be touched up with a stone, then they should be sharpened on a grinding wheel. If you use a grinding wheel to sharpen drills, keep the same cutting angles on the face of the drill. If you can afford one, an electric drill is a real work saver and there are many different types of attachments available that will make your work easier.

**How to Lay Out a Chassis**

If you are going to build a piece of gear from an article, it is always best to follow the layout of the unit described as closely as possible. In many cases the writer of the article will state that the layout isn't critical, but this usually means the general layout should be followed, even though an exact duplicate isn't necessary. Don't just grab a drill and start drilling holes — give a little time and thought to the arrangement of the components. Incidentally, aluminum chassis should be used wherever possible as aluminum is much easier to work with than steel. However, for heavy power supplies, steel chassis will provide greater support.

When you buy the chassis you'll find that it is covered with paper. Leave the paper on the chassis, since it will protect the top from unnecessary scratches when doing your layout. All the components that are to be mounted on the top of the chassis should be assembled and arranged on the top for the best layout. Be sure that parts below deck don't interfere with the top-mounted components. If the unit is to fit inside a cabinet, allow enough room around the parts to clear the cabinet sides when placed inside.

In laying out the components, make the electrical circuit follow a logical sequence. In other words, if you have a transmitter of three stages, oscillator-buffer-amplifier, you wouldn't put the oscillator on one side, the amplifier in the middle, and the buffer on the far side. Also, when mounting tube sockets, give some thought to the pin arrangement. Wherever possible, the plate connections of one stage should face the grid connections of the next stage. As a general rule, any coil should be mounted at least its own diameter away from surrounding metal, panels or chassis sides. This is particularly necessary if a steel chassis is used. If the coils are mounted too close to the metal, the Q of the coil is degraded.

After you've decided on a component arrangement, you are ready to mark the chassis for drilling of holes. You'll find a square and straightedge handy for this purpose. Leave the paper on the chassis top and mark off the hole arrangement with a pencil. Wherever a hole is to be drilled, use the center punch and hammer to mark the spot. The center punch will make an indentation in the chassis which will keep your drill from wandering when you drill the hole. After all the holes are drilled, you can remove the paper.

Next, remove all burrs from around the holes. For small holes you can used a larger size drill to remove the burrs. With larger holes, either a knife or a cold chisel will do the job. If you are not fussing about the appearance of the completed unit, you can now mount the components. However, a much neater and cleaner piece of gear will result if the chassis is first prepared properly. There are two methods of preparing a chassis so that the finished product has a smooth sheen. The chassis can be buffed down with steel wool, washed to remove oil, and then sprayed with a clear acrylic spray. The sprayed chassis will resist finger marks and dirt when you handle the unit. The other method consists of preparing a lye bath with ordinary household lye. The lye should be mixed in an enameled container such as a dishpan or baby's bathtub (remove any dishes or babies, first.) Use about 1/4 to 1/2 can of lye to each gallon of water and be careful not to get the solution on your hands or clothes. The aluminum chassis is then immersed in the lye bath for 1/2 to 2 hours, depending on how strong a solution you have. It is a good idea to use a test piece of aluminum first. When the chassis is covered, you'll notice the solution will bubble, so ventilation should be provided to permit the generated gas to escape. After the chassis has been in the solution long enough, remove and wash it clean with cold water. A paint brush wet with water can be used to remove the

### Table 1

**Novice Tool Kit**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-nose pliers</td>
<td>6-inch</td>
</tr>
<tr>
<td>Diagonal cutting pliers</td>
<td>5-inch</td>
</tr>
<tr>
<td>Screwdriver, 6- to 7-inch</td>
<td>1/4-inch blade</td>
</tr>
<tr>
<td>Screwdriver, 4- to 5-inch</td>
<td>1/8-inch blade</td>
</tr>
<tr>
<td>Hand drill, 1/4-inch chuck</td>
<td></td>
</tr>
<tr>
<td>Metal working drills, 5/8- and 1/4-inch</td>
<td></td>
</tr>
<tr>
<td>Nos. 18, 28, and 33</td>
<td></td>
</tr>
<tr>
<td>Slip-joint pliers, 6-inch</td>
<td></td>
</tr>
<tr>
<td>Large coarse files, one flat, 12-inch, one rattle, 3/8-inch diameter</td>
<td></td>
</tr>
<tr>
<td>Small files, one flat, 8-inch, one rattle, 1/4-inch diameter</td>
<td></td>
</tr>
<tr>
<td>Hack saw for 10- to 12-inch blades</td>
<td></td>
</tr>
<tr>
<td>Pocketknife</td>
<td></td>
</tr>
<tr>
<td>Square and straightedge</td>
<td></td>
</tr>
<tr>
<td>Hammer, small ball-peen type</td>
<td></td>
</tr>
<tr>
<td>Chisel, 1/2-inch face</td>
<td></td>
</tr>
<tr>
<td>Center punch, 3- or 4-inch</td>
<td></td>
</tr>
<tr>
<td>Socket punches, one for 5/16, 3/4-, and 11/16-inch holes</td>
<td></td>
</tr>
<tr>
<td>Soldering iron (See text)</td>
<td></td>
</tr>
<tr>
<td>Resin-core solder</td>
<td></td>
</tr>
<tr>
<td>Optional tools:</td>
<td></td>
</tr>
<tr>
<td>Nibbler tool</td>
<td></td>
</tr>
<tr>
<td>Electric drill, 1/4-inch chuck</td>
<td></td>
</tr>
<tr>
<td>Wire strippers</td>
<td></td>
</tr>
<tr>
<td>Reamer, point 1/8-inch diameter, shank 1/2-inch</td>
<td></td>
</tr>
<tr>
<td>Soldering aid</td>
<td></td>
</tr>
<tr>
<td>Hex nut driver set, hex sizes 5/64, 1/4, 5/32, 3/8, and 7/32 inches.</td>
<td></td>
</tr>
<tr>
<td>Bench vise, 3- to 4-inch jaws</td>
<td></td>
</tr>
</tbody>
</table>

*June 1961*
black oxide which often forms. After a thorough wash, let the chassis dry and then give it several coats of clear acrylic spray. It is now ready for the components.

Wiring Do's and Don'ts

There are many types of hookup wire available and the beginner is sometimes in a quandary as to which type to use. Whichever type is used, consideration should be given the amount of current the wire will be required to carry and the voltage its insulation must stand without breaking down. A wire with 1000-volt insulation commonly used is Belden type 8330 thermoplastic hookup wire (No. 22 conductor). For heater circuits where the current does not exceed 2 amperes or so, No. 20 solid tinned wire is adequate. Where greater current-carrying capabilities are required, No. 18 or larger wire can be used. If you have any doubts about the current-carrying capabilities of a particular wire size, look up its circular-mil area in the wire table in the ARRL Handbook and allow about 500 c.m. per ampere.

If TVI is likely to be a problem, shielded wire should be used for all heater wiring and leads not carrying r.f. currents. Belden 8888 shielded wire, which has a conductor the equivalent of No. 20, is suitable for most applications. Coax cable can be used for high-voltage leads (over 1000 volts) that must be shielded. In the event stranded hookup wire is used, the ends should first be twisted together and tinned with solder. Otherwise, when the wire is fed through a terminal there is always the danger of a single strand of wire getting loose and shorting to another terminal or ground.

Before getting into the story of making connections and wiring, a word about soldering is in order. Probably the place where most beginners make mistakes is in their soldering. In the first place, the soldering iron should be hot enough to deliver sufficient heat. The tip of the iron should be clean, bright metal. If the tip is pitted or seamy, as it will become through continued use, it should be filed clean. When the tip is clean, heat the iron and flow some solder on the tip and then wipe it clean. This tins the iron and prepares it for soldering. In radio work always use a noncorrosive solder. When you buy solder be sure to specify a resin-core type. A 30 per cent tin/60 per cent lead content is satisfactory for radio work. If you’re working on etched circuit boards or with any unit that cannot stand too much heat, it would be wise to use solder with a higher tin content as the melting point of such solder is lower.

The process of soldering is quite simple. Apply the tip of the iron to the work and let the work get hot enough to melt the solder. Don’t put the solder on the iron tip, but apply it to the connection. When the connection reaches soldering temperature, the solder will melt and flow around the connection.

If the work isn’t hot enough, or if the solder is applied to the iron and not the work, a “cold” solder connection is likely to result. A cold solder joint is one that looks good but can cause you a lot of grief. The connection may prove to be intermittent, which makes it difficult to locate if you have to do any trouble-shooting. Also, be sure that all the leads being soldered are clean. In fact, it may take a little more time but it is a good idea to tin all leads with solder before putting them in a terminal. If you want, you can run the lead through the terminal and wrap it around. The only trouble with the “wrap-around” system is that you may have to remove the lead when
trouble-shooting, and the connection can get quite messy. A simpler system, and just as good from the standpoint of making a solid electrical connection, is to run the lead through the terminal, make a 45-degree bend on the end of the wire so it doesn’t slip out of the terminal, and then solder it in place. When you have several leads going into a single terminal, make sure that all of them get soldered. If you tin the leads beforehand, you shouldn’t have any trouble getting a good soldered connection. Don’t hurry your soldering work. A little time spent making good connections can save you a lot of work later on.

When you come to the actual wiring of the unit, run all wires, wherever possible, parallel with the chassis sides. This is also true of small components such as resistors, capacitors, and coils. The completed unit will have that “commercial” look, but what is more important, will be much easier to service than if you have a hodgepodge of wiring. All leads carrying r.f. should be as direct as possible and should not wander around the chassis. On the other hand, leads not carrying r.f. can be routed around the edges of the chassis. In this case, you will probably find that you have several leads running parallel with each other and the unit can be made to look neater by cabling the leads or taping them together at intervals. Cabling techniques are described in detail in the ARRL Handbook. The liberal use of bakelite tie points and ground lugs will make your job easier and improve the appearance of the equipment.

Holes large enough to clear Nos. 4, 6, and 8 machine screws can be drilled with Nos. 28, 28, and 18 drills, respectively. Most volume controls require a 3/4-inch diameter hole and toggle switches a 1/8-inch hole. miniature tube socket mounting frame holes are slightly smaller than a No. 4 screw, so the holes should be drilled out to take a No. 4 screw. When mounting any component with screws and nuts, always use lock washers, otherwise the component is liable to work loose.

What to Wire First

Usually the best approach is to wire the heaters and power supply first. By doing this, you can test the supply and heaters before going on to the other wiring. Wherever possible, mount resistors and capacitors close to but not directly over a tube socket. If you pile all the components directly over the socket you’ll find it hard to make connections and difficult to check socket voltages. When soldering germanium diodes, small resistors or disk capacitors, especially if the leads are short, hold the lead being soldered with a pair of pliers between the body of the component and the connection. This will prevent too much heat from reaching the component and ruining it. Wherever leads pass through holes in the chassis, use a rubber grommet to prevent the lead from chafing or shorting out. If the circuit calls for grounding terminals on a tube socket, mount a ground lug under the screw and nut holding the socket and make your ground connections to the lug. In other words, keep the leads short.

When the unit is completed, there are a couple of things you can do to test it before actually applying power. If you have an ohmmeter, check the resistance between the +B line and chassis ground.

Look at the circuit diagram and find the value of the bleeder resistor in the power supply. If there are no other resistors connected between the +B line and ground, then your ohmmeter should read approximately the same value as the bleeder. Where there are other resistors in parallel with the bleeder, such as voltage dividers, these values must be taken into consideration also. You can use Ohm’s Law for parallel or series resistors for an exact figure. However, with nearly all circuits Novices will be using, the resistance between +B and ground should be something more than, say, 20,000 ohms. The ohmmeter should read whatever value the +B line should be above ground. If it is a much lower value than this, it is a good idea to check your wiring for errors. Otherwise, you will be blowing fuses or ruining the power supply when you turn the unit on. By using the ohmmeter, you can also follow the circuit, making resistance and continuity checks. If you come across a reading that doesn’t look right, check over your wiring. These precautions can sometimes save you the cost of expensive components.

While it is understandable that a Novice is in a hurry to get a piece of gear completed and on the air, a little more time and effort in building your gear will pay handsome dividends.

In addition to the information given in this article, it is suggested the beginner study the construction practices chapter of the ARRL Handbook. You’ll find information on color codes, how to wire coax fittings, and many other things of interest to the ham who wants to “roll his own.”

Strays

W2MTD (E. C. Mann, 452 68th St., Brooklyn 20) would like to hear from any hams who worked for the Electro Importing Co. He’s also looking for an extra E-I catalog.

The Denver Radio Club has published the second edition of the Colorado Ham Directory, with W05IN and K0RGU bearing the brunt of the burden. More than 2300 Colorado amateurs are listed by name, call, and geographical location. It includes several pages of operating aids, and is particularly helpful to certificate hunters who are after the Mile-Hi award. You can get a copy by sending one dollar to the Denver Radio Club, Inc., P. O. Box 356, Denver 1, Colo.

The Old Old Timers Club is made up of old-time radio men who started in radio at least 40 years ago. It meets on the air every Thursday at 1900 EST on 3940 kc. Secretary of the OOTC is Earl Williams, W2EGE, P. O. Box 462, Asbury Park, N. J.
How To Use Them in
Ham Equipment

Screws—Nuts—and Things

BY WILLIAM A. DEANE,* W2RET

One of the basic keys to good construction is an intimate knowledge of how to fasten parts together. Few books have been written on the subject of fastening or joining, and those that have been published have either been slanted toward the production engineer or have been confined to one specialized technique. Those entering the amateur radio field are likely to have only a casual acquaintance, or none at all, with machine screws, nuts and associated items.

Machine Screws

All small screws used in threaded holes or nuts for fastening parts together and similar applications can be said to belong to the large and varied family of machine screws. The holes or nuts in which these screws fit have to be threaded exactly the same as the screw. The opening of the hole must be just large enough to pass the body diameter of the screw (diameter of screw at thread bottom) and, in some cases, must be shaped to receive and seat the head of the particular screw (flathead screws, for example).

Machine screws are made of steel, brass, aluminum, bronze, stainless steel and plastics. Steel screws are often plated with cadmium, zinc, nickel, or other material to resist corrosion. Stainless-steel screws are very strong for their size and, without any type of protective coating, are highly resistant to corrosion. Aluminum also resists corrosion well except in salty atmosphere or in the immediate presence of chemical vapors such as those discharged from chimneys.

There are several standards under which machine screws are manufactured. However, most of the machine screws that amateurs may use are manufactured under the American Standards Association (ASA) requirements. Machine screws are generally classified by head type, body diameter, number of threads per inch, length, the material from the screw is made and the finish. The screw heads that most amateurs will come in contact with are round, flat, binding, truss, fillister and oval. Fig. 1 illustrates the various head types. It will be noted that the flathead screw has a head-seating angle of 80 to 82 degrees. For this reason a standard twist drill, which has a normal cutting angle of 59 degrees, can not satisfactorily be used to seat a flathead screw. A countersink-type drill especially designed for this application should be used.

Body diameters are classified in numbered sizes from 0 to 12 and in fractions from 1/4 to 6 inches. Numbers 0 to 12 are listed in decimal parts of an inch; i.e., No. 2 is 0.086 inch (86 mils) in diameter. No. 6 is 0.138 inch (138 mils) and No. 10 is 0.190 inch (190 mils).

**Fig. 1—Various types of machine screws frequently used in assembling amateur gear.**

The number of threads under ASA standards varies from 80 to 24 threads per inch for body Nos. 0 to 12. These threads have been divided into two standard classes—National Coarse (NC) and National Fine (NF). The difference between them is the thread pitch and number of threads per inch. Course threads are for general work and fine threads are used in aircraft and

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automotive work where secure fastening is desired. Both coarse and fine threads have four classes or types of fit. They are designated as either loose, free, medium or close. Loose fit is used on stove bolts. Free fit is used on the majority of commercial nuts and screws used by the amateur. Medium fit is required on most machine, automotive and aircraft work. Close fit refers to machine parts where exacting tolerances are necessary.

Table 1 lists screw sizes No. 0 to 12, and to 1/2 inch by outside diameters and threads per inch. The length of a screw is measured from under the head to the end of the screw. When specifying or ordering machine screws, a full description should be given. For example, if a specification should call for a 3/8-inch, 8-32, flathead, steel, cadmium-plated machine screw, we would know that the length is 1/2 inch, body size is No. 8, and there are 32 threads per inch. The rest of the description is self-explanatory.

<table>
<thead>
<tr>
<th>SIZE</th>
<th>DIAMETER (INCHES)</th>
<th>THREADS PER INCH</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>0.000</td>
<td>80</td>
</tr>
<tr>
<td>1</td>
<td>0.073</td>
<td>64</td>
</tr>
<tr>
<td>2</td>
<td>0.086</td>
<td>56</td>
</tr>
<tr>
<td>3</td>
<td>0.099</td>
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<tr>
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<td>0.112</td>
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</tr>
<tr>
<td>5</td>
<td>0.125</td>
<td>32</td>
</tr>
<tr>
<td>6</td>
<td>0.138</td>
<td>32</td>
</tr>
<tr>
<td>8</td>
<td>0.164</td>
<td>32</td>
</tr>
<tr>
<td>10</td>
<td>0.190</td>
<td>32</td>
</tr>
<tr>
<td>12</td>
<td>0.216</td>
<td>24</td>
</tr>
<tr>
<td>1/4</td>
<td>0.250</td>
<td>28</td>
</tr>
<tr>
<td>5/32</td>
<td>0.3125</td>
<td>18</td>
</tr>
<tr>
<td>3/8</td>
<td>0.375</td>
<td>16</td>
</tr>
<tr>
<td>7/32</td>
<td>0.4375</td>
<td>14</td>
</tr>
<tr>
<td>1/2</td>
<td>0.500</td>
<td>13</td>
</tr>
</tbody>
</table>

Self-Tapping and Sheet-Metal Screws

The self-tapping screw has attained rather wide use. It is a hardened-steel screw that cuts its own thread. The entering end of the screw is pointed or tapered and the screw cuts a thread in a drilled hole as it is forced in, thus providing a close fit, secure against loosening under average service conditions. It is supplied in sizes from No. 2-56 to 1/4-20 and in lengths ranging from 1/2 to 1 1/2 inches, depending upon the diameter, and in round, binding, flat and oval heads. The self-tapping screw is very useful in construction work where it will not be subject to vibration which, over a period of time, would cause the screw to loosen. In areas where it is difficult to place a nut on a machine screw, a self-tapping screw may be acceptable. It is very helpful in construction work of a temporary nature. It should not be used to hold grounding lugs.

The sheet-metal screw is another variety of self-tapping screw. The thread, however, is more like that of a wood screw, as shown in Fig. 2E. As the name implies, it is designed primarily for joining relatively thin metal sheet where the fine threads of a machine screw would have little holding ability. The sheet-metal screw does not hold well under strenuous vibration.

The Phillips-head screw is widely used in automotive and aircraft work. The screwdriver slot is cross-shaped and has a large center opening, tapered slots, and a blunt bottom with rounded edges, as shown in Fig. 2A. A special Phillips screwdriver is required for this type screw. In other respects the Phillips-head screw is standard and will be found in both machine and self-tapping types.

Nuts

Once a good basic understanding of machine screw threads is acquired, it is not difficult to match a screw with the proper nut or threaded hole. Two of the most-used series of nuts included in ASA standards are the finished and heavy series. The finished is designed for average use. The heavy series is made thicker and wider for greater strength and bearing surface. The term “finished” refers to the quality of manufacture and tolerance and does not indicate that the surfaces are completely machined. Standard sizes range in width between parallel sides from 1/4 through 3 inches, with coarse and fine threads.

Nuts are generally classified according to screw body size and threads per inch. A 6–32 nut would indicate that it will accept a screw having a No. 6 body size and 32 threads per inch. Nuts are made of the same materials and finish as the machine screws.

In mobile applications where considerable shock and vibration are encountered, consideration should be given to the use of the elastic stop nut. The locking element is a compression collar built into the head of the nut. The collar’s inside diameter is smaller than the major diameter of the screw. Therefore, when the threads of the screw enter this section, a mating thread is impressed into the locking collar. This compression force sets up a friction grip that holds the screw under rigorouos conditions.

(A) Fig. 2—(A) Phillips-type screw head. (B) External-tooth lock washer. (C) Internal-tooth lock washer. (D) Spring or split-type lock washer. (E) Sheet-metal screw.

Washers

Plain washers are used under the heads of
screws and bolts and under nuts to distribute the compressive stress over areas larger than that of the head or nut. They also serve to prevent damage to finishes from the scraping effects of heads or nuts as they are tightened. Plain washers vary in size according to screw size. The size is a measurement of their inside and outside diameters. In numerous cases there are two outside diameters for each inside diameter. Plain washers are made of the same materials as the machine screw. They are classified as light, medium, heavy and extra heavy. As most amateur construction involves machine screws of the No. 4, 6, 8, 10 and 14-inch sizes the associate washer would be No. 4 — 1/4-inch washer, No. 6 — 5/32-inch washer, No. 8 — 3/16-inch washer, No. 10 — 7/32-inch washer, and the 14-inch screw would take a 9/32-inch washer.

Lock washers are intended to exert an auxiliary friction on the under side of the head of the screw or bolt with which they are used, or on the under side of a nut. This is to keep the parts being clamped from loosening and turning when subject to vibration, as in the case of mobile application. Lock washers are generally classified as spring-lock or tooth-lock types. The spring-lock washer (Fig. 2D) is produced in light, medium, heavy and extra heavy. Such washers are advantageous when occasional dismantling and reassembling of parts are expected. Tooth-type lock washers are supplied in three styles, one having external teeth (on the outer rim of the washer — see Fig. 2B), one having internal teeth (Fig. 2C), and one having both internal and external teeth. The teeth are formed so as to rotate slightly and bite into the surfaces they contact when they are compressed. This provides good electrical contact and is recommended for general amateur application. These washers are thinner than the spring-lock type and do not occupy so much space in a pile-up of parts. The external tooth type has slightly better holding qualities than the internal tooth type. External tooth washers are also produced in a conical form to fit flathead screws.

### Nails and Wood Screws

Considerable effort is expended by the average amateur in the construction of towers and related items. A little information on nails and wood screws may be of help when that next antena-tower construction urge arises. Nails have been in use for many thousands of years and have been made of iron, copper, brass and even gold. Today we have improved these metals and added steel, monel metal and aluminum. Nails are measured by the penny system (indicated by the symbol d). This originally indicated the price per 100 nails. There are many types and sizes of nails. Table II lists a description of the common flat-head nail. In learning to recognize nail sizes readily, just remember that a common 2d (2 penny) nail is 1 inch long, and 1/2 inch is added to the length for each penny size up to 16d. From there on, the sizes increase in length by 1/2-inch increments. Galvanized nails are coated to prevent corrosion and are recommended for outdoor use. In softwood, a nail must penetrate farther than in hardwood for equivalent holding power. About two thirds of the nail length must go into the lower piece when softwood is used. In hardwood, a nail of smaller diameter will be less likely to split the wood. Since the holding power of hardwood is about twice that of softwood, the nail does not need to penetrate as far. It is often helpful to drill a small pilot hole — about half the diameter of the nail and apply a coat of soap to the nail before driving it into hardwood. All nails hold better when driven into the wood across the grain. Use a longer nail or one with bars when driving a nail parallel to the grain or into the end of a board.

### Table II

<table>
<thead>
<tr>
<th>Size</th>
<th>Length (Inches)</th>
<th>Wire Gauge</th>
<th>Per Lb.</th>
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</tr>
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### Table III

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<tr>
<td>8</td>
<td>0.154</td>
<td>34</td>
</tr>
<tr>
<td>10</td>
<td>0.190</td>
<td>31</td>
</tr>
<tr>
<td>12</td>
<td>0.216</td>
<td>—</td>
</tr>
<tr>
<td>14</td>
<td>0.242</td>
<td>19</td>
</tr>
<tr>
<td>16</td>
<td>0.268</td>
<td>—</td>
</tr>
<tr>
<td>18</td>
<td>0.294</td>
<td>9</td>
</tr>
<tr>
<td>20</td>
<td>0.320</td>
<td>—</td>
</tr>
<tr>
<td>24</td>
<td>0.372</td>
<td>1/16</td>
</tr>
</tbody>
</table>

Wood screws will hold wooden parts together much better than nails. Wood screws are made of steel, brass, bronze or stainless steel and are finished bright, cadmium-plated, nickel-plated or blued. There are three common types of heads used on wood screws — flat, round and oval — although the Phillips head is not too uncommon. Always drill a pilot hole when using wood screws. Where two pieces of wood are to be fastened, the top piece should be drilled to clear the body of the
screw. The bottom piece then should be drilled
with a drill about 60 per cent of the minor diame-
ter of the screw thread when softwood is used and
about 90 per cent of the minor diameter of the
thread for hardwood. A coat of moistened soap
on the screw threads will help in driving the screw.
In selecting the length of screw, use the rule that
requires two thirds of the total length to enter
the lower piece of wood. Screws driven parallel to
the grain have a holding power of about 75 per
cent of those driven cross grain. Therefore,
slightly larger or longer sizes should be used when
driving parallel to the grain. Care must be taken
to select a size that will not split the wood. Wood-
screw sizes run from No. 0 to No. 24. Nos. 0
through 12 have body sizes identical to machine
screws of the same number (see Table 1). Threads
extend over two thirds the length of the wood
screw.
Table III lists the sizes, basic diameter and
pilot drills for wood screws. In general cabinet-
work, screw sizes Nos. 2 to 6 would commonly be
used. In heavy-duty work, such as in towers, Nos.
8 to 12 would be used.
An occasional use of the lag bolt can be anticipated. A lag bolt can be visualized as a large screw with a square bolt-type head for wrench driving. Common sizes are No. 10 – 1/4-inch, 3/8-inch and 7/8-inch, in lengths varying from
3 to 8 inches. Lag bolts must be used in pre-
drilled holes. Use a drill that is 60 per cent of the
shank diameter for softwood, such as pine and
fir, and 90 per cent for hardwood, such as oak and
hickory. Wood-frame structures, such as towers,
tend to fail at bolted joints. Fig. 3 illustrates the
type of failure occurring when the wood is
stronger than the bolt. In the case where the bolt
is stronger than the wood, the joint fails by de-
forming or splitting the wood.
To furnish a positive resistance to slip between
the faces of lumber, an alligator-type connector
then be used. This toothed connector is placed
between the two pieces of lumber and is forced
into the lumber as the members are forced to-
gether. Fig. 4 illustrates this type of connector.

Fig. 3—Bolt failure at
antenna-mast joint.
Fig. 4—Toothed timber
connector.

Associated Tools

It might be appropriate to discuss the use and
care of some of the hand tools used with machine
screws. The screwdriver is probably the most
essential tool of the home workshop. It should be
remembered that it is made for one purpose —
turning screws. It is frequently misused for open-
ing bottles, prying drawers open, as a cold chisel,
for chipping ice, changing tires and testing tank
circuits for r.f. Any of the abuses mentioned
above will probably damage it to the extent that
it will be ruined for its primary purpose. Most
screwdriver troubles can be avoided by selecting
the right size tool with the right blade for the job.
Standard screwdrivers are made in lengths from
2 to 12 inches. The length is measured from the
lower end of the handle to the tip of the blade.
Three or four sizes, such as the 4-, 6-, 8- or 10-inch,
will be satisfactory for the home shop. The size
depends entirely on the size of the screw and its
slot. The tip of the blade must make a good
square fit in the screw slot and should reach to
the full depth of the slot. Fig. 5 illustrates the
correct fit.

June 1961 33
The following size blade tips should normally be used with screws as indicated:

<table>
<thead>
<tr>
<th>Screw</th>
<th>Blade Tip</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-40 round-head</td>
<td>3/32 inch</td>
</tr>
<tr>
<td>6-32</td>
<td>1/32 &quot;</td>
</tr>
<tr>
<td>8-32</td>
<td>1/32 &quot;</td>
</tr>
<tr>
<td>8-32 binding-head</td>
<td>5/64 &quot;</td>
</tr>
<tr>
<td>10-32 round-head</td>
<td>5/64 &quot;</td>
</tr>
<tr>
<td>10-32 binding-head</td>
<td>5/64 &quot;</td>
</tr>
</tbody>
</table>

The Phillips-head screwdriver has a cross-shaped blade which fits the small cross slots of the Phillips screw. These screwdrivers come in sizes 1 through 5. A size 2 should take care of most amateur requirements.

Taking care of a screwdriver is simple — just keep the working edges square and the tip flat. Don't wait — get out your screwdrivers and file today. A last reminder concerning screwdrivers: "He who checks electrical circuits with screwdriver often lies on floor of workshop while spirit departs to land of ancestors."

Twist Drills

Twist drills are made of either high-speed steel or carbon steel. The carbon-steel drill will suffice for most construction work and costs less than the high-speed. Drill sizes are commonly denoted by three systems. The smaller drills come in numbered sizes from 1 to 60. The largest is No. 1, which is 0.228 inch (228 mils) in diameter, while No. 60 is 0.010 inch (40 mils) in diameter. Twist drills in the numbered sizes are listed in Table IV. An asterisk indicates the commonly-used sizes. It is recommended that several of the common sizes be purchased rather than a complete set, most of which will be used infrequently.

The letter sizes are commonly known as jobber-drill sizes and run from A (0.234 inch in diameter) to Z (0.143 inch). The third system overlaps both of the other series. The size differences are greater and are increased in 64ths from 1/16 to 1/2 inch.

When drilling avoid using too much pressure. This will generate excessive heat and burn the drill's cutting edges, possibly break the drill, or bend it so that it enlarges the hole.

To get the most satisfactory results from a drill it should be kept sharp. An electric grinder and drill-grinding fixture is highly recommended for a satisfactory job. With practice, a good job can be done by hand on the grinder. For average use the cutting angle of a drill should be 59 degrees, the lip angle clearance 12 to 15 degrees, and the angle between dead center and the cutting edge 120 to 135 degrees. It can be seen that drill grinding can be difficult for a beginner. It is recommended that one of the books on the market be consulted for full details.

Thread-Cutting Tools

Since the major portion of this article has been devoted to screws and their threads it may be well to discuss thread-cutting tools. Hand taps used to cut internal threads may be purchased in sets of three — taper, plug and bottoming taps. The taper tap is used to start the threading process because it is ground away at the tip for gradual and easy starting. Where the thread goes all the way through the metal, the taper tap is often used to complete the thread. However, if the piece is a thick one, a better thread will result if a plug tap is used after the thread has been started with the taper. The bottoming tap, as its name implies, is used to finish the thread at the bottom of a hole which does not go all the way through the material. Hand taps are held in a tap wrench.

When drilling a hole to be tapped you must remember that the hole must leave enough material for the thread to be cut. Table IV lists drill sizes for tapping. Use a back and forth rotation in doing the tapping job. Apply a light lubricant and turn the wrench a quarter turn forward, move it back a little and then forward for another quarter turn. The backward movement clears away the cut metal. Do not force a tap as taps are very brittle and have a bad habit of breaking. A broken tip may be extremely difficult to remove without ruining the material.

External threads are cut with a die. The same precautions that apply to taps also apply to dies. The material to be threaded should be the same major diameter as a corresponding size screw. For example, if it is desired to cut a 10-32 thread the material should have a diameter of 0.100-inch (about 3/32 inch). Table I can be used to select proper diameters of material.

Conclusion

There are many other applications, standards, descriptions and uses of machine screws and nuts that have not been covered. Material was selected that would be of major interest to the amateur. For additional information I recommend a visit to your local library, where you should find several books covering machine screws, fasteners in general, and the use of hand tools.
COAX TO MIKE CONNECTOR

The standard coax cable connector type 83-18P can be made to mate with screw-on single contact microphone connectors by simply removing all but \( \frac{3}{4} \) inch of the center conductor tip of the 83-18P connector. The sketch in Fig. 1 shows the finished microphone connector.

--- Jerry Malinski, K9LRU
--- Carl M. Stern, K9EGH

CABLE LACING MATERIAL

The vinyl jacket covering on popular types of coaxial cable can be used for cable lacing. Strip the covering off the coax by cutting a long, straight line down the length of the cable. Open the tube and snap it over the wire or cable you wish to cover.

--- Gary Guenther, K0PQW

APX-6 ON 1296 MC.

Much has been published on getting the APX-6 transmitter-receiver on 1215 Mc., but there is a great deal of activity on the high-frequency end of the band, and the APX-6 transmitter will not go that high in frequency “as is.” To extend the range of the transmitter to 1296 Mc., remove the six machine screws that hold the cavity assembly to the drive-gear box and remove the cavity. With a fine-tooth hacksaw, modify the cavity slugs as follows: Transmitter slug, remove \( \frac{1}{4} \) inch; receiver mixer slug (t.r. cavity slug), remove \( \frac{1}{2} \) inch. Do not alter the receiver oscillator slug. After cutting off the slugs, file smooth to remove all burrs. It is also necessary to construct a new feedback cable for the transmitter. It should be 6\( \frac{1}{2} \) inches long, tip to tip of the BNC connectors. Reassemble the cavity and adjust the feedback loop for maximum output. To operate on the low-frequency end of the band, it may be necessary to use the “old” 7\( \frac{1}{6} \)-inch feedback cable. Power output at 1296 Mc. runs about the same as it does at 1215 Mc. — that is, about 3 or 4 watts.

--- Dick Stevens, W1QWJ

TRANSISTOR AUTOMOBILE REGULATOR

The circuit in Fig. 2 was developed to reduce regulator noise in my mobile radio station. Although my regulator is a German Bosch for my Mercedes 190D,\(^1\) the circuit can probably be adapted for use in standard American regulators. The 2N677 transistor switches the heavy current, a job formerly done by the relay contacts in the regulator. Now the relays switch only a few milliamperes which control the base circuit of the transistor. The heavy lines in Fig. 2 show connections already built into the original regulator. The connections to the cutout relay and the voltage and current relays are not disturbed. The transistor can be mounted on the regulator cover, which acts as the transistor’s heat sink. Capacitors and resistors are mounted inside the regulator case. A new \( F \) terminal is necessary for this modification, as the original \( F \) (field) connection on the regulator is not used.

The 2N677 transistor can probably be replaced with a less expensive unit but the circuit shown does accomplish its objective of eliminating regulator noise. The regulation provided by the modified unit is as good as the original system, as indicated by the dashboard voltmeter and ammeter. The diagram in Fig. 2 is for negative ground systems only.

--- Erwin Aymar, W4HS

\(^{1}\) W4HS has found one way to cure ignition noise; the 190D is Diesel powered! — Ed.

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**Fig. 2—Transistorized regulator reduces regulator noise.**
Coaxial Transformer for Voltage-Fed Antennas

A quarter wavelength of coax cable makes a good weatherproof transformer for matching a coax line to an end-fed antenna. The author uses it to feed a half-wave beer-can vertical on 20 meters.

Simple Matching Device for Coax Feed

BY W. PETE CZERWINSKI, W2ITJ

According to a famous saying, many roads lead to Rome. In matching an antenna there are also many roads or approaches one can take. In a previous article the author described a matching unit for an end-fed half-wave vertical radiator, constructed of a coil and capacitor. Although the electrical performance of that matching unit was almost ideal, certain mechanical features were not.

Matching System

Fig. 1 shows the basis for an improved matching device. The shorted quarter-wave coax cable at the left is electrically equivalent to the coil and capacitor of the parallel resonant circuit to the right. For a design frequency of 10.1 Mc., the length of coax cable needed is 11 feet 6 inches. If your radiator is not precisely a half wave long (and it need not be) it will be either capacitive or inductive, depending on whether it is slightly shorter or longer, respectively, at the design frequency. This is of no consequence, for the resultant susceptance of the stub and the radiator will automatically be cancelled during the tuning procedure. However, the length of the coax section should be made longer to allow for this.

Adjustment

A grid-dip oscillator and a standing-wave bridge will be needed and they will be used in the same manner as described in the previous article.

First, solder the inner conductor (point A) of the coaxial transformer to the radiator and the outer conductor (point B) to the ground system. Now measure 26 inches from the shorted end and remove a half-inch-wide band of the vinyl jacket (see Fig. 2). Spread the braid carefully to expose a spot on the polyethylene inner insulation. Solder a sewing needle to the exposed end of the inner conductor of your feed coax coming from the transmitter. Insert this needle through the prepared opening in the exposed braid of the stub so that it makes contact with the inner conductor. Now spot-solder the feed-line coax and stub.

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Fig. 1—A shorted quarter wavelength of transmission line is equivalent to a parallel-tuned circuit. A match is obtained in either case by connecting the feed line at a tap point. The factor 0.66 is the velocity factor of the line used for the matching section.

Fig. 2—The correct tapping point for the transmission line is determined experimentally by probing the center conductor of the matching section with a needle. Bared spots to right and left are additional check points.

QST for
braids together. Excite the line from the transmitter with the g.d.o., and read the s.w.r. bridge.

If you're lucky, the reading will be close to a null (no reflected voltage). If not, then make an adjustment on the length of the coaxial transformer by inserting a second needle approximately one inch from the shorted end, making sure that it is shorting the braid to the inner conductor. Repeat this adjustment, moving the short an inch at a time, as long as it improves the bridge null. Then make a similar adjustment on the location of the tap by moving the first needle approximately 3 inches either way, after baring two new spots as shown in Fig. 2. This will show in which direction the tap should be moved, and the final adjustment can be made by trying the tap at smaller intervals.

![Diagram of Tee Connector](image)

**Fig. 3—After the correct tap point has been determined, lengths C and D are measured and the permanent matching section is made up using a coax T connector at the tap point.**

When a bridge null is obtained and the g.d.o. dips best at the design frequency, carefully measure the dimensions C and D of Fig. 3, and make up a new cable as shown.

**Materials**

The author used 50-ohm coax cable throughout. The coaxial transformer section is RG-58 U. There was no sign of voltage arc-over using a DX-100 with 175 watts input. For higher power, it is recommended that RG-8 U be used. When the coaxial transformer is completed, the open ends should be sealed with plastic tape; then it can be wrapped into a coil and practically hidden from view. (See Fig. 4.)

In conclusion, the coaxial matching transformer, by virtue of its physical configuration, greatly improves resistance to the effects of rain, snow, or little children, without sacrificing electrical performance. The author's unit has been in service for over a year and has proved to be a reliable and worthwhile improvement at W2ITJ.

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**Strays**

Governor Michael DiSalle of Ohio has issued a proclamation making the week of June 18–24 Amateur Radio Week in Ohio. Shown here with the governor as he signed the proclamation are William Golding, W8OJS, chairman of the Ohio Council of Amateur Radio Clubs; Robert Skidmore, K8NCY, vice chairman of the OCARC; and Ernest D'Angelo, K8DJM, secretary of the OCARC. This is the ninth consecutive year that Ohio has honored its amateurs in this manner.

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June 1961
High-Accuracy Channels at 3-KC. Intervals

4125 Washington St.
Lincoln, Nebr.

Technical Editor, QST:
W2AOE's plan for channel-type phone operation 1 suggests a possible new method of frequency control for amateur transmitters and receivers, I have devised a system for generating a signal on any of his 50 channels in the 75-meter phone band using a minimum number of crystals. The circuit automatically compensates for f.v.o. drift and produces a signal exactly on frequency in any channel—simply by tuning the v.f.o. near that channel.

The principle of operation is not unlike that used in the Racal RA-17 receiver.2 A 4-ke. oscillator is used to drive a harmonic generator (Fig. 1). The harmonics lying between 290 and 400 kc. are heterodyned to 3 Mc. where they are fed into a filter which will pass only one of the 4-ke.-spaced signals at a time. The particular harmonic being used is determined by the v.f.o. frequency. Simultaneously the v.f.o. signal is fed to a balanced mixer where it is combined with 4199 kc. from a crystal oscillator to give a sum frequency between 6799 and 6999 kc., depending on the v.f.o. setting. This is finally combined with the 3-ke. signal in the last mixer, where the difference frequency will be one of the desired channels between 3799 and 3999 kc.

That any reasonable amount of v.f.o. drift will have no effect on the output frequency can be seen by the following example: Assume that the v.f.o. is set to 2788 kc. and thus beats with the 4-ke. harmonic on 212 kc. to give the sum frequency of 3000 kc. in the center of the filter pass band. The same v.f.o. frequency beats with 4199 kc. from the crystal oscillator to give a sum frequency of 6987 kc., and this in turn is mixed with the 3000-ke. output of the filter to obtain the final difference frequency of 3887 kc. If the v.f.o. drifts to 2789 kc., the sum with 213 kc. will be 3001 kc., the sum with 4199 kc. will be 6988 kc., and the difference between 6988 and 3001 kc. will still be the same channel frequency, 3887 kc. The only effect on the output signals is a variation in amplitude, since 3001 kc. will be on a different part of the response curve.

The principal precautions to be observed with this system are (1) preventing spurious signals from appearing in the output, especially the 4199-ke. crystal-controlled signal because of its closeness to the desired output frequency, and (2) preventing more than one of the 4-ke. intergal signals from passing through the filter at one time, for any v.f.o. tuning condition. The latter means that the filter attenuation should be very high when the v.f.o. is tuned midway between frequencies that give maximum output through the filter; i.e., the filter transmission should be negligible at 2 kc. either side of its band center.

Because of school work the editor does not have an opportunity to try out the method at present, but it would appear to offer a fairly simple way of getting accurately-spaced channel frequencies with a minimum of expensive equipment.

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 Phillis H. Byrne, WA5AXX

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T.R. CIRCUIT

Norwich, Vermont

Technical Editor, QST:
On page 20 of the January issue of QST there is described a 1-kc. switch. Without discussing the merits of the system, which was devised by Prof. M. G. Morgan (WHDA) of the Thayer School of Engineering, Dartmouth College. During the course of designing certain pulse equipment, one contract from ONR, he incorporated this feature in the final stages of a two-channel pulse transmitter, in the year 1950. This was disclosed in the status report of 15 Nov—30 June 51, and subsequently patented, with rights assigned to the U.S.A., in patent No. 2,886,812.

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W. C. Johnson, W1FPG
W2PL RECEIVER

188 Burbank Drive
Snyder 26, N. Y.

Technical Editor, QST:
Since the publication of my article on the 453 variable-l.f. receiver in February, QST, a number of points have arisen that should be explained.

Resistance in the power supply is 250 ohms at 10 watts in my set. It, or preferably the input capacitor in the filter, should be adjusted to give the desired voltage for the r.f. and i.f. amplifier.

In the a.g.c. circuit there should be a 1-megohm resistor between the top end of the 1-megohm resistor to Pin 2 on 14 and the top of the 0.033-μf. capacitor. Without this resistor the oscillator on the bus will ground out the r.f. at the diode. This resistance will allow the 8 meter to work when the a.g.c. is switched off.

An inset in Fig. 1 shows a decoupling network that serves to reduce the gain in the r.f. amplifier to avoid blocking on 80 meters. The use of this expedient can be avoided by reducing the number of turns on 1a to reduce the gain and this method is suggested.

Crystal 15 is noted in the parts list as an overtone; it is a fundamental crystal.

Some builders appear to be having trouble tuning the TV width coil in the output of the product detector to 85 kc, to get the proper attenuation or dip. The coil is tuned by the 400- and 330-μf. capacitors, and they should be adjusted, if necessary. After having had experience with both types of filters in this receiver and in my earlier one (QST, September, 1959), I think I would recommend the low-pass type used in the latter because of its ability to cut off sharply at 3000 cycles, thus eliminating some of the high-frequency audio signals that are only interference.

The article did not clearly explain that the potentiometer R10 (OCR) used in the T-notch circuit is not on the front panel. The "tune" knob is the slug screw and the "off" knob is a rotary-type switch. The potentiometer was set for maximum notches and left there. If it is desired to adjust the notches from the front panel, there should be another potentiometer connected in series with the one on the panel so that the panel potentiometer can be set for full depth of notch with maximum rotation. The point of full notch is very sharp on the potentiometer and too difficult to find on a panel control unless it is at one end of the travel. Incidentally, I have heard a couple of these receivers with the Halliwellers notch coil in them and it certainly works fully as well as mine.

I am interested in hearing the zero beat "stay put" as sidebands are switched, and thus being able to switch sidebands in a QSO without retuning. I have added another crystal for the 6E5 in 1a. The new crystal is about 1000 cycles lower in frequency and is alternately switched with the original by an audio circuit on the notch switch. Thus, b.f.o. is then set to center on the pair of crystals. It is pleasing to note that, once set, the stability is such that there is no apparent shift in the oscillators with time.

W2HIU has built an interesting variation of this receiver. He used Wophe's a.g.c. circuit from QST, October, 1957. It certainly does a wonderful job. I may put it in mine. W2UHII had some difficulty in getting it to work due to original leaky bypass capacitors in the BC-453 l.f. He had a bus resistance of less than 50,000 ohms and had replaced all of the by-passes. I have checked mine and a couple of other 453's, and found these capacitors to be OK. W2UHII also elected to put his 6A6S and 6E5 stages on 80 meters and beat up from there for the higher-frequency bands. He did not experience trouble with 80-meter signal feed-through, as I thought he might. He also has the dual 6B15 crystals. Frank used the Crosby three-triode product detector, but I'm not sure that this is not of any real advantage in a receiver of this type.

Another fellow who is interested in a.m. reception is going to mechanically couple to the BC-453 l.f. coil sliders to get a panel adjustment of band width. This is not too difficult to do.

Some builders have made the dial-cord drive from the BC-453 to the 6HA5-6BE6 tuning capacitor too tight, resulting in cocking the 453 dial which is spring loaded. The coil should have no tension in it. Free play at this point will not degrade performance at all.

— Carl Briscoe, W2PL

K8RHR was high scorer in the recent Hambores sponsored by Boys' Life, the national publication of the Boy Scouts of America.

This is the very neat operating position at W3CVS. The final at the left is home-built, and is adapted from the all-band 813 rig described in January, 1954, QST. The sideband package at the right is from June, 1958, QST, while the receiver is from Hammarlund. The shelf above holds a Heath s.w.r. bridge, a speaker, and 1-kc. audio oscillator. W3CVS built the table using 3/4" oak veneer plywood, standard tapered legs (Stanley Hardware), wood type (Weldwood) to finish off the edges of the plywood, plus the usual treatment of stain, lacquer, and hard work. Pieces of 3/4" dowel stock are used to support the shelf on which the receiver and exciter rest and also the shelf above the receiver. (Photo by K3JRU)

T.R. VILLIANY

2417 Ervin St.
Columbia, S. C.

Technical Editor, QST:
Quite a few stations use mixer-type v.f.o.'s with one v.f.o. oscillator on at all times. This v.f.o. signal can mix with an incoming signal to produce a spurious response in the receiver.

Some time ago while I was operating on 3795 kc. in a traffic net a fellow ham said my signals were readable on 7000 kc. Well, 3795 is not harmonically related to 7000, but I told him I would get off the air at once and check my exciter. I could not find this so-called "harmonic" on my own receiver. I made some checks with hams in my own city to be sure. They found nothing.

I made contact with the station that had originally given me the report and asked him whether he was using a t.r. switch and whether his v.f.o. ran continuously. He confirmed this. I asked him to check again on 7000 kc. and he came back right and said, "loud and clear" on 7000 kc. I asked him to disconnect his t.r. switch from his transmitter and connect his receiver directly to the antenna. He did so, and the "harmonic" he thought he had heard on 7000 kc. was not there.

Perhaps this will save someone a great deal of time in trouble shooting his exciter or transmitter. This mixing effect can and will happen with certain types of t.r. switches.

— Paul G. Marsh, K44YY.
Keyboard-Controlled C.W. Station

Perhaps the title of this article is unduly restrictive, since the control system described here is not limited to applications where tape transmission is available. Automatic send-receive switching with hand keying is an integral part of the system.

From time to time various items of c.w. (that is, International Morse code) and teleprinter-tape transmitting equipment appear on the surplus market. While this article is primarily directed toward c.w. operation, the same idea may be used for RTTY work. The tape perforators and transmitting units, generally Wheatstone perforators and Boehme or Creed keying heads, are designed to handle large quantities of continuously running paper tape to key a c.w. transmitter at high speed.

This equipment can be adapted for use in an amateur c.w. station so that it will work "start-stop." By striking one of the keys on the perforator keyboard the entire station shifts from "receive" to "transmit." After a pause of selected length, when no signal is being transmitted, the process is reversed and the entire station shifts to "receive." A method by which this can be done is explained in the following paragraphs.

Briefly, the control arrangement used at W6EAR boils down to this: After the master power switch has been turned on and all high-voltage rectifiers warmed up, the entire station is controlled from the keyboard of the tape perforator. The operator needs only to tune the station receiver and perforate tape.

To transmit, it is only necessary to strike a single key on the keyboard. Immediately after this "start" pulse has been sent, the following action takes place:

1) Keyer motor starts.
2) Station antenna is shifted from receiver to transmitter.
3) High voltage is applied to final r.f. amplifier and exciter stages.
4) Plate voltage is removed from station receiver.
5) Headphones or speaker are switched from station receiver to monitor receiver, providing a "raw-signal" monitor.
6) Tape key the transmitter as long as the keyer sensing pins are supplied with perforated code characters.
7) Tape keyer also keys a 500-800-cycle audio oscillator. This oscillator provides additional monitoring facilities and functions as a portion of the control system.

Now—to halt transmission and receive from the distant station, the operator strikes the perforator BLANK TAPE key three times immediately after the end of the perforated message. This results in three to four inches of blank (no character) tape, these blanks normally being used between transmissions in the course of tape sending. When the blank tape reaches the keyer sensing pins, no keyed signal is sent and the following action takes place:

1) Keyer motor stops.
2) Antenna is switched from transmitter to station receiver.
3) Plate voltage is applied to station receiver.
4) Plate voltage is removed from final r.f. amplifier and exciter stages.
5) Headphones or speaker are switched from monitor receiver to station receiver.

Since the details of send-receive switching will vary with individual setups, some of the operations listed above will be replaced by others.

* 4224 Avila Lane, Sacramento 25, Calif.
in individual cases. The description to follow is therefore confined to the basic control system. A pair of relay contacts is provided for send-receive change-over and may be used to control additional relays and circuits for any purpose that may be desired.

**Keyboard Control**

To maintain fast and smooth “to-and-fro” operation, the keyer should be located as close as possible to the perforator, and the keyer motor should be capable of fairly fast starts and sudden stops. When a Boehme tape keyer is used as it was originally intended, the motor has a flywheel on the shaft to smooth out the speed. For ham use in this automatic equipment the flywheel should be removed. Then the motor will start and stop very quickly at the beginning and end of each transmission.

The keying and control functions make use of two polar relays controlled by the keyer sensing pins, as shown in Fig. 3. These pins sense the tape perforations (mark and space), changing polar impulses into neutral (make and break) keying of the transmitter and audio-oscillator monitor.

Polar relay $K_4$ keys the transmitter and polar relay $K_5$ keys the audio oscillator. This type of keying will perform perfectly at speeds in excess of 100 w.p.m., which, of course, are never necessary unless the station at the other end has access to a syphon ink recorder. When $S_5$ is thrown to “manual,” a bug or hand key can be used to activate the coil of $K_4$ and thus send polar signals into the keying system. In the manual position the keyer motor will not start. $S_4$, Fig. 2, controls the send-receive change-over relays manually. This arrangement is handy for instant change-over to manual operation and permits keying the monitor locally without keying the transmitter.

To transmit control impulses from the keyboard, two spring leaf switches are so mounted on the keyboard frame that striking the combination key will result in its connecting bar closing the start-pulse contacts. The contacts on this switch are normally open, as shown in Fig. 2. Once a transmission has started, the combination key may be used for its normal purpose without disturbing the control sequence. The second spring-leaf switch is so mounted on the frame that striking the $S_4$ key will cause its connecting bar to open the stop-pulse contacts. This switch is normally closed.

Any one of the punctuation keys on the right-hand side of the keyboard may be used for the “stop” key, but it must be remembered that this key then will no longer be useful for punctuating when a transmission is running, since striking the key will operate the “stop” control.

The stop pulse, as mentioned earlier, is entirely automatic when $S_4$ is in the “blank tape stop” position, being sent when the three blanks reach the keyer sensing pins. However, if so desired, the operator may control the stop function by striking the $S_4$ key. If keyboard stop control is wanted at all times, $S_5$ should be placed in the “keyboard stop” position.

When $S_3$ is in the “blank tape stop” position, the operator has complete change-over control from a bug or hand key when operating manually. The first “dit” sent on the bug changes the entire station from receive to send, and after a pause in sending of something less than one second the station changes back to receive.

**Operating Details**

The heart of the control system lies in the action of relays $K_1$, $K_2$, $K_3$ and $K_5$. When the start impulse is sent by striking the combination key, relay $K_1$ closes, starting the keyer motor and throwing all change-over relays to the transmitting position. As soon as the keyer pins sense the first code character of a transmission, the contacts of relay $K_2$ close the circuit to the coil of time-operated relay $K_3$ (relay $K_2$ follows the keying of polar relay $K_5$ via the tone oscillator). The contacts of $K_3$ are wired in series with the keyboard stop contacts, the coil of latching relay $K_8$ (the armature of which is mechanically connected to the armature of $K_1$ by a homemade push-rod arrangement), and a pair of contacts on relay $K_1$. Relay $K_3$ and the keyboard stop contacts, therefore, operate the latching relay which holds $K_1$ closed during a transmission. When the three blanks at the end of a transmission halt operation of $K_2$, the 40-mf. capacitor across the coil of $K_3$ discharges, allowing the contacts of

The leaf-spring switches are mounted under the perforator keyboard so they can be actuated when the proper key is depressed. These switches, made from jack parts, are mounted on aluminum brackets which in turn are bolted to the keyboard frame with the regular frame mounting screws.
Figs. 1-4, inc.—The control system broken down into sections. Fig. 4 is an alternative holding circuit for Fig. 2 (see text); connections to lower set of $K_1$ contacts should be made as shown in Fig. 2. Capacitances are in μf; capacitors with polarity shown are electrolytic; others may be paper or ceramic as convenient. Resistances are in ohms, resistors are 1/2 watt, except as otherwise specified.

Accessories such as the 110-volt d.c. source indicated in Fig. 3 are not discussed in this article, since they are normally required for the perforator-keyer setup and thus are assumed to be already available.

Note on polar relays: W6EAR advises that several types—Western Electric 215-A, 255-A, 209 FG, and Western Union 17B, all of which operate on less than 60 ma.—are readily available at low cost in surplus, since automatic equipment in which these relays have been used is being replaced by newer models. The Sigma 7AOZ-16OT (see page 12, December 1960 QST) also will be satisfactory.
$K_2$ to open after a short time delay. This opens the circuit to the coil of latching relay $K_4$, thus $K_1$ opens and all sending processes halt immediately, with all send-receive relays switching to "receive." The contacts on relay $K_3$ open approximately one second after keying ceases, which is about the correct interval for average sending speeds. The operator, therefore, has a choice of using three blanks or hitting the stop key to end his transmissions.

**Some Possible Modifications**

The dual relay arrangement, $K_2$–$K_3$, was used for another purpose and was simply left that way in developing the present system. However, it should easily be possible to eliminate $K_3$ and use the sensitive relay $K_3$ for the timing function since the author's experience with the d.c. output of the rectifier section of the 6SL7 leaves no doubt that there is energy to spare for charging a larger capacitance across the coil of $K_2$. The capacitance can be substituted for the pair of 0.25 capacitors and 300-ohm resistor now used as a filter, and will fall in the range between 40 and 150 $\mu$F, depending on the relay resistance and individual operating preferences as to time delay. The most suitable value can be determined by experiment. If this change is made, the contacts of $K_3$ should connect to the points marked 1 and 2 (circled) in place of the contacts of $K_3$.

Study of the circuit will show that when operating with $S_3$ in the "keyboard stop" position, the control circuit is latched immediately (through the upper contacts of $K_1$) upon striking the "start" key. This is not quite the case when operating in the "blank tape stop" position, since the 115-volt circuit to the coil of $K_5$ cannot be completed until $K_3$ closes, which will not occur until actual keying starts. Thus with the circuit as shown, it is necessary to hold down the "start" key until keying commences, an interval of a second or so.

To overcome this, the writer uses the alternative circuit shown in Fig. 4, incorporating a 10,000-ohm relay, $K_7$, which gets its coil power from a simple selenium supply similar to that used for $K_3$. With 150 to 200 $\mu$F across the coil, the start pulse holds the coil circuit of $K_1$ closed for about three seconds, during which period the keying has ample time to start and thus close the latching circuit. $K_7$ then opens and is ready for the next cycle.

**Some Remarks on Keyboard C.W.**

Keyboard c.w. transmission through the use of tape-operated keyers is a very pleasing experience, both to the sending and receiving operator. Also, the much-sought-after c.w. with tape precision then becomes a reality instead of a wish.

A few suggestions, or hints, based upon past experience should prove valuable to those who are planning tape operation for the first time.

The perforator and keyer should be physically arranged so that the tape loop is as short as possible at the very beginning of an operating session. Sufficient space should be allowed between tables supporting the units in order that a longer loop will reach the floor.

If a start pulse has been sent and the keyer commences using tape at a rate too fast for comfortable manipulation of the keyboard, striking the blank tape key alternately with the letter v key will cause the tape to be advanced rapidly from the perforator, resulting in v's being transmitted with more than normal spacing between characters. This allows a slow or inexperienced typist to keep ahead of the keyer if the need should arise. Once a QSO has been started, it is rarely necessary to run out tape in this manner.

Maintaining keyer speed in time with typist speed is important. A touch typist is able to perforate tape faster than average sending speeds, so the perforated tape will usually be fed to the keyer faster than the keyer is able to handle the perforator output. This allows for considerable relaxation and tension-free sending on the part of the operator. The operator is not glued to the sending position, as is the case when using paddle or keyboard manual-entry Morse code generator types of equipment.

The amount of memory realized through this medium of c.w. operation is phenomenal. During the course of a QSO a speedy typist can easily have one entire transmission completely recorded on perforated tape long before the circuit is turned over to the operator on the other end.

Fast, businesslike comebacks are easily accomplished by using the following procedure:

(Continued on page 138)

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**Ci:** Paper or mica; value can be varied to change audio tone.  
**Cr1, Cr2, Cr3:** Selenium rectifier, 130 volts a.c., 50 ma. or more.  
**J1, J2:** Open-circuit phone jack.  
**K1:** D.p.s.t., 115-volt a.c. coil.  
**K2, K3, K5, K6, K7:** 10,000-ohm coil ($\Sigma$ 41F-10000-5/SIL or equivalent).  
**K4:** Polar, S.p.d.t. (Western Electric 255-A); see note on facing page.  
**K5:** 115-volt a.c. relay with armature modified to close the contacts of K1 mechanically.  
**Li:** 15-20 henrys, 50 ma.; not critical (Stancor C-1003 or equivalent).  
**P1:** Phone plug.  
**R1:** 0.1-megohm control.  
**R2:** 2000 to 4000 ohms, 5 watts, for polar relays operat-

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Recent Equipment

Model HA-10 Warrior
Linear Amplifier

One of the new items from the Heath Company is a linear amplifier called the "Warrior" and designated Model HA-10. It is available in both kit and wired form — the first Heath departure from kit-form-only in the amateur field. The Warrior is a grounded-grid linear amplifier covering 80 through 10 meters, with four 811As connected in parallel and operated Class B. The power-handling capability is 1000 watts p.e.p. on s.e.b., 1000 watts on c.w., and 400 watts on a.m. phone (500 watts with controlled-carrier drive). The amplifier and power supplies are built on a single chassis and housed in a two-tone green cabinet.

The plate tank circuit of the amplifier is a pi network using two coils, one for the 10-meter band and the other, which is tapped for the remaining bands. A 350-μf variable is used for the tank input capacitor. The loading capacitor is a two-gang job with a total capacitance of almost 900 μf. A fixed 500-μf mica capacitor is switched in parallel with it when 40 meters is used, and a second 500-μf mica is added to the circuit on 80 meters. The network is designed to work into a 50- to 70-ohm load.

The 811As are neutralized with a variable capacitor connected between the plates of the tubes and a properly polarized coil wound on the filament choke. The filament choke is a bifilar winding of 10 turns of No. 14 enamelled wire on a ½-inch ferrite core. The neutralizing coil is 9 turns of No. 18 wire, 8 turns per inch, one-inch diameter, and is mounted over the center of the filament winding.

The high-voltage supply for the amplifier uses a pair of 806As in a full-wave rectifier. A 5- to 50-henry swining choke is installed in the center-tap lead of the power transformer. An 8-mf oil-filled capacitor and a 60,000-ohm, 100-watt bleeder resistor complete the high-voltage supply. The large capacitance, along with the swining choke provide good power-supply regulation. D.c. voltage out of filter, key up, is approximately 1600 volts; key down, fully loaded, it is 1350 volts.

A bias supply consisting of a 10-volt transformer, silicon rectifier, 100-μf electrolytic capacitor, and an 11-ohm bleeder provide a stiff 4.5 volts of bias for the 811As.

Complete power-supply switching is accomplished with two double-pole, single-throw switches. One switch controls the 811A and 806A filaments, a green pilot light, and a cooling fan for the 811As. The second switch is used to turn the high-voltage transformer primary on and off. The high voltage cannot be turned on unless the first switch is closed. A red dial lamp is also connected across the high-voltage switch to show when the high voltage is on.

The r.f. portions of the unit are enclosed in a shielded box to reduce harmonic radiation. However, this could probably be improved upon by grounding the outer braid of the coax output lead where it leaves the enclosure.

A single meter is switched to read the different voltages and currents, with four meter positions available. The ranges in the first three positions are: grid current, 200 ma.; plate current, 1000 ma.; plate voltage, 2000 volts. The last position is a relative-power range calibrated with a 0-1000 scale; its range is adjustable by a front-panel.
output to the vertical plates of an oscilloscope for monitoring purposes.

The kit comes in two packages, one containing the power transformers and filter capacitor, the other for the remaining components. Construction time was about twelve hours. The instruction manual is quite clear and no problems were encountered in putting the amplifier together.

The manufacturer states the amplifier can be driven by any exciter in the 50- to 100-watt output range; we tried it with a 100-watt job and found we had drive to spare. The amplifier loaded quite easily to the 600- ma. plate current specified on c.w. and worked equally well on s.s.b.

— L. G. M.

### Model HA-10 Linear Amplifier

- **Height:** 11¾ inches.
- **Width:** 19½ inches.
- **Depth:** 16 inches.
- **Weight:** 90 pounds.
- **Power requirements:** 1250 watts, 117 volts, 50/60 cycles.
- **Price Class:** $230 kit, $330 wired.
- **Manufacturer:** Heath Company, Benton Harbor, Michigan.

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### Heathkit Transistor-Diode Checker Kit

**With** all the new semiconductor devices on the scene today and with transistor build-it-yourself projects becoming increasingly popular, it is only natural that some method of testing these devices is in demand. Several transistor test circuits have appeared from time to time in QST, and now the Heath Company has brought out a combination transistor-diode checker kit. Although the unit is strictly a "relative quality" tester — the meter simply has a 0-10 scale — it can help in deciding whether or not to replace the transistor or diode under test.

The model IT-10 is certainly uncomplicated when it comes to circuitry and construction, and should satisfy the busy ham who is interested in an evening's construction project. The total time involved, from opening the package to final testing, is not more than a couple of hours.

Here's what the checker can do: It tests transistors for leakage between emitter and collector terminals (not to be confused with \( I_{CE} \), which is collector current with the emitter open). The simplified circuit for this test is shown in Fig. 1A. The battery and meter polarities given are for p-n-p transistors. The tester can also be used to measure relative transistor gain. The simplified p-n-p circuit for this test is shown in Fig. 1B. A negative bias is applied through the 100,000-ohm resistor to the transistor base, causing collector current to flow which is indicated on the meter. The checker can also detect shorts — which are indicated by full-scale reading during a leakage test — and opens, which do not deflect the meter in either leakage or gain tests.

Diodes can also be checked. The diode is connected between the collector and emitter terminals on the checker (Fig. 1A) and the meter deflection noted. Then the battery and meter polarities are reversed by throwing a switch on the checker. The relative meter indications will, of course, depend on the type of diode being tested, but most of the common silicon and germanium

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1 Heinen, "An Experimental All-Transistor Communications Receiver," QST, May, 1956, p. 15.

Priebe, "Checking Transistors," QST, April, 1958, p. 20.

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diodes will show a high ratio of forward-to-reverse current — if they are good. As in the case of transistors, opens and shorts can also be detected in diodes.

In addition, the IT-10 can be used as a continuity tester. The emitter and collector test leads are connected to the circuit under test and the meter will show full-scale deflection with circuit continuity. In order to monitor the status of the internal batteries of the IT-10, the emitter-collector leads are shorted and, if the batteries are up to par, the meter will indicate full scale.

The complete circuit diagram of the transistor-diode checker is shown in Fig. 2. The switches, meter, and test terminals can also be identified in the photograph. The three 10-inch flexible leads connect the transistor or diode under test to the checker if the test item itself will not fit the socket provided. The leads have a banana plug at one end, for mating with the jacks on the tester, and small alligator clips on the other end.

The three slide switches on the unit include the npn-pnp switch, which is also labeled for-rev, which reverses the polarity of the power supply for either n-p-n or p-n-p transistors and diode tests. The hi-lo switch is used to shunt the meter and, as the diagram in Fig. 2 indicates, reduces the series resistance in the base circuit to 2200 ohms so that a higher transistor collector current will flow in the "gain" test. In the hi position, full-scale meter deflection is increased from 3 ma. to about 175 ma., which is useful in checking high-power transistors. The leakage-gain switch opens the base lead for emitter-to-collector leakage tests. It is a spring-return switch normally in the leakage position.

The IT-10 is powered by three standard C cells housed in the checker's case. The case, finished in light gray, has a flange around the top and a sloping front so the unit can be placed in any position without having the meter or switches touch the supporting surface.

E. L. G.

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Hammarlund I.F. Noise Silencer

Designed specifically for the Hammarlund HQ-170 and HQ-180 receivers, the Hammarlund i.f. noise silencer is an accessory that provides effective noise reduction in c.w. and s.s.b. reception. The basic circuit is similar to the Lamb silencer of twenty-five years ago, a principle which has been used recently in one form or another in several modern communication receivers.1,2

The silencer is inserted electrically in the 455-kc i.f. system and blanks out the receiver for short periods during individual noise pulses. These "blanks" are short enough so that with proper adjustment, the operator will not be aware of the "holes" in the signal.

1 "Recent Equipment," QST, May 1958.
2 "Recent Equipment," QST, November, 1959.

The circuit has two i.f. amplifier stages, a noise rectifier, and a clipper tube. A block diagram of the unit is shown in Fig. 1; the actual circuit closely resembles the one that has been in the receiver chapter of the Handbook for the past few years. Signals and noise at the input end of the silencer are amplified by the 6BH6 and then detected by $V_{3A}$. The resulting audio signal is a.e. coupled to the No. 3 grid of the 6BE6 i.f. amplifier, $V_1$, across which there is also a 6AL5 rectifier which clips off the positive-going side of the signal. The negative swings reduce the gain of $V_1$ and since $V_1$ is in series with the receiver's i.f., also reduces the total i.f. gain. A gain control ("threshold control") in the 6BH6 cathode allows adjustment of the noise amplifier's gain so that $V_1$ will be "blanked"
by noise pulses having amplitudes greater than that of the desired signal, but will not be affected by the signal itself.

Installing the noise silencer in the HQ-170 or HQ-180 is a short and easy job: fitting one to an HQ-170 took us only about 30 minutes. No special tools were needed; a couple of screwdrivers, nutdrivers and a soldering iron will do. No aligning is necessary, so there's no worry about special alignment tools or procedures. In the case of the HQ-170, the silencer is fastened to the receiver chassis by two self-tapping screws which normally hold the selectivity-sideband switch bracket to the chassis. The old noise limiter control is removed from the receiver's front panel and replaced by the one supplied with the silencer. The new control is actually two separate potentiometers with concentric controls: one replaces the old audio control and the other is the i.f. silencer gain control.

The tube socket adapter shown in the photograph goes between a 6BA6 i.f. amplifier tube and its socket in the HQ-170. Installation in the

The noise silencer is connected to the receiver by the special tube socket and plug at the right; an i.f. amplifier tube is removed from the receiver and is replaced by the plug assembly. The tube is inserted in the top of the special socket and covered by the tube shield in the foreground. The concentric volume controls replace the existing noise-limiter potentiometer on the receiver's front panel. The two loose leads in the photograph connect to the receiver for supplying the heater and +B voltages to the silencer.

HQ-180 is similar, except that the silencer chassis is fastened to the inverted spade lug which is located on the top rear end plate of the bandspread tuning gang. It seems likely that the unit could be used with almost any receiver having a 455-ke, i.f., provided room can be found for it near the i.f. system.

In use, the silencer gain control simply is set to a position where the noise is effectively suppressed. The exact setting depends on the strength of the received signal, the strength of the noise, and the type of noise. The original noise-limiter circuits of the receiver are not affected and can be used separately or along with the silencer.

— E. L. C.

I.F. Noise-Silencer Accessory

Height: 3 1/4 inches.
Width: 2 1/8 inches.
Depth: 3 3/4 inches.
Power Requirements: 0.75 amp. at 6.3 volts and about 12 ma. at 225 volts.
Price Class: $35.
Manufacturer: Hammarlund Manufacturing Co., Inc., 40 West 34th St., New York 1, N. Y.

Strays

Speaking of Field Day

Some of the KL7s held an Alaskan Field Day last January, and you can see from the photo (right) that conditions were (we hope) somewhat different than those most of us will experience on June 24-25. The temperature was 20 degrees below zero while KL7DDQ was tightening the tent stays. Other members of the Arctic ARC who participated in this "Operation 49 below the 49 below" included K1JYX/KL7, KL7CWO, KL7DMB, KL7CUH, KL7DH, KL7ABQ, KL7AZJ, KL7DE, KL7DCP, KL7BET, KL7OFM, and WLI7DPL.

W5KOK says not to give up if your generator starter rope breaks on Field Day. Merely tie a knot in a piece of RG-59/U and crank away.
Hey, Marge, how much time before we have to leave?

"Twenty minutes?"

"Good, I'll have time for a short QSO. Turn on the rig and here we go."

"Might as well call CQ. Only got a minute. Band's been lousy lately — probably no one on anyway.

"Hello CQ CQ CQ CQ CQ Q short QSO. CQ CQ CQ CQ CQ CQ short QSO. Calling CQ for a short QSO. CQ CQ CQ CQ CQ CQ CQ —"

"Ahhhhhhhhhhhh. Grid current a little low — ahhhhhhhhhh. Ooooooooohhhhhhhhh. Just touch it a little. That's better. CQ CQ CQ CQ CQ CQ CQ CQ short QSO. Hello CQ for any short QSO. Hello CQ CQ COC CQ CQ CQ CQCOQCQCOQCQCOQCQCOQCQCOQCQCO QC short QSO. This is W6ISQ, Whiskey number six, 1 Indiana, S Sugar, Q Quebec calling CQ CQ CQ CQ CQ CQ CQ CQ CQ CQ CQ CQ CQ CQ CQ CQCOQCQCOQCQ short QSO."

"This thing must not be tuned up right. That s.w.r. up to 1.5 Hmmm —"

"Ahhhhhhhhhhhhhhhhh. Wonder if those meters are zeroed. Little better. Wonder why this thing detuned since last week. CQ CQ COC CQ COC CQCOQCQCOQCQCOQCQCO QC short QSO. Hello for a short QSO."

"Might as well rotate a little more northeast. Hello CQ CQ CQ CQ CQ CQCOQCQCOQCQCOQCQCOQCQCOQCQCO QC for any short QSO. Aahhhhhhhh. Ought to have a few more miles.

"Oh well — only have a few minutes. Hello CQ COC CQ COC for a short QSO. This is William Six 1 as in Indianapolis, S as in Saskatchewan, Q as in Queensland — calling CQ for a short QSO. CQCOQCQCOQCQCOQCQCOQCQCOQCQ short QSO.

"Wonder if this rig is getting out. CQ CQ COC CQ CQ short QSO. Aahhhhhhhhhhh. CQ short QSO. This is William Number Six —"

*45 Laurel Avenue, Atherton, California.*

**Strays**

WA2MLII was called out to service a microwave relay tower near Kingston, N. Y. one night in February during a howling snow storm. The drifting snow closed the road to the tower and so he and another technician were marooned at the tower site without food. But he reckoned without K2CWI, who lives at the foot of the hill where the microwave tower is located. K2CWI realized the two technicians were marooned and must be hungry, and so he plunged through the snow on foot (snowshoes, perhaps?) with a basket of food. He made two more trips later in the day before the access road was finally plowed.

Here is K5UHP’s home-brew tilt-over tower. Shown here partly tilted over, the triangular section to the left serves both as a strengthening member for the joint and as a lever for tiling the tower up and down. This tower is self-supporting, and is anchored to a concrete base.

QST for
**I.A.R.U. News**

**QSL BUREAUS OF THE WORLD**

For delivery of your QSLs to foreign amateurs, simply mail cards direct to the bureau of the proper country, as listed below. Cards for territories and possessions not listed separately can be mailed to the bureau in the parent country; e.g., cards for French Camerooners (FES) go to RFR in France; cards for VPes go to RSGB in England. W, K, VE and VO stations only may send foreign cards for which no bureau is listed to ARLR.

For service on incoming foreign cards, see list of domestic bureaus in most QSTs under "ARRL QSL Bureau." Bold face listing indicates corrections or additions.

- **Algeria:** G. Derrive, F100W, Box 21, Maison-Carree, Alger
- **Angola:** L.A.R.A., P.O. Box 481, Luanda
- **Argentina:** R.C.A. Carlos Calvo 1424, Buenos Aires
- **Australia:** W.T.A., Box 2811 W, G.P.O., Melbourne
- **Australia:** O.C. Y.S.V., Vienna 1/9, Box 999
- **Austria:** Via Posta 6/1
- **Bahamas:** Via ARLR
- **Barbados:** Arthur St.C. Farmer, Storms Gift, Brandon, Deacons Road, St. Michael
- **Belgium:** U.B.R., Postbox 624, Brussels
- **Bolivia:** R.S.B., P.O. Box 275, Hamilton
- **Brazil:** I.A.B.B.R., Caixa Postal 2253, Rio de Janeiro
- **British Guiana:** D. E. Yong, VP8Y, Box 333, Georgetown
- **British Honduras:** H. L. Alpaca, VP7HA, P.O. Box 1, El Cuyo
- **Bulgaria:** Bulgaria 850, Sofia
- **Burma:** B.A.R.S., ¶ Tara Singh, 187 Eden St., Rangoon, Burma
- **Canton Island:** Charles Singletary, KB6BH, ¶ F.A.A., USPO 06-5000, Canton Island, Phoenix Group, South Pacific
- **Cayman Islands:** G. E. Clark, P.O. Box 907, Colombo
- **Chile:** Radio Club de Chile, Casilla 701, Santiago
- **China:** M. T. Young, P.O. Box 16, Taichung, Formosa
- **Colombia:** L.C.R.A., P.O. Box 584, Bogotá
- **Congo:** F.C.A.R. QSL Bureau, P.O. Box 3748, Elisabethville
- **Cook Islands:** Bill Scarborough, ¶ Radio Station Barotonga, Raroa, Cook Islands
- **Costa Rica:** Radio Club of Costa Rica, Box 2412, San José
- **Cuba:** F.A.R.A.C., QSL Bureau, P.O. Box 6996, Havana, Cuba
- **Cyprus:** Mrs. E. Barrett, P.O. Box 219, Limassol
- **Czechoslovakia:** C.A.Y., P.O. Box 69, Prague I
- **Denmark:** E.D.R., QSL Bureau, Inetegrup
- **Dominica:** VP2DA, Box 64 Roseau, Dominica, Windward Islands
- **Dominican Republic:** Jose de las S. Perkins, P.O. Box 157, Ciudad Trujillo
- **East Africa:** (VQ1, VQ3, VQ4, VQ5): P.O. Box 1313, Nairobi, Kenya Colony
- **Equador:** Guayaquil Radio Club, P.O. Box 5777, Guayaquil
- **Ethiopia:** Telecommunications Amateur Radio Club, P.O. Box 1047, Addis Ababa
- **Finland:** RF7, Helsinki
- **France:** HQ MAAG, APO 63, San Francisco, California
- **France:** E.F.P., P.O. Box 28, Versailles (S & O)
- **France:** (FE 700) F7 QSL Bureau, MARS, Headquarters U. S. European Command, APO 128, New York, N. Y.
- **Germany:** (DL4 and DL5 calls only): DL4 and DL5 QSL Bureau, ¶ DL4VJ Base MARS Station, APO 130, New York, N. Y.
- **Germany (other than above):** D.A.R.C., P.O. Box 99, Munich 27
- **Gibraltar:** E. J. Willis, ZBB1, 9 Naval Hospital Road
- **Ghana:** W1GB, H. D. Burton, Telecommunication School, Accra
- **Great Britain:** Post & Telecommunication Dep't
- **Great Britain (and British Empire):** A. Milne, 29 Kechill Gardens, Hayes, Bromley, Kent
- **Greece:** George Zoras, P.O. Box 504, Athens
- **Guatemala:** Unlisted SVs only: USASC, APO 305, New York, N. Y.
- **Greenland:** (OXS only): Via Denmark
- **Greenland:** (KG1a only): MARS Director, Directorate of Operations, 1st Air Force, Westover A.F.B., Mass.
- **Grenada:** VP2G, St. Georges
- **Guam:** M.A.R.C., P.O. Box 145, Agana, Guam, Mariana Islands
- **Guatemala:** MARS, P.O. Box 115, Guatemala City
- **Haiti:** Radio Club d'Haiti, Box 943, Port-au-Prince
- **Honduras:** O. A. Trohe, P.O. Box 244, Tegucigalpa, D. C.
- **Hong Kong:** Hong Kong Amateur Radio Transmitting Society, P.O. Box 541, Hong Kong
- **Hungary:** H.S.R.L., Postbox 185, Budapest 4
- **Iceland:** Einarsson Radio Amateur, Box 1088, Reykjavik
- **India:** P.O. Box 334, New Delhi
- **Ireland:** E.R.T.S. QSL Bureau, 24 Wicklow St., Dublin 2
- **Israel:** L.A.R.C., P.O. Box 4096, Tel-Aviv
- **Italy:** Vittoria Veneto 12, Milano, Italy
- **Jamaica:** Ruel Samuels, VP6BS, 31 Port Royal Street, Kingston, Jamaica
- **Japan:** (JA): J.A.R.L., Box 377, Tokyo
- **Kenya:** East Africa QSL Bureau, Box 1313, Nairobi
- **Korea:** Korea Amateur Radio League, Central Box 102, Seoul, Korea
- **Kuwait:** William N. Buehler, K9K2Z, ¶ Kuwait Oil Co. 14-5th St, North, Kuwait, Persian Gulf
- **Lebanon:** R.A.L., Amal, B.P. 9245, Beyrouth
- **Liberia:** (ELIs only): HARC, P.O. Box 32, Liberal
- **Liberia:** AATZ, Box 372, Tripoli
- **Lichtenstein:** via Switzerland
- **Luxembourg:** M. Schwerts, 35 rue Batty Weber, Eich/Als.
- **Luxembourg:** (MC11O) RC5, 1100 Luxembourg
- **Macao:** Via Hong Kong
- **Madagascar:** P.O. Box 587, Tsnararate
- **Madeira Island:** P.O. Box 297, Funchal
- **Mali:** QSL Manager, Box 777, Koura Lampur
- **Malta:** R. F. Galea, ZB1B, "Casa Galea," Railway Road, Birkirkara
- **Mauritius:** Paul Cabeche, VQ8AD, Box 467, Port Louis
- **Mexico:** L.M.R.R., P.O. Box 907, Mexico, D.F.
- **Midland Island:** K0MB, AIRBRRS Two Detachment, Midway Navy 3090, F.P.O. San Francisco, Calif.
- **Monaco:** 3J2CN, Anderholt Pierre
- **Montserrat:** VP2MY, Plymouth
- **Morocco:** A.A.E.M., P.O. Box 2060, Casablanca
- **Mosambique:** Lda dos Radio-Emissores de Mozambique, P.O. Box 812, Lourenco Marques
- **Netherlands:** V.E.R.O.N., Postbox 400, Rotterdam
- **Netherlands Antilles:** (Aruba): Verona, Postbox 392, San Nicolas, Aruba
- **Netherlands Antilles:** (Curaçao): Verona, Postbox 383, Willemstad, Curaçao
- **New Guinea:** Via Papuan
- **New Zealand:** N.Z.A.R.T., P.O. Box 489, Wellington U1
- **Nicaragua:** Club de Radio Experimentadores de Nicaragua, Apartado Postal 925, Managua
- **Nigeria:** Dr. M. Dramatfield, Z021KO, Regional Research Station, Samaru, Zaria, Northern Nigeria
- **Northern Rhodesia:** N.R.A.R.S., P.O. Box 332, Kitwe
- **Norway:** N.R.R.L., P.O. Box 898, Oslo

(Continued on page 166)

**June 1961** 49
1961 ARRL Field Day Rules

Annual Test for Emergency-Powered Stations, June 24-25

Ready for the Field Day? If not, you're just not with it. Thousands of amateurs in the ARRL Field Organization are busily readying generators, planning operating schedules, allocating assignments and otherwise impatiently awaiting this official radio-amateur way to start the summer season.

With emergency preparedness the theme, clubs and groups will take to the field and set up and operate stations independent of normal power facilities. You can participate with a club or non-club group portable; one- or two-man portable station; mobile; emergency powered home station or as a regularly powered home station. What ever your class of participation, you're sure to gain valuable operating experience under atypical conditions as well as have a grand time.

The rules and entry classifications are unchanged from last year. Pick any 24-hour period from the Field Day timetable. To raise contacts call "CQ FD" on C.W. or "calling any Field Day station" on phone; then swap signal reports and ARRL sections or specific locations.

Here are examples to assist score calculations:

Example 1

Assume a 25-watt rig wholly on batteries, not originating or relaying any messages, and not having more than two operators.

40 points (40 stations worked)

X 3 (power below 30 watts)

120

X 3 (all radio equipment independent of commercial mains)

360

X 1.5 (If Class B or C and everything on batteries)

540 claimed score

Example 2

Same as Example 1 but one Field Day Message to the SEC or SCM is originated and passed in good form.

65 points (40 QSOs + 25 points for FD message)

X 9 (3 x 3 - power multiplier multiplied by independence-of-mains multiplier)

585

X 1.5 (everything on batteries)

877.5 claimed score

(Copies of all messages originated and relayed must accompany Field Day reports.)

Example 3

The Padunk Hollow Radio Club (or any group of three or more licensed operators), portable at its FD site, operates two transmitters simultaneously. Each rig runs 75 watts input and batteries or generators furnish power. One message is started in good form (25 points), 1 is received and relayed onward (2 points), and 250 stations are contacted.

237 points (250 QSOs + 25 + 2)

X 2 (power input over 30 and under 150 watts)

474

X 3 (all gear independent of mains)

1,422 claimed score

(No battery multiplier for either clubs or groups.)

Mobiles are an important part of Field Day too, and clubs should strive to get all member-owned mobile units on the air during Field Day and report their mobile scores for the mobile aggregate scores to appear in the final results. Mobile units are the key to any emergency communication.

Log forms and summary sheets are now available on request from ARRL. Your best bet is to send for some, but the sooner the better. You may also use the summary on the next page, or prepare a facsimile. All reports should include starting and ending time of operation, bands used, dates and contact times, calls of stations worked, signal reports sent and received, and locations of stations worked, as well as power sources and inputs, location and call of station, number of transmitters in simultaneous operation, number of persons participating, club name (if any), and score computations. Results must be postmarked no later than July 24 for listing in QST.

Portable stations are reminded to be sure they comply with FCC regs in signing portable, C.W. stations follow their calls with a slant bar followed by the numeral of the area in which they are operating; phone stations follow their calls with their geographical location. See Sec. 12.82 2(b) of the Amateur rules for details (in License Manual).

Check these FC rules, which follow below, very carefully: a scan of last year's FD results (December 1960, QST) may give you some hints.

Rules

1. Eligibility: The Field Day is open to all radio amateurs in the sections listed on page 6 of this issue of QST.

2. Object: For portable and mobile stations to work as many stations as possible; for home stations to work as many portable and mobile stations as possible.

3. Conditions of Entry: Each entrant agrees to be bound by the provision of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Contest Committee.

4. Entry Classification: All entries will be classified according to number of transmitters in simultaneous operation. They will be further classified as follows: "A," club or nonclub group portable stations; "B," unit or individual portable stations; "C," mobile stations; "D," home stations operating from emergency power. "E," home stations operating from commercial power sources. Thus a club or group running three transmitters simultaneously will be in the 3A classification, or a mobile station with one transmitter will be in the 1C classification.

Portable stations are those installed temporarily, for FD purposes, at sites away from customary fixed-station locations. Portable equipment or units must be placed under one call and the control of one license, for one entry. All control locations for equipment operating under one call must lie within a 1000-foot diameter circle.

Group participation is that portable-station work accomplished by three or more licensed operators.

Unit or individual participation is that portable-station work accomplished by either one or two licensed operators.

Mobile stations are complete installations including power source and antenna, mounted in or on vehicles and capable of being used while in normal motion. If they utilize antenna supports not normal or suitable for use during motion, in-
FIELD DAY TIMETABLE

Time Start End
GM T June 24 June 25
2100 2100

(Operate no more than 24 consecutive hours out of the total 27-hour period)

AKR I FIELD DAY SUMMA RTY

STATION CALL...............................FD LOCATION........................................

(Indicate / where applicable)

CLASS OF ENTRY (check only)

A. Club or group portable.
B. Unit or individual portable.
C. Mobile
D. Home -- Emergency power.
E. Home -- Commercial power.

If club entry, name of club:______________________________

If Class B entry, call(s) of operators:

Number of people participating at this station:

Period of FD operation: Starting time:___________________ Ending time:___________________

POWER SOURCE (check)

Generator. [ ] Commercial Mains. [ ] Battery. [ ] Other.

Description of power source (generator type etc.):________________________

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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>


TOTAL: X

CLAIRED SCORE: Enter total number of scores, work being (should be equal box). [ minus box ]

This certifies that the station whose call appears above was operated in accordance with the current Field Day rules and that, to the best of my knowledge, the points and score as set forth in the above summary are correct and true.

(Primary signature)

(Official of club authorized to issue this field day stamp)

June 1961
VE/W Contest—1960 Results

Last September 24–25, the Montreal Amateur Radio Club hosted its annual VE/W Contest for single-operator stations. When the QRM cleared, contest chairman VE2BB found himself with 383 logs, representing all Canadian and 60 U.S. sections. The 1960 trophy for top contest score goes to VE2NI with 151,528 points (higher than last year’s top tally from K6NXA). Other high VE scores were summed up by VE7EH 115,473; VEA01 92,814; VE3AGX 91,575; VE2YA 86,826; VE5KX 84,210 and VE5AO 84,075. The highest W score was entered by W5KC with 116,314.

After eight years of administering the VE/W activity, VE2BB and XYL plan to step aside for others and at this time wish to thank all amateurs for their friendship, cooperation and patience.

The following tabulation was prepared by the MARC Contest Committee. The figure following each call is the final score with the amateur heading each ARRL Section listing earning a certificate.

### Maritime

<table>
<thead>
<tr>
<th>Call</th>
<th>Score</th>
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<tbody>
<tr>
<td>VE1ER</td>
<td>68,121</td>
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<tr>
<td>VE1YV</td>
<td>63,308</td>
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<tr>
<td>VE2AEH</td>
<td>60,210</td>
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<tr>
<td>VE1MN</td>
<td>54,230</td>
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<tr>
<td>VO1AJ</td>
<td>51,250</td>
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<td>VE1D</td>
<td>42,578</td>
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<td>38,578</td>
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<tr>
<td>VO1AW</td>
<td>33,361</td>
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<td>VO1W</td>
<td>15,402</td>
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### Quebec

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<tr>
<th>Call</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>VE2MN</td>
<td>154,258</td>
</tr>
<tr>
<td>VE2YA</td>
<td>68,526</td>
</tr>
<tr>
<td>VE2ATU</td>
<td>51,782</td>
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<tr>
<td>VE2RH</td>
<td>40,854</td>
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<td>VE3AR</td>
<td>36,386</td>
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<td>VE2A</td>
<td>24,410</td>
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<td>VE2SH</td>
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<td>VE2D</td>
<td>7,953</td>
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### Labrador

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<td>VE2CE</td>
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### Ontario

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<td>VE2D</td>
<td>415</td>
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<tr>
<td>VE2C</td>
<td>413</td>
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</tbody>
</table>

### Newfound/Labrador Winner

**1. W6TNP**

**2. VE1DP**

**3. VE2JH**

**4. VE1GB**

**5. VE2AP**

**6. VE2AC**

**7. VE2AY**

**8. VE2AW**

**9. VE2AX**

**10. VE2AY**

**11. VE2AV**

**12. VE2AJ**

**13. VE2AD**

**14. VE2AC**

**15. VE2AA**

**16. VE2AR**

**17. VE2AH**

**18. VE2A**

**19. VE2H**

**20. VE2E**

**21. VE2D**

**22. VE2C**

**23. VE2B**

**24. VE2A**

**25. VE2H**

**26. VE2E**

**27. VE2D**

**28. VE2C**

**29. VE2B**

**30. VE2A**

**31. VE2H**

**32. VE2E**

**33. VE2D**

**34. VE2C**

**35. VE2B**

**36. VE2A**

**37. VE2H**

**38. VE2E**

**39. VE2D**

**40. VE2C**

**41. VE2B**

**42. VE2A**

**43. VE2H**

**44. VE2E**

**45. VE2D**

**46. VE2C**

**47. VE2B**

**48. VE2A**

**49. VE2H**

**50. VE2E**

**51. VE2D**

**52. VE2C**

**53. VE2B**

**54. VE2A**

**55. VE2H**

**56. VE2E**

**57. VE2D**

**58. VE2C**

**59. VE2B**

**60. VE2A**

**61. VE2H**

**62. VE2E**

**63. VE2D**

**64. VE2C**

**65. VE2B**

**66. VE2A**

**67. VE2H**

**68. VE2E**

**69. VE2D**

**70. VE2C**

**71. VE2B**

**72. VE2A**

**73. VE2H**

**74. VE2E**

**75. VE2D**

**76. VE2C**

**77. VE2B**

**78. VE2A**

**79. VE2H**

**80. VE2E**

**81. VE2D**

**82. VE2C**

**83. VE2B**

**84. VE2A**

**85. VE2H**

**86. VE2E**

**87. VE2D**

**88. VE2C**

**89. VE2B**

**90. VE2A**

**91. VE2H**

**92. VE2E**

**93. VE2D**

**94. VE2C**

**95. VE2B**

**96. VE2A**

**97. VE2H**

**98. VE2E**

**99. VE2D**

**100. VE2C**

(Continued on page 159)
It was just a year ago this month that the Rhododendron Swamp V.H.F. Society first started hearing echoes of their 1296-Mc. signals returning from the moon. These first echoes were obtained using a 30-watt output transmitter and an 18-foot parabolic dish. They were, in truth, weak, but they were repeatable and could be obtained at will. At the time we only knew of three other groups who were seriously interested in moon-bouncing experiments. At the present time there are at least 30 interested groups, and 12 of these groups are actively engaged in constructing equipment for use on moon-bounce experiments. Not all the interest has been centered on 1296 Mc. Several of the groups are concentrating on 2 meters; others are working on 50 Mc. and 432 Mc. A good portion of the "planning but not in construction stage" groups are concentrating on 220 Mc.

There is a natural tendency for anyone who is planning a moon-bounce effort to choose the band on which he feels his equipment is best suited to the task. In our efforts we explored the possibilities of 50 Mc. and 144 Mc. and as a result of these explorations decided that the most useful frequencies would be those above 420 Mc. The reasons we had for choosing 1296, however, did not exclude the possibility of using the lower frequency bands. The accompanying chart which shows antenna temperature vs. frequency is one of the prime reasons for looking above 432 Mc. to obtain optimum moon-bounce transmissions. As can be seen, the antenna temperatures at 144 Mc. are 10 times higher than those at 1296 Mc. 220-Mc. antenna temperatures are only 5 times as bad and 432 Mc. antenna temperatures are almost comparable. The prime deterrent for 432 Mc. is, of course, the existing power limit which makes the necessary antenna gain prohibitively high. This additional noise obtained at the lower frequencies does not, however, rule out their use for moon-bounce purposes, as the path loss in sending the signal to the moon and back is considerably less at the lower frequencies.

Without going into any extended calculations on how we obtain the number, the path loss of a one-meter signal leaving the earth, reflecting from the moon and coming back to the earth is 258 db. (This figure neglects other incidental changes in the path loss caused by variations of distance to the moon, absorption in the ionosphere, etc.) Now this 258 db. at one meter varies as the square of the wavelength or, to put figures on it at 1296 Mc., the path loss has increased to 271 db. whereas at 144 Mc., it has decreased to 252 db. — so that a signal traveling to the moon and back at two meters suffers 19 db. less loss than one traveling the same route on 1296 Mc.

Interestingly enough the gain of a fixed aperture antenna array varies in the exact opposite manner. For example, an 18-foot dish can give 35 db. gain at 1296 Mc. and 16 db. gain at 144 Mc. It should be observed, however, that the additional 19-db gain obtained on 1296 Mc. for the same size dish is obtained once on transmitting and once on the receiving so that, in fact, the system antenna gain is 38 db. higher on 1296 for a constant size array.

Now in case you're confused as to what we mean by path loss, the 271-db. path loss for a 1296-Mc. signal means that a signal leaving your antenna will come back from the moon 271 db. weaker than it left. In calculating your chances of successful moon bouncing, the first step is to subtract the antenna gain from the path loss. In the case of an 18-foot dish used on 1296 Mc., this gives us approximately 35 db., which gain will be obtained once when the signal is transmitted and once more when the signal is received, for a total of 70 db. antenna gain. This 70 db. subtracted from the path loss leaves a resultant path loss for our signal of 201 db. The next calculation required to evaluate your system is to determine the weakest signal that your receiver can detect. In order to properly evaluate the minimum discernable signal capabilities of your receiver, the band width of the receiver, the noise figure or temperature of the receiver, the loss in the feed line between the antenna and the receiver, and the temperature of the antenna or the incidental noise coming in the antenna must all be taken into account. By modern standards, there is no excuse for having a receiver noise figure any worse than 1 db. and on 1296 a system temperature of 150° Kelvin should be obtainable. This would be approximately equal to having a 2-db. noise figure system. The additional
noise over the receiver noise figure is generally incurred in feed-line loss and added antenna temperatures. This is the point in which the 50-Mc. or 144-Mc. receiving systems will suffer most, as the added antenna temperature will degrade the performance of the receiving system.

The bandwidth of the receiver can be chosen to suit the particular fancy of the operator. In general it is safe to say that a 100-ke. bandwidth has a 10 db. signal-to-noise advantage over a 1000-ke. bandwidth. If we assumed a 2 db. noise figure and a 100-ke. passband, the equivalent noise input of this receiver would be $-151$ dbm. or $151$ db. below 1 milliwatt. Now this 151 dbm. is subject to considerable variation due to the integration ability of the human ear. Or to put it another way, the 10-db. advantage of the 100-ke. bandwidth over a 1-kilocycle bandwidth may be entirely offset by the ability of the ear mechanisms to produce an equivalent narrow bandwidth of their own. Unfortunately this innate ability of the ear is somewhat difficult to calculate and varies to some degree from operator to operator, as witness the DX man who can hear more with an SW3 than another one can hear with a 75A-4. Suffice it to say that the 151-db. signal which will appear in the 100-ke. bandwidth is a signal equal to the noise already existing in the receiver and to the ear will be approximately 10 db. above the noise. It now remains only to calculate how much transmitter power is required to come back from the moon with a signal of at least $-151$ dbm. The difference between 1 milliwatt and 1 watt is 30 db. If our receiver can hear a $-151$ db. below a milliwatt signal, it can obviously hear a $-181$ db. below a one watt signal. Now the remaining path loss after subtracting the 70 db. of antenna gain was found to be 201 db. of loss. Thus if we transmitted a 1-watt signal the returning signal would be 201 db. below 1 watt or approximately 20 db. weaker than our receiver capability. So in order to obtain a signal equal to our receiver capabilities, we must add 20 db. of power to our 1-watt transmitter or 100 watts. So we find that a 100-watt transmitter using a 35-db. gain antenna at a frequency of 1296 Mc. into a receiver having a 2-db. effective noise figure and a 100-ke. passband will return a signal which is equal to a noise in our receiving system and which to our ears will be somewhere between 6 and 12 db. over the noise. So much for system requirements on 1296 Mc. The only case that can be made for lower frequencies is that the path loss is less and the antenna temperature is somewhat higher and these to some extent balance out.

Karl Lickfield, DL3FM, v.h.f. Editor of DARC, seated at the controls of the W1BU moon-bounce station.

The second problem which occurs at lower frequencies is the phenomena known as faraday rotation. Without delving into the technical aspects, what this means in plain English is that the polarization of a signal which passes through the ionosphere is shifted. The amount that the polarization is shifted depends on the angle at which it passes through the ionosphere and the frequency of the transmitted signal. This faraday rotation is practically zero at 1296 Mc. However, at 432 and lower it is a definite problem which must be contended with. Now one should not assume that the rotation is completely random and, in fact, as one tracks the moon the resultant change in polarization on the returning signal varies quite slowly. So if the receiving antenna can be rotated in polarization to optimize the received signal, it will be quite adequate for at least an hour's transmissions. The thing that is difficult is to predict exactly how much it will be at a given time for any given frequency. The obvious solution to this problem is to use circular polarization. However, while this solves the problem of faraday rotation, it does not solve the problem of hearing your own signals as the direction of rotation of the circular polarized signal is reversed when it is reflected from the moon. This means that if you transmit left-hand circular polarization, the received signal will come back with right-hand circular polarization. Once again this would not be a problem if the receiving equipment is separate from the transmitting equipment, as the transmitter can use left-hand circular and the receiver can use right-hand circular. However, the operator who is attempting to hear his own signals must provide a system of reversing his direction of rotation between transmitting and receiving. Furthermore, it means that if two stations are set up to exchange signals, all other stations can either hear one of the other but not both of the stations. The solution is an antenna with a switchable circular polarization and almost all commercial type installations have this capability. All this really boils down to is that a 150-foot parabolic dish with provision for right and left hand circular polarization will give approximately the same results on 144 Mc as an 18-foot dish will give on 1296 Mc. Furthermore, the signals from the Rhododendron Swamp V.H.F. Society moon-bounce effort could be received on a 4-foot diameter parabolic antenna system with a good parametric amplifier following it.

Speaking of moon bounce, as we were, we just privileged to receive a visit from Dr. Karl G. Lickfield, V.H.F. Editor of the Deutscher Amateur Radio Club in Germany. Karl is engaged in a scholarship effort to produce a 1296-Mc. moon-bounce installation. With any luck his installation should be completed and on the air before the end of 1961. He plans to use a 10-foot parabolic dish on a polar mount. His receiver, of course, will utilize a parametric amplifier feeding a narrow-band i.f. system. The transmitter will employ an RCA 7650. To date he has the antenna and is expecting within a month completion of his
polar mount. The transmitter hardware for the final stage is completed. And, hopefully, after his return visit to various installations in this country, his parametric amplifier will be completed.

Here and There on 6 and 2
Why is it that towers, antennas, feedlines, rotators, etc., all seem to "give up the ghost" when contest time is drawing near? We've all seen it happen many a time; or else they hold up until the contest is started and then one thing after another lets go, including the operator's voice. According to Walt, W4FWH, it has happened to him. High winds from a series of tornadoes north of his QTH in Doraville, Georgia, caused serious damage to Walt's tower and beat the elements to pieces. Because of the angle at which the tower was left after the storms, the thin poles supporting it were dismembered and are in the process of being rebuilt. Walt is planning on operating the June v.h.f. contest from Brack Town Bald Mt. with gear on three bands, 90 Mc., 144 Mc., and 230 Mc. If the fellows backs hold up and they are able to carry 420 Mc., that also will be the air. From what we heard at the Delta Division Convention from Walt about that operating mountain top, it will most certainly be a good station to listen for during the contest. So far the operators lined up for that little excursion are W4VTH, W4WKE, W4NG, and W4FWH.

Another report from a station ready for the June contest is one from Charlie, W7ITL, who says he'll be operating on 6 Mc. and 230 Mc. W7ITL will be running 30 watts on six, and 250 on 2 and 144 meters.

Armond, K7MFA, says that when he moved to Casper, Wyoming, from Los Angeles he got a Heathkit HW-20 Stiver and is now enjoying low power. With the S信心 and a five-meter layout, he has made one Canadian section since his arrival in Wyoming. Among the other information he gave us was included the names and calls of v.h.f. hams in Casper: W7YTB, W7UFB, W7FSS, K7OLL, W7VDZ and K7MFA. This is very good news for the east-coast boys and we surely will be listening for those calls when the skip stretches a bit.

A quick report from Brian, W4OAB, tells us that most of the seven activity in North Carolina is on six meters, with most cars being equipped with "sixers." He has yet to hear a station above 50.5 Mc. This report brings to mind something that has popped up a number of times; according to what we hear there is a great deal of mobile activity on 50 Mc. But when have you heard any reports of mobile operation in this column? If there is so much mobile activity, there must be a great many of the v.h.f. gang interested in hearing what the others are doing; and if not, why not? Don't ask me! Cause no one reports! Ask the friend that you know is mobile to ask his friend who is also mobile to send us a report so that we know for certain there is 50-Mc. mobile activity in your area. Now if the foregoing doesn't make much sense, just go ahead and see what happens. In any case. "No news is (not) good news."

On the West Coast K6ICP has completed his six-meter s.s.b. rig and is running a C.E. 10B to a 6500 to 3 8147s to 2 4C-300As e.g. about 850 watts. Ken has been keeping schedules with W6FZA (178 miles) and has heard W6NKL, but as yet no contact. The foregoing all using s.s.b., by way of scatter and meteor bursts. Ken is also working with the 6CW7's for six meters and says the circuits can be improved by "tweaking."

Not many reports of "skip" for the month. A report from Mike, K3GJEZ, Blairsville, Pennsylvania, gives his version of the opening of April 7. Although Mike did not work the Florida region, he heard many strong signals, the strongest of which were K5ROG/5 in Wimberley, Texas, and K5FPH in Mobile, Alabama; he also copied stations in Mississippi and Oklahoma. Mike is most interested in knowing whether any of the 4s or 5s heard him during the opening. Activity has picked up considerably in that area, Indiana, Cumbria and Westmoreland counties, during the last year, with about fifteen new stations on the band. A second report on this same opening comes from Independence, Missouri, where K8LIL and his son Bill, K8FPTO, were hearing Florida and Texas among others. During the month of March, Dot Hall, KBGIC, had one lousy skip contact on 50 Mc. That was on March 10 with W4FWK at San Antonio, and was the last station needed for the WASD Certificate. The following day, March 11, K8JTK worked into Kansas City and heard Florida working into Oklahoma. On the 11th W46KVS also reports an opening, for him to W4-land, along with the news that W2LHQ was heard in California during that opening. On the 13th the Florida band was opened to W4s and 5s, and on March 15 the band was open once again to the 5's with reports that K9HUX was heard, and a final very erratic opening on March 31 when 8s and 9s were coming through, and the heavy QSB was back.

Last "opening" report received was from our old friend Jay Thornhill, K4KLD, who reports hearing LU4DQZ in Argentina on April 14. First heard Arthur at about 250 p.m. EST and when his signals came up to 8 (2:15) Jay gave him a call and a ten-minute QSO, then signed Last Jay heard Art was approximately 3:30 p.m. when he was working the boys in Florida. Art was running 10 watts into a three-element beam. No other South American stations were heard at that time and no others reported.

Now to aurora: W2AHIJ reports hearing VES3AQG during the auroral of March 5. Fred also announces his plans for operating portable with W2MVA during the June v.h.f. contest. They'll be going to Mt. Greylock, Massachusetts, or Mt. Washington, New Hampshire. Good luck, fellows! W3RTV heard W1s, W2s, W3s, W4s and W6s during the same auroral period on March 5. Jules says all were heard on 50 Mc. on e.w. Could copy no phone signals. K2HUE also reports 5s, 6s and 8s coming through via phone on that date; see only locals could be copied on phone. Stan is keeping an eye open for an APX-6 and is trying to arouse interest in his area about same. W2ZBPE worked Ohio, Massachusetts and Michigan, New Jersey and New York on 50 Mc. during the six-hour auroral opening and ended the evening by working K9GFW in Indiana. Toms also noted very poor auroral conditions on the nights of March 9, March 13, and March 27. W3ENOE has been working diligently, both on his equipment and on the air, and has raised his states worked on 144 Mc. to 31. New ones to obtain this total are North Carolina, Kansas, and South Dakota. Lou reports the aurora of March 14 was also good, hearing 0s, 8s, 4s and 3s coming in with good strength on 144 Mc., he heard a few on 50 Mc. e.w., but very little on phone. On March 12 Lou was hearing Wisconsin, Indiana, Illinois, Ohio, Iowa and Kentucky on 144 Mc. at his own QTH in Michigan. On 50 Mc. he reports hearing "VYXG" e.w. on 49.520 Mc. fading rapidly up and down, strength 4-6, with the beam south. This may have been back-scatter. Whether or not, it is put out in Canada. According to Lou the local v.h.f. Ler is still "with it." W3WFP is running 200 watts on 144 Mc. K8QPI is putting up a new antenna for 230 Mc. and is working cross-band, 50 Mc., with K8IRW. K8BXX has a new 5 over 5 on 144 Mc. K8BQZ, Lansing, Michigan, heard 2s, 8s, 4s and 3s during the aurora of the 5th. Dave observes that two-meter activity is generally increasing in his area while six-meter activity seems to be falling off. Revamping job is being done at the station of K8GZG, including the erection of a fold over tower and a larger antenna for two meters. Factory overhauled job being done on receiver plus the 6CW1 converter. K1CCX, Auburn, Maine, adds his comments to the effect that he worked New York, New Jersey and Pennsylvania during the same aurora on 144 Mc. with good reports. Also mentions several other very poor (weak) auroral sessions during March and comments that he heard aurora quite frequently when no one else seems to be aware of it. Just may be that far northern location of yours, Dick, maybe it doesn't come down this-a-way.

We've had a great many more reports of that March 5 auroral session which seemed to be the big one for that month. A number of the boys also agreed with K1CCX and W4ZBQ in that they had several very poor auroral sessions during the month of March.

W4ZBQ and W4HKK at the Chattanooga ARRL Delta Convention, V.h.f.-ers abounded.

June 1961
From K4EU in Virginia we received a complete report of his activities during the March 5 auroral session, on 144 Mc. "Got on at 1820 and was on until 2305, signals faded out completely at times but there were some 'A' signals coming through about 80% of the time. I worked W1 PZ, New Hampshire, at 2135, W2MV, New York; and K1CRN, Rhode Island at 2132. I called but heard no reply from VE2NW, K9EUT, VE3AGQ. Also heard K1CRQ/8, W8RAH, W8JX, W8WMN, K3QGI, W1-HV, W3RF, W7CHW, W8LTH, W2XK, W2XO, W2XJ, W2ZL, W2NCF, and W8EOH. At about 2130 EST K3HDW with both regular and 'A' signals simultaneously, this was off the back of his beam -- he is about 125 miles north of here. At about 2155 W8SFY was heard 2770 with beam pointed at him. Swinging the beam around to the northwest caused his signal to change to 'A' with strength of 7 when 30 degrees west of north. Swinging my beam back toward W8SFY brought the signal back to 'T.'"

Report received from K2KIR at deadline time of the aurora on April 15 during which time Bud heard W1ET, New Hampshire; W1JSM, Massachusetts; K4WVH, Virginia; W1LNA, Pennsylvania; W1REZ, Connecticut; W0BOZ, Illinois. Bud is a recent convert to the v.h.f. bands and enthusiasm is running high. He is currently using an 8-element beam, driving a LW converter. By June he hopes to have something on e.w. but finds it a bit more difficult to do on two meters than on 80 and 20. Another paradox in construction is one by K5AXN who has a 16-foot parabola about completed. It was constructed in eight pre-shaped sections, has an aluminum foil surface, and the over-all construction of the feed bar and wires with plywood ribs to stiffen it and to provide a flange on the back to bolt the sections together. All sections were formed over the same plaster mold.

W1EHF/1 will be operating from Mt. Asagunticus, Maine, on Saturday evenings during the month of June. Operation will be on 220,000 Mc. between 8 and 9:30 p.m., and will switch to 432 Mc. upon request. At approximately 9:30 p.m. operation will commence on 432 Mc. Operation during the June contest will begin at 3:00 p.m., local time Saturday and conclude at 6:30 p.m. on Sunday. The 432 Mc. rig will be running 32 watts output to a 44-element array and a Tapetone converter with parametric amplifier in front of it. 220-Mc. equipment will consist of 75 watts output to a 22-element Tapetone converter and a parametric amplifier, C.W. QRS (narrow bandwidth). Schedules can be arranged by addressing Frank Vernon, W1EHF, 1 George St., Cambridge, Mass.

220-and 420-MC. STANDARDS

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The figures after each call refer to states, call areas, and miles.
CONDUCTED BY ROD NEWMARK, W0BRD

How?
Radio amateurs view with intense interest the communications aspects of man's first ventures into space. The restless creature must be assured a reserve of foolproof wireless contact with Mother Earth under fantastic limitations in bulk, weight, delicacy and complexity of equipment. If something goes wrong he can't call up the lab; he must get it working and keep it working. OM Doppler, weird signal paths and other factors join to complicate the project. Here is a Field Day proposition worthy of Marconi himself!

The old claw hammer must be nearly as ancient as carpentry, and the screwdriver as old as the screw. More sophisticated hammers and screwdrivers come along to speed the mechanical arts. That's progress. Yet the rudimentary versions apparently will be with us in quantity for some time to come. Their applications, where tactically advantageous, seem inexhaustible.

There's another venerable gadget that's been extant ever since wire and wireless communication broke upon the scene. It's called the telegraph key, and there are indications that the doggedon thing must be as durable as other basic tools. In fact it now turns up in the very forefront of sensational scientific advance. According to an Associated Press dispatch datelined Moscow, April 13, 1961, cosmonaut Y. A. Gagarin included this statement in his post-orbital commentary:

... I was in communications contact on various channels using a telegraph key. Weightlessness had no effect on my ability to work...

Brass-pounding at 18,000 m.p.h. Just goes to prove something we humans—particularly DX hounds—have known right along. If it proves to the world day after day: Applied skillfully and advantageously, radiotelegraphy and that wonderful rugged old telegraph key are no more out of date than a man in space.

What:
We understand that Yuri worked phone, too, so you c.w.—forever chiefs needn't get too Pull up, ... Hams not particularly interested in journeying into space, but who like to work DX and aren't sure how about how they do it, would do well to keep their code abilities in good repair. We recall that the last sunspot minimum was especially rough on radiotelephone DX. It's an immutable fact of communications life that fringy propagation conditions often find DX paths open for solid c.w. work while prevailing use of other modes. The past few years of abnormal sunspot prosperity may have rusted a few fists and worn some code skills here and there. Those QRP 10- and 15-meter voice DXers were lots of fun, but the going was rough. The amateur is versatile; 'tis well that he's ready to call upon every trick and tool of the communications art. Grandma's old telegraph key included.

Versatility therefore be our theme this month, and we find this attribute no better exemplified than by DXers of the new frontier, sideline-band, on

75 phone. There we find W1BU (W1FZJ & Co.), K3AB, KE4ME, K3SG and K3CCQ slicing through to QTHQ, E8A7TD 881, K3AQT, G4AZL, E8DZ, LM8, LM8B, LM8C, GM2BUD, G3CDF, GW3EHN, H0GKU, H6BHK, H6G2R, H9BB, K4AAQ, K4AAT, LA1M, LI1DE, QRIZ, QK5RF, O4HBM, O4M7V, O6I4A, PA1A, PA9, PY3AYA, PZ1AX, SM3AZI, SP3DC, TGSHC, UA1DZ, VP5AB, VK7NT, YN1ATB, VS1ANS, ZG4A, ZL1ACX, ZL6TE, 4X4S, K00K and 9G6DAB, W1RU, as a matter of fact, has collected 165 s.s.b. and live a.m. DX stations in 33 countries in a year or so on 3.8-Mc. voice.

80 c.w. sees Japan's hams beginning to cross the water in force. K3KMO, K0QHG, W5D34, K03SCD, W5OJN and K4LID mention chats with KH3AI, HIABH, HIABZ, JA1BTH, LA1, AE5P and DI1XZ (12), 2WYX, 1YV, 2WB 6ILW T2K SLN and K0QGA. K4VZ (10) 7, CI (2) 7, KH8E and K7N3 in number, PY7LJ of Fernando de Noronha, T7EE, VP5K, VK1R, VP5MC, K7CTK and V7AB, a dozen ZL3, ZZ65 AGCH DW and TE, plus the usual smattering of routine transatlantic triumphs. Incidentally, "(1)" is our usual design for "300" or "0700 GMT."

40 phone finds W1PA and W9YMZ advantageously applying the single-sideband technique for success with K4TGF (217) 2-3, HIABZ (217) 2-3, K4GJSR (306) 9-10, K4PS AXT 2M, OA5V (200) 5, PZ1AY (300) 10 and ZL3J3 (136) 11.

40 c.w. satisfies the faraway yearnings of W1OPB, K1s IVE3 MOD, KS1PEQ, WA2B 80K, KAYK, K0O, K3s CNN KHIH, W5SHY, K0s ALU 80T O71, W6RVC, K6CF, WA6 10Q 1YM JPY, W7s DJU LFQ, K2CAD, K5PEY, W1LR, K3s LI0 SPO F5ED and HIEE with the likes of KG1AD, CM2 122 ZU2 (15), 11BM (1), GC8BM, OD2s DM (1), PY (0) 26, CP1DA, QUNU, E9M, EB4A, FK3AH, FMT7W, HKS, H1V 1QG, 5-6, 5STD 7ZT, one KL1QK, HP1s AC ES IT, ITIAGA, KM6B, KL5x JM FPFLY, KV4AQ, KW6G, LA7RF (mm), LS2s 4ZK (15) 7, ZR (4) 6, 4X3ODLS, PZ1AX (7) 8-9, PZ1AX, SL6DC/mm (12), SP5HT, TE3WA, UA5s ZAC 2KW B1A 8KDA (3) 9, 0KFT 5IA 8KID, UB5s DX K3A, K3A 12QAN, V7B5, W1R9K, VP5 s 2AM 417, VRs D9K 87C, W5SBN, XE2s IE (705, 7, KH 155) 1, UA, Y94AB, Y09ZU, a dozen TVs, ZG4CT, ZD2sH, ZKI9 (12), AR, a helping of KG7BI, KGAIAY, SNZJMN, 9M2s FM and FS. Over 101 JAs show up on 7-Mc. lots, the "raver" being JA5h B2O DX VX ZG, JAe3 BFF DC 4X, JA6s FY, WR YX, JA8 3W QK 1R and RR, No JA4s, by golly, except for JA4AIM/mm —. ... On the 7-Mc. Novice front W76s NON NON and ORS show up with K8DQI, K1W0H, H6ECE and W8DQF, in wavelike confidence.

15 phone had a dandy spring season according to KINOD, W4C2LJ, WA3Q, W4JH, KIs DW4 IU LVX

*7802-B West Lawrence Ave., Chicago 31, Ill.

June 1961 57
Possibly representing a minority school, VE3PMV extols the virtues of inducting cards in quantity. Listener J. Porter has that it the VQ5CH address in the listing to follow can be used for any VQ5 messiers but not for British Cable & Wireless personnel. John adds that VQ5BB requires a.a.e. to help with his rare Grand Turk DX status. W4LTH is interested, but recent KG4AZ operation was limited by Navy duties to two evenings and 101 QSOs. QSO confirmations for all KG4AZ c.w. operation on March 6th-7th should be sent to his care.

W1HJSU needs the whereabouts of HB9AD, F08KB and YS1RA, neighbor in the way, WA2HIF will settle for the scoop on a QSO. F08VY worked last December, and K3MMJ wants for full F07XJ data. By the way, WA2BQK, K3KINJ and K9VTG offer their services to rare overseas DXers in non-bad weather and conditions. KG5XJ operates KG5B, Director of Certificates and DX QSL. Newsletter renewals call attention to the fact that many batches of QSLs are lost in the mail because of improper addressing. Make sure that your shipments go out fully armored and plainly labeled. They really got stuck up about your QSL-Get Them Out of Your Station.

UL7FA and XYL keep Kozakh catchable on many DX bands, c.w. preferred. (Photo via W6MLV-W1WPO)

TQ9ED, A. Berke, USOM Education, c.w./U.S. Embassy, Guayaquil, Ecuador, Guatemala.
T2UAE, G. Laine, B.P. 1863, Abdijan, I.C.R.
U9AREG, P.O. Box 44, Novosibirsk, Siberia, U.S.S.R.
U8EM, via VE1FX
VK2AN/VK9, R. Howland, c.w. DCA. Norfolk Island, Australia
VK8TH, Officers Club, RAAF, Darwin, N.T., Australia
VPSBL, V. Hoyes, P.O. Box 169, Kingston, Jamaica
VQ5CH, Grand Turk ABF, GMRD Box 4167, Patrick AFB, Florida
VP6WR, W. Richardson, 40 Highgate Gardens, St. Michael, Barbados.
VP7BO, R. Hyneman, Grand Bahama ABF, c/o GMRD Box 4167, Patrick AFB, Florida
VR9ID (via ZG5N)
V5WS (via G3MCN)
V56AZ (via KG8MA)
ex-V56J (to KG5KU)
ex-V59ADI, sgt. D. Leese, “A’” Sqdn., Royals, Singapore
V59ARV (via R5GB)
V59BM (via W5CWB)
V51XG (via KG5V)
XE3A, Box 404, Oregano, Sonora, Mexico
XZGCM (to Z72L)
YA1AC (via W7MQA)
Y06AC (via KH7FX)
Y6HM (via W5CTN)
YV1F1, Judubana, Falcon, Venezuela
YV5AX, J. Serran, P.O. Box 5739, Caracas, Venezuela
YV4A, J. Herrera, Box 92, Anaco, Venezuela
YV6CN, Puerto Ordaz, Venezuela
Z51L, Box 250, Rabat, Morocco
ZC5PM, P.O. Box 296, Rabat, Morocco
ZCR5, c/o PTTO, Sao Tome Island, Portuguese Africa
KL7N, P.O. Box 57, Monrovia, Liberia
F8BMG (via W5XDO)
FO3RHN, P. Postel, P.O. Box 171, Bangui, C.A.R.
F6JTH, P.O. Box 1923, Brazzaville, C.C.
FO8HJZ, P.O. Box 574, Brazzaville, C.C.
G4BLS (to Z0AHI)
H5HA (via W5CTN)
H6CJCB, C. Bartholomew, Naval Mission, c.w./U.S. Con- sulate, Guayaquil, Ecuador
HCSHA, P.O. Box 159, Llo Hamba, Bolivia
HKYO, Apartado Aereo 1041, Cuenca, Colombia
HK7YB, P.O. Box 704, Bucaramanga, Colombia
HPHE (via W5CTN)
HR3HI (via W5KIE)
H7ZA MP, American Embassy, Bangkok, Thailand
HV4CN (via WA2BB; see text preceding)
ITIPAK, Dr. O. Pennisi, P. Za. Acostino Pennisi 14, Aiciruta (Catania), Italy
J7AKY, N. Wada, Shimoto, Nichinan, Hiroyuki, Japan
KB6BP (via W6ULW)
KH6GAJ (via W6ULW)
KW0KH (via W6ULW)
LA2ZDE (p. to LA2DE or via NNR1)
LAFRAN (via W6GFE)
LZ1BZ, M. Grozov, Box 669, Sofia, Bulgaria
LZ1KBD, Tolbuhin 64, Sofia, Bulgaria
OA5GH, P.O. Box 150, Lima, Peru
OA4KW, P.O. Box 375, Lima, Peru
PK5X (to K3FYX)
PZ1AX, J. Guibal, P.O. Box 21, Moengo, Surinam
SLZ2A (via SM2BGG)
SM2BGG, E. Wikstr, Fredrikshoej, 17, Umea, Sweden
SPTL4, M. Assadian, Miskiania 8, Blok 14, Mokra Ulica 25, Lodz, Poland
Fernando de Noronha’s P717 has been a constant presence on 80 through 10 meters since May, last year. Alvaro’s conditions are on the rocks, and they are many W/KVs in his log who are unaware that he’s an exceptional DXCC-type catch. P717 soon will resume less DXotic status as P1YBLT. (Photo via W8KX)
WBGDO of Wellington, Ohio, apparently is only the second amateur in history to work all continents on 160 meters. A c.w. two-way with ZC4AK, early March, clinched Willard's claim to DX fame. The first certified 160-meter WAC was achieved by W1BB in 1953. They don't come easy or often, do they?

Milt Schooling, a good thing for youngsters to bear in mind that education comes first. DX second. Opportunity for concentrated bookburnin' usually comes but once a lifetime; DX is always there. Here's an old yarn but it's always delightful: The neighbor who dropped in to complain of interference from WAGVM caught the bug from Ray and now signs W18G ultramodern equipment. GQ8E's present doghouse is built like a square brick. With Malpelo's HATBU in early April, October is PY7/LJ's Fernando farewell date, according to word via W8KX. Meanwhile, 80 meters was the choice, with W9WWA, 1000 GMT at 10, 15 at 10. During this period PY7/LJ works 30 or 15 meters around 2000, Alvare's unfamiliarity with English is a key, hence the old catch phrase, W9WWA, ably abetted by the YJL, and W9FJ PM and UCK, relieves trusty W9AB, G9R and K9R in the midst of W8DXCA. Many different DX parties, such as K9C and VERNON supply these local observations. V2PB of Fram sign is temporarily landlocked in California, Sun Diego DX, W1C or QST Box 1000, San Diego 16, is enquiring of DX enthusiasts of further DX ventures by Danny & Co. W9BB can rampant during these busy Amateur Radio Club of QST telegrams in late April. Check with VOSNN, 80, with regards to club's WAG certification.

Ten Years Ago in "How's DX?" An attempt is made to describe W1BB's claim DX Man in the curtain-raising commentary Ekia, G8RUB, GW3FST ZY and K8AA still claim DX scores on 160. Incidentally, W1NNN challenges W1BB's claimed "first" with South America on 1.8 Mc., calling attention to his own ARL DX Test contact with HC1PF last year. Scores on 80 desirable include FR8AW (HB9BAP), W1BRE, HZ1KE, SV8HWH, ZD1AB, ZM6AB and 4X4E. Forty-meter fans scramble mostly for K8IDX, PW6DRC, FZ9BZAZ, K8GAC/JPX6, K8AC, M1P1BAPF, YASU, V8NXT and ZD9AA. The mob on 20 c.w. cursors C8JF, AS8A, Ekia, G8RUB, ZD1, 8A2, IC3B, HZ1KE, ZM6AB, MR6BQ, MD2BO, M1V5G, OY3BO, TA5FAS, V7EA RB YM, WTIAF, WA2QJE/K8M, K8AC, SC6AG, SL3AL and AX - - - Phone 20-Mc. targets 8A9, KG4K, KCOCW, RK6L/RK6W, KJ6AAA, ZK2AA and ZM6AA. Ten-meter voice values: GY7G, OY5BO and ZD1- AA - - - Fixed or mobile-station operation under one call, from one location only, is permitted. A transmitter used to contact one or more stations may not be used subsequently under more than one call during the contest. 17) Scoring: point for each five-minute exchange on 220 or 420 Mc.; 1 point for exchanges on higher v.h.f. bands. To derive final score, sum the points of these multipliers by the number of different ARRL Sections worked per band. You may work the same stations on different bands to increase both your contact points and multiplier. A certificate will be awarded to the top scorer in each ARRL section, as well as a certificate to the highest scoring Novice, and multiple-operator cabinets in each section from which at least three entries in that special category are submitted. Please follow the new log and summary form shown on page 64 of June, 1963, QST, or send to ARRL Hq., for a supply. These free log forms are now available on request. Reports should include your call and ARRL section, as well as times, calls, and sections of stations worked. Your entry must be postmarked by June 30, 1961, for QST listing.

Rules
1) The contest starts at 2:00 P.M. Local Standard Time, Saturday, June 10, and ends at 10:00 P.M. Local Standard Time, Sunday, June 11. All claimed contacts must be within this period and must be on authorized amateur frequency assignments in all bands, using permitted modes of operation.
2) Name-of-section exchange, to be exchanged by both operators before either may claim contact point(s). A one-way exchange, confirmed, does not count; there is no fractional breakdown of the 1-, 2-, or 3-point unit.
3) Fixed, mobile, or mobile-station operation on one call, from one location only, is permitted. A transmitter used to contact one or more stations may not be used subsequently under more than one call during the contest. A certificate will be awarded to the top scorer in the high-score single-operator station in each ARRL section. In addition, the high-scoring multi-operator station will receive a certificate in each section from which three or more valid multiple-operator entries are received. Certificates will also be given to the top Novice in each ARRL section, or more such licensees submit logs. Award Committee decisions will be final.
4) Scoring: 1 point for each five-minute exchange on 220 or 420 Mc.; 2 points for each five-minute exchange on 50 or 144 Mc.; 3 points for each five-minute exchange on 220 or 420 Mc.; 2 points for exchanges on 144 Mc.; 1 point for exchanges on higher v.h.f. bands. The sum of these points will be multiplied by the number of different ARRL Sections worked per band; i.e., those with which at least one point has been earned. Rewriting sections on additional bands for extra section credits is permitted. Cross-band work does not count. Contacts with aircraft mobile stations cannot be counted for section multiplier.
5) A contact per band may be counted for each station worked. For example: W2BLV (S.N.J.) works K8CRO (Conn.) on 50, 144 and 220 Mc., for complete exchanges. This gives W2BLV 4 points (3 + 1) and also 2 section-multiplier credits. (If W2BLV contacts other Connecticut stations on these bands, they do not add to the section multiplier but they do pay off in additional contact points.)
6) Each section multiplier requires complete exchange with at least one station. The same section can provide another multiplier point only when contacted on a new v.h.f. band.
7) Awards: A certificate will be awarded to the high-scoring single-operator station in each ARRL section. In addition, the high-scoring multi-operator station will receive a certificate in each section from which three or more valid multiple-operator entries are received. Certificates will be given to the top Novice in each ARRL section, or more such licensees submit logs. Award Committee decisions will be final.
8) Reports must be postmarked no later than June 30, 1961, to be eligible for awards. Follow the sample for correct form, or a message to Headquarters will bring printed blanks for your convenience.
1961 V.H.F. Sweepstakes Summary

The V.H.F. Sweepstakes looks more like its lower-frequency counterpart every year. Always the top event on the v.h.f. man’s calendar, the V.H.F. SS now threatens to displace one of the Big Three (Field Day, SS, DX Contest) as an all-time favorite operating activity. The 14th running, January 7–8, 1961, brought in 1561 valid logs, up 8 per cent over the 1960 record. Some 1094 stations were on 50 Mc., and 900 on 144; both records. All this came about with conditions generally poor. We shudder to think what might have happened had there been major propagation breaks around the country!

For the first time in v.h.f. contest history, single-operator contest totals went over the 500 mark, W3HYJ and W3KKN, both of the Philadelphia area, worked 521 and 541 stations respectively. W3HYJ had 19 ARRL Sections, for 30,218 points, and W3KKN 15, for 27,025. Eight stations exceeded the magic figure of 400, once considered all but impossible of achievement in a v.h.f. contest. These included W9ROS, Roselle, Ill., with 415, showing that there was no East coast monopoly in this field.

Club spirit makes the V.H.F. Sweepstakes the grand party it is, and several years of intensive effort paid off in 1961. The Mt. Airy V.H.F. Club, never less than 5th since their entry into the fray in 1957, climbed to 3rd, then 2nd, and finally this year pushed the perennial winner, the South Jersey Radio Association, out of the top spot. With practically every member taking part, 92 Pack Rats brought home a total of 617,130 points. Note well that this is an average score per member of 6708 points, an achievement not even approached by any competitor.

SJRA virtually equaled their 1960 score, but lost to their across-the-river rivals by a wide margin. Third position in the club standings was taken by the 6-Meter Club of Chicago, repeating their 1960 effort. A new name to reckon with in club competition is the National Capital V.H.F. Society. The boys from the Washington area jumped from 9th to 4th, pushing back the hard-working Dayton Amateur Radio Association by a mere 6 points! Three other clubs retained their 1960 ranking, 6th, 7th and 9th places being held by the Mobile Sixers, Waltham Amateur Radio Association, and the Keystone V.H.F. Club. Old hands at V.H.F. contesting, the Rochester V.H.F. Group landed in the top ten for the first time, and a newcomer, the Southern California V.H.F. Radio Club, hit the 8th spot on their first try. We have the feeling that here is a group capable of making trouble for the leaders.

While all the top scores represented work on two or more bands, there were some notable one-band efforts. In 57 ARRL Sections represented, awards were won in 12 on 50 Mc. and 2 on 144. KSMM/M hummed his way through 280 50-Mc. contacts for 12,320 points and the Ohio Section wallpaper. W2GOO stuck to it to lead the Eastern New York Section, and all 2-meters-only operators, with 295-10-11,800. W3LBH worked more stations on 144, an even 300, but with a lower multiplier had to be content with a thousand points less than W2GOO.

Success in digging for new sections is the mark of the hot contest operator. W1HDS came up with 20 sections on 50 Mc., enabling him to post an 8100-point total with only 135 contacts. K1AI, also in Eastern Massachusetts, operated by the licensee and W1BVP, worked 22 sections. With 290 contacts, this resulted in 18,414 points, one of the best multi-op accomplishments. How do you knock off the hard ones others miss? One way; used well by both W1HDS and K1AI, is to learn to push a key effectively. This will get you sections the voice-only fellows never even hear. Quite a few contestants bemoan the lack of c.w. in v.h.f. contests. All who can use it agree that it misses its true potential by too wide a margin, simply because not enough v.h.f. operators give it a real try. If you’re looking for a secret weapon for next year, why not train a few good c.w. operators in your club? Keys are cheaper than kilowatts!

The V.H.F. SS gets around. This year we had two entrants in Alaska. KL7AUV, Anchorage, was able to work 28 stations on 6 and 2, without any DX help. K0KK/YKH picked up a few 6-meter contacts in the 50th State. And we even had one log from Mexico. While we cannot issue awards to, or credit section multipliers for, an area outside the ARRL Field Organization (see page 6 of any QST) we’re happy to report that XE1OE, Mexico City, was able to work 48 stations in 7 ARRL Sections, plus Mexico. With W9OWK and W8NRM at the controls, XE1OE did business on 50, 144, 220 and 420 Mc.

A large group effort that made the contest more fun for many entrants, but which cannot be credited for awards, was that of the Connecticut Mobiles. These boys (and gals) are a potent factor in the 2-meter activity picture all through Western New England, and they went all-out in the SS, totalling some 180,000 points. Unfortunately they drew their support from much too wide a territory to be acceptable under SS Rule 7, in fairness to other clubs of the region, so they had to be ruled out of this and future club-award activities. This move is made with a bow in their direction for a superb job of v.h.f. promotion and public service.

-- E. P. T.

June 1961

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**CLUB SCORES**

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<td>Connecticut Mobiles*</td>
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*Ineligible for awards, contest rule #7. Approximate total counting stations outside of club territory 184,000 points.

**SCORES**

In the tabulation on the next pages, scores are listed by ARRL division and sections. Unless otherwise noted, the top scorer in each section receives a certificate award. The highest-scoring Novice also receives a certificate in each section where at least three such licenses submitted valid contest logs; footnotes denote these winners. Columns indicate final score, number of operators in the contest secured, and the bands used, number of counties worked, and D 144 M, C 220 M, D 420 M, E 1215 Ms. Multiparameter operators are shown at the end of each section tabulation.

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**ATLANTIC DIVISION**

**Eastern Pennsylvania**

<table>
<thead>
<tr>
<th>Club</th>
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<td>27-025-514-15-ABC</td>
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<td>19-032-209-14-ABC</td>
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### QST for 64
An unexpected dividend from amateur radio for some has been — Romance! The boy-meets-girl theme has been often parlayed more rapidly into the boy-marries-girl ending (or beginning?) by the added impact of the common denominator of ham radio. And be there an amateur radio operator, male type, so rare who isn’t happy to have his spouse actively share his hobby with him? Conversely, among amateur radio operators, female type, the feeling seems to be mutual.

Kn7DXE and K5CDA/mm

Hear of one O'M who volunteered his “little legend of an amateur radio romance.” Max Stout, K5CDA/mm, (ex-W9JTY), radio officer of the S.S. Penn Shipper, reveals that his initial introduction to Jean, KN7DXE, was made last summer through the kindness of Flo, W7QYA, a long-time ragchewing friend. Results of the introduction earned W7QYA the title of “Cupid” in 7-Mc, e.w., circles, for the marriage of KN7DXE and K5CDA/mm took place in Clarksville, Arkansas, Oct. 15, 1960. It was a “real Ozark wedding”, and local hams naturally turned out to bestow blessings along with friends.

Never Underestimate the Power of a Woman!

We quote from the April 1961 issue of Sparkles of Happiness, publication of the Sparkles of Happiness Clubs, Dell Daykin, VE3AJR, president:

“One of the bugbears of the radio amateur is TVI. In the early days of TV, it is true that most hams had to modify or rebuild their transmitters to avoid causing annoying patterns on the TV sets of their neighbors. Today, however, most interference on TV is due to other causes. The idea still persists, nevertheless, and the poor ham is blamed for many things. Jeannette, K8PYN, a pal of ours from the YL Welcome Net, sent an amusing article to the YL Harmanes listing the dauntlessly deeds of which her neighbor accuses her.

“Shes says I have caused her sewer to become plugged so she can’ t flush the toilet. I’ ve caused her mirror to get too hot and she burns all her clothes. Her alarm clock won’t ring anymore. Her refrigerator clicks. Even her hot dogs are charged when she cooks them. I’m causing her children to get nightmares, she says. The foreman told her the rusty sauce on her roof are definitely caused from my radio. Her city water is charged and also her telephone. She claims my radio burned down our neighbor’s garage.

“So, when you receive a call from an irate neighbor who claims you are spoiling his picture and you aren’t on the air, think of Jeannette and be thankful!” — VE3AJR

Feedback

April column, caption to photo of W1HCV: Jane’s nice DXCC record should be 150 countries worked, 153 confirmed. Same column, caption to photo of W9YGC—while a Novice Connie did confuse operations to Novice frequencies. The slip was ours. We believe she has her Technician license now. ——

Congratulations to WA21AF, Marilyn, the daughter of W2CGB, Al, and WA2GNN, Lucille Schroeter, of Orange, N.J., and the niece of W2CSS, Al Neuer of Hashbrow Height, N.J., who wed K2GUS, Roger, the son of WA2- PFB, Reg Bogert, of Wyckoff, N.J., in May. ——

Coming Events

Field Day — June 21-23. Need we say more?

1961 AWTAR — The 16th annual All-Woman Transcontinental Air Race will start at Montgomery Field, San Diego, Cali., on July 8 and will terminate July 12 at NAFEC (National Aviation Facilities Experimental Center), Atlantic City, N.J. Carolyn Currans, W3ZPC, chairman of the AWTAR radio net, invites YL participation in the net. (See last month’s column.)

A Flying Sweetheart?

As mentioned in last month’s column, OM K6BX of Directory of Certificate Holders and Certificate Honoree fame, is now organizing a Flying Hams Club. Cliff appeals to any YL who also hold a pilot’s license to contact him. Such YLs will be eligible for nomination as the “Flying Sweetheart” for 1961, with the winner chosen not necessarily for beauty but rather for personality and popularity. Cliff claims that Flying Hams Club must have a sweetheart, so, flying YLs, here’s an opportunity exclusively yours. Contact Cliff Evans, Box 388, Bonita, California.
Frances Dorné, W3AKB, Elizabeth Zandonini, W3CDQ, and Ethel DeBoroldeen, K4LMB (ex-W3MSU), l. to r. three of our most active and best-known YLs are now all members of the Washington Chapter of the Quarter Century Wireless Association. At the annual dinner of the QWCA in the capital, K4LMB was admitted as a member, joining W3AKB and W3CDQ who were already members on the basis of having been licensed amateurs for 25 years or more. Coincidentally, the three YLs are all employed in the field of engineering by the government in Washington. W3AKB is an electronics engineer with the Navy's Bureau of Ships and W3CDQ and K4LMB work for the National Bureau of Standards. (Photo courtesy W4CVO)

We hope you all saw the photo of WB6NAZ in April QST, page 61. For years Lenore has been one of the more outstanding YLs of amateur radio, and it is grand to see credit publicly given where it is truly deserved. Even modest, the charming Lenore, who feels "a tremendous compulsion now to work harder than ever," felt that she was merely a symbol of other devoted traffic handlers and that it was really a "This Is Your Life — Ham Radio" show.

The Washington D.C. chapter of the Quarter Century Wireless Association not only has three YLs as full members (see the photo of W3s AKB, CDQ, and K4LMB) but also has two husband-and-wife teams — K4LMB/W4TE and W3AKB/W3BWT. OM W4CVO wants to know if any other QCWFA chapter can boast such a record.

**YLCC, WAS, WAC, DX-YL Certificates**

Rules for the four most popular and best-known YL awards are herewith summarized. All are issued by the Young Ladies Radio League. The DX-YL award is issued to YLs only, while the WAS and WAC-YL awards and YL Century Certificates are available to OMAs as well as YLs.

**Worked All States YL** — This award parallels the ARRL's WAS. Contact a YL operator in each of the 50 states. Send QSLs and alphabetical by state list showing call, date, and band to Grace Ryden, W9RME, 2051 N. Lincoln Ave., Chicago 14, Ill. Include postage for return of QSLs by 1st-class mail.

**Worked All Continents YL** — Proof of contact with a duly licensed YL in each of the six continents should be sent to Barbara Houston, K5YTB, Rte. 2, Box 178, Garland, Texas. OM QSLs and full names, calls, and dates along with QSLs to Katherine Johnson, W4GID, Box 666, Fuquay Springs, North Carolina. Include postage for return of QSLs by 1st-class mail. Endorsements are issued for contacts with each additional 50 YLAs. (This award is for working 100 different YLAs, not just 100 contacts with the lesser number of YLAs.)

**DX-YL** — This award is issued to any YL (only) who works 25 other licensed YLAs outside her own country on or after April 1, 1961. A list of the 25 contacts should be sent to Maxine Willis, W9NLH, 6502 Wykoff St., Los Angeles 45, California. Note that this award is for working 25 different DX YLAs, not necessary for working YLAs in 25 different countries.

W6DXI, Gladys Eastman, receives from Vada Letcher, W6CCE, the new service award plaque given by the YRL to the outgoing president of the club. The illuminated scroll-type plaque was designed by Vl Grossman, W2I2XZ. Presentation took place during the Valentine's Day banquet of the Los Angeles YLRC.

At the ninth annual Valentine's Day banquet of the Los Angeles YLRC, eleven of the club's fifteen presidents reminisced and posed together. Standing, l. to r. are W6QOG, W6DXI, W6CCE, W6QGQX, K6ANG, W6WSV, seated are W5FAA, K6BUS, W6PJU, W6CBA, and W6UHA. Founded in 1944, the club's first president was Carol White, W6WSV. Billie Blakney, K6ANG, is currently president.

The rig is in the kitchen. Mom's at the rig, and the children are gathered round. Could be there's a contact with Dad, who's on the high seas with the Merchant Marine. Mom is Val, W6HHF, and Dad is Andre, K6DPD. To Gene, Mike, and Kathy La Croix (and just possibly puppy Zsa Zsa) of San Pedro, California, ham radio is just as commonplace an activity as eating breakfast—well, almost. (Photo via W6WSV)

June 1961
Happenings of the Month

LICENSE SUSPENSIONS

Ending proceedings covering more than two years, the FCC has suspended the Advanced Class license of Dale A. Hoppe, W6VSS, for a period of one year, effective April 10, 1961. On March 6, 1959 (during the ARRL DX Contest), Commission field personnel monitored W6VSS's transmissions from two vehicles about two blocks from his house in La Crescenta, California. When field-strength measurements had been made, one of the inspectors went to the house while the other stayed behind to furnish comparison readings. During test transmissions, with one engineer inside and the other at the mobile location, the signal had substantially less power, later determined to be 51,000 microvolts as against the former 90,000 microvolt signal recorded at the FCC car. The engineer in Hoppe's house then measured the input power and found it to be about 1400 watts, still in excess of the legal limit. The engineer suggested that the reduced signal might have been due to the amateur having reduced the primary voltage: from 220 to 110 volts between the time the first measurement was made and the time the engineer was admitted to the station. Mr. Hoppe stated that the primary was at 220 volts but refused to allow the engineer to measure that voltage, claiming that the procedure was too dangerous.

The original suspension order was issued May 11, 1959, but Mr. Hoppe requested a hearing, which was eventually held June 23-24, 1960. Testimony during the hearing concerned, among other things, the accuracy of the measuring instruments, both those of the FCC and those installed in the amateur station. The initial decision of the hearing examiner found that the amateur had run power in excess of one kilowatt, had prevented the FCC engineer from completing his investigation, and in addition, had operated his station at a permanent location other than the one shown in his license for more than the four months provided by the regulations, without having applied for a modification of the license. The Commissioners, in reviewing the examiner's decision and subsequent exceptions filed by Mr. Hoppe, did allow minor changes to the record, but upheld the decision that the amateur had indeed violated the regulations on three counts, and placed the one-year suspension into effect. [Section 308(a) of the Communications Act of 1934 as amended; Sections 12.131 and 12.93 (a) of the FCC regulations.]

FCC suspended for six months the Conditional Class license of Floyd Joseph McClure, KG0HG, Twenty-Nine Palms, California, for transmitting communications containing obscene, indecent or profane words, language or meaning on or about January 25, 1961. The suspension, which was not contested, went into effect March 28, 1961. [Section 12.157 of the regulations.]

The General Class license of a San Diego amateur, Steven Charles Pugh, WAGEFXL, was suspended for one year. The Commission found that Mr. Pugh, on or about January 3 of this year transmitted communications containing obscene, indecent or profane words, language or meaning, and in addition, had transmitted a call sign not assigned to the station being operated. Mr. Pugh did not contest the suspension which, accordingly, went into effect on March 16, 1961. [Sections 12.157 and 12.158 of the regulations.]

Strays

There's an error on page 10 of the May issue of QST, bottom of the left-hand column. (Meyer, "Two-Meter Transistor Converter.") The oscillator frequency is 118.5 Mc., not 133.5 Mc. Since the article was written, the transistors used have been assigned EIA type numbers. Q1, Q2, and Q3 are now respectively 2N1742, 2N1743, and 2N1744.

In the circuit diagram of the SJ-07A transmitter, page 28, of the August, 1960, issue, the 100-pf. .814 grid coupling capacitor should be connected to the stator of Q5 — not as shown.

Re the 1296-Mc. converter in March QST, page 39. No information is given as to the position of the tap on L9. About 7 turns up from the bottom will do.

A featured speaker at the recent New England Division ARRL Convention in Swampscott, Mass., was Massachusetts Governor John Volpe. It turns out that the governor knows more than a little about ham radio. He has two brothers who are hams — W1LEL and K1NOV.
California — The San Fernando Valley Radio Club will hold its fifth annual hamfest on Sunday, June 4, at the Victory-Vanowen Park in North Hollywood. Among the featured events, this event will include hidden transmitter hunts for two and six meters, free refreshments, games for the children, and other activities of general interest to hams. Admission is by donation of $1.00 and is open to the public. No registration is necessary and everyone will share equally in the fun. For further information contact William J. Neilson, W6ASA, 18350 Nordhoff St., Northridge.

Kentucky — The Interstate Annual Hamfest will be held on Sunday, June 11, 1961 at the Breaks Interstate Park, which is located between Elkton City, Kentucky and Haysi, Virginia, on Highway 28, 30 miles from Pikeville, Kentucky, and which is now known as the Grand Canyon of the south. The park has plenty of parking space and picnic tables. There are hardtop roads running all over the park and storm-shelter facilities for campers out. Bring the wives, kids, and some of the neighbors. It is free-for-all and the public is invited. Be sure to bring your cameras. If you have any radio or ham gear you wish to trade, sell, or give away, bring it along. Pleads will be on the ground. Bring a basket with an extra chicken leg, or if you prefer, there is a modern cafeteria and dining room in the park lodge. For further information, contact Cordell Dameron, K1BQO, Box 1325, Pike St., Pikeville, Ky.

Maine — The fifth annual Augusta Hamfest, sponsored by the Augusta Radio Club, will be held on Sunday, June 11, beginning at 9:00 a.m. at the Columber Club, West River Road, Augusta, Maine. All ham transmissions are $3.00; or $3.50 at the door; children under 12, $2.50. Tickets may be reserved by writing to Wilfred Lemenius, 151 Cony Street, Augusta, Maine. All reservations and money must be in by June 14. If you want tickets mailed directly to you, enclose a self-addressed stamped envelope with your check or money order. No reservations will be made over the air. Saturday evening, June 11, there will be an informal get-together at the Columber Club, for the "Hamfests West of New York." All friends, Sunday there will be no meetings, a RACCE conference, a swap table, an auction, hidden transmitter hunt, and a turkey dinner at noon. For further information contact Walter J. Dolson, K1BZD, 20 Pine St., Augusta, Me.

Montana — The third northeastern Montana hamfest will be held on Sunday, June 11, at Beaver Creek State Park, South of Havre, Montana, sponsored by the Hi-Line Radio Club. The event will feature games, contests, an auction, mobile judging contests, mobile held strength contest, hidden transmitter hunt, best QSL card display, top award, plus a prize for ham coming longest distance and a prize for oldest ham present. There will also be a show and sale of equipment, and an XYLs lounge. For further information contact Ralph L. Arthur, W7EWR, 305 16th St., Havre, Mont.

New Brunswick — An informal ham social and get-together, sponsored by the St. Croix Valley Radio Club, is to be held on July 2 at the Canadian Legion Hall, St. Stephen, New Brunswick, just over the border from Calais, Me. Amateurs everywhere are invited to participate in the July 2 activities as well as Frontier Week — an international celebration running from July 1 to July 4, throughout the world. There is no registration fee. A certificate will be awarded to any amateur working a club member and attending.

Ohio — The Sixth Annual Picnic sponsored by the Northeast Ohio V.H.F. Group will be held on Sunday, June 11, at Sunset Park, Rte. 619, West of Alliance, Ohio, starting at 12:00. There will be mobile check-ins on six meters, Bring your lunch, although refreshments are for sale on the grounds. There is a supply of water for everyone. For further information contact Robert Morehead, KSWPP, 581 Lin Street, Barberton, Ohio.

Pennsylvania — The ARRL Eastern Pennsylvania Section Picnic will be held on Sunday, June 11, at pavilion No. 7, Hershey park, Hershey. The program begins at 9 a.m., including speakers and other events. A swap and auction table will be set up, so bring your surplus gear. Also, bring your own basket lunch, or buy lunch at the park. The day will be rounded out with numerous award presentations. Admission is $1.00 per amateur call. Bring the family. Make all reservations in advance to Katie Gibson, K3BBU, 10 W. Pottsville Street, Pine Grove, Pa.

Pennsylvania — The Unibmont Amateur Radio Club will hold its 12th annual hamfest on Saturday afternoon and evening, June 17. This hamfest will be held on the club grounds on the Old Pittsburgh Road, 2 miles north of Unimont, Pa, just off Route 31. Refreshments will be available and an informal get-together will be sponsored. Admission is $2.00 per man at the gate, with advance registration for $1.50. For further information and advance registration write to the Unimont Amateur Radio Club, P.O. Box 340, Unimont, Pa.

Pennsylvania — The Greater Pittsburgh V.H.F. Society is sponsoring the First Annual Greater Pittsburgh V.H.F. Hamorama on Sunday, June 11, from 11 a.m. to 5 p.m. at the Museum Building, South Park Fairgrounds, near Pittsburgh. This will be a convention-type hamfest, complete with indoor and outdoor activities. Although the main theme of this Hamorama is v.h.f. operation, there will be events of a diversified nature to interest all who attend regardless of their likes as to modes of operation. The Museum Building is large enough to accommodate 1500 persons and will provide shelter in case of inclement weather. Ham activities within the scenic building will consist of manufacturers, Hamorama general admission, various lights, swap & shop, ham gear auction, home-brew gear exhibition, and more. There will be mobile check-in on 10, 6 and 2 meters, and a hidden transmitter hunt on 6 meters. The registration fee is $1.50 in advance or $2.00 at the door. XYLs and children are free if accompanied by a registered member of the family.

Tennessee — The Mid South Amateur Radio Association will host its annual hamfair on June 18, at the Women's Hdz, in the Fair Grounds, Memphis, Tennessee. Admission to the hamfest will be 50c, and a noon meal is available for those who wish it, at $1.50. Transmitters will be set up on all bands to guide mobiles, and the program includes various contests. For further information and for tickets and hotel/motel reservations, contact Clayton Elam, K4FZ, P.O. Box 3845, Memphis, Tenn.

Vermont — Sit aside June 17 and 18 to enjoy yourself in the Green Mountains of Vermont at the largest hamfest north of Swampspeck. It is called International Field Day. The registration fee includes a 2-hour ferry boat ride across beautiful Lake Champlain. Early bird registrations bring free evil pins. Bring your rig, and be at the site, featuring a 390 special meal, $5.00 early bird, $3.00 later; gate, $2.50; reserved reservations and money to WJOSO, c/o Burlington Amateur Radio Club, Box 804, Burlington, Vt.

Virginia — The Virginia Phone Net will hold its annual hamfest on Sunday, June 18, at Gordonsville, Virginia.

Washington — On June 18 Seattle will be the site of the 7th annual family picnic of the Royal Order of Hootowls and this affair is known as the largest v.h.f. picnic on the west coast. For further information contact Lee M. Smiley, W6RJU, 1914 Ballinger Road, N.E., Seattle, Wash.

West Virginia — The 1961 West Virginia Hamfest will be held on Saturday and Sunday, July 8 and 9, at Jackson's Mill State 4-H Campground, West Virginia, on U. S. Route 19. One fee of $6.00 entitles you to registration, meals (Saturday evening, Sunday morning and noon), and lodging (Saturday night). Additional registrations only are available as an addition in the vicinity of $2.00. All forms of activities for the entire family. There will be a station on 3880 kc. to guide mobiles. For further information write: West Virginia Hamfest, P.O. Box 129, Spring Hill Mall, South Charleston, W. Va.; or P.O. Box 999, Fairmont, W. Va.

W3JQW has worked VP6L/N twice — 20 years apart.

June 1961
When the United States Coast Guard Academy’s training bark Eagle leaves New London, Conn., June 10, she will represent perhaps the most unique maritime mobile installation in the world.

That is the claim, at least, of the Coast Guard cadets who will operate W1CQA/mm aboard the famous windjammer for two and one half months during their yearly north-Atlantic cruise.

The Eagle, a 295-foot, 1900-ton, bark-rigged vessel, carried ham gear aboard last summer and worked over 1000 stations during her cruise to Great Britain, France and the Scandinavian countries. Her 1981 itinerary calls for stops in France, Portugal, Spain and the Canary Islands. While most of the cadets’ on-the-air time will be spent working all the ham stations they can, some time, will, of course, be devoted to attempting to handle traffic for the more than 250 cadets, officers and enlisted men aboard the Eagle.

Located in the vessel’s library, on the Eagle’s third deck, W1CQA/mm will boast a 328-1, 5L1-1 (military version of the 75A-1) and a vertical antenna. For technical reasons, however, the ham’s dream of a vertical atop one of the Eagle’s 150-foot masts will not come to pass. Instead, as was done last summer, the vertical will be attached to a railing on the forward deck house. This is about 20 feet above the waterline.

A cadet’s life aboard the Eagle, by the way, is a mixture of hard work, pleasure and sightseeing. On his first cruises, he stands the watches and performs the duties that enlisted men carry out aboard most Coast Guard cutters: helmman, lookout, signalman, messenger, oiler and others. He must be familiar with every part of the Eagle — on deck and aloft. He must be able to locate every one of the 154 lines in the dark. He must learn the hard way, with brass polish and chipping hammer, that the maintenance of a ship, even a sailing ship, is a never-ending task. He also finds that vigilance and an alert attitude are the qualities that constitute a good watch at sea.

The upperclassmen on the cruise are given the jobs with added responsibility: officer-of-the-deck, engineering watch officer, communications officer — jobs normally carried out by officers or senior petty officers.

The station aboard the Eagle, incidentally, represents just one small part of the ham radio picture in the Coast Guard. Though it is the smallest of the nation’s armed services, the Coast Guard fosters a far-flung amateur radio communications system — both ashore and afloat. Because of the number and size of its many isolated units, the Coast Guard discovered early the great morale factor in having amateur radio stations at its units.

At present there are nearly a dozen Coast Guard vessels with maritime mobile stations aboard. They operate in areas from the lonely vigil on Ocean Station Victor in the northwestern Pacific to the icebreaker Kuskokwim (KCHUSE) when she makes her Antarctic trips, to the three ships of the Cadet Practice Squadron during the summer in the north Atlantic.

In addition, the cutter Kukui, a Coast Guard cargo ship which rounds the western and southwestern Pacific six to eight months of the year on long range logistics work, carries KH6DDD from Hawaii to the Philippines, Palau, Marianas, Marshall Islands, Hong Kong and Japan.

Coast Guard hams, by the way, are the same as any others — except that their problems are often very different. On the Kukui’s first patrol with ham gear aboard, crew members decided they weren’t getting out as well as they wished using only a long wire. However, since they were off some sparsely populated islands in the Philippines, there was neither a local ham supplier nor an electronics store. So, when a working party went ashore in the dense jungles of Talunpolo, in the southern Philippines, ham ingenuity once again went to work. Several choice logs of Philippine bamboo were cut and used in the construction of a 15-meter cubical quad. Needless to say, results were excellent.

Ham radio afloat in the Coast Guard got a big boost starting in 1959, in the 14th Coast Guard District, headquartered at Honolulu. The ten cutters operating out of Honolulu were given blanket permission by Coast Guard headquarters to have ham gear aboard provided the vessels’ commanding officers approved. In all previous
instances headquarters permission was required — with letters going up the long chain of command.

Rear Admiral Stephen H. Evans, then commander of the 14th district and though not a ham himself, saw the need for amateur radio stations largely for morale purposes. None of the regular sea-going patrols in that district was shorter than two and one half months.

As a result of the efforts of Admiral Evans, now superintendent of the Coast Guard Academy, and of several other officers in the 14th district, the first continuous amateur radio “watch” at sea was inaugurated on July 24, 1939.

On that day the Coast Guard Cutter Winneba-go sent out the first “CQ” from Ocean Station Victor, an ocean weather station at 34° north, 161° east, half way between the Midway Islands and Japan. She was followed within months by the cutters Chautauqua and Matagorda. All three cutters now have their own call letters. They are KH6DRY, KH6DPW and KH6DOE, respectively.

But maritime mobile contacts, no matter what their positions in the world, practically never count as new countries. As if to alleviate this problem the Coast Guard has amateur radio stations ashore accounting for 15 official ARRL countries — from VP5CD on South Caicos Island in the Bahamas, to KC6SP at Angaur in the Palau.

Most of these are scattered around the Pacific — many on very small islands. A few of these rare DX outposts are: Johnston Island, KJ6BV;

Wake, KW6CGA; Iwo Jima, KG6IC; Saipan, KG6SA; Ulithi, KC6CG; Kwajalein, KX6CA; and Eniwetok, KX6CG. This list does not, of course, include the many tiny islands scattered through the Aleutian chain, or even St. Paul Island, in the Pribilofs, KL7DN. Nearly all of these are at Coast Guard Loran (L0ng Range Navigation) stations. KG6AFA, however, is at the Coast Guard buoy depot on Guam. (And while it isn’t DX, K3CG, at Washington, D.C., is the Coast Guard headquarters station).

One island that has, for a number of years, sought status as a different country is Tern Island, at French Frigate Shoals. Here, on a tiny sand spit about 450 miles northwest of Honolulu, 18 men spend a year on a lonely Loran station.

Because of DXCC criteria, however, French Frigate, no matter how small, will probably never be counted as a separate country.

Kure, about 50 miles west of Midway, is soon to be the site of another Coast Guard Loran station. When this is completed, it is hoped that some Coast Guard ham station will begin operating to open another new country consistently to DXers the world over.

One of the big jobs among Coast Guard hams today is, strangely enough, not fighting for recognition and equipment, but fighting for more hams. Many ships and stations now have ham gear, much of it modern single sidband equipment, but because of a lack of operators, a good deal of it is on the air only intermittently or not at all. The lonely Loran stations, often on one-ham-station islands dotting the Pacific, represent some of the rarest and most wanted of DX. Unfortunately, many must wait the coming of an operator.

To many Coast Guard hams, especially those on isolated duty ashore and afloat, ham radio has brought something pleasant — a chance to talk to the wife at home, to hear the youngsters’ voices. And for the ham, especially the K2 who has long been on the short end of the DX cycle, it is a chance to be the called instead of the often unanswered caller.
MORE SOCK...

I have read "More-Sock-For-Cents Antenna" (April QST) several times, and the message escapes me. I am a graduate electrical engineer, with several years experience in communications work, including some antenna design, so I don't think the trouble lies in my lack of comprehension.

The first part of the article deals with some obvious truths, and extolls the virtues of antennas with gain (I assume relative to a dipole) and then gives the dimensions of an antenna that has been the standard for more years than my age, the dipole itself, which by definition has no gain.

The author patted himself on the back for constructing this amazing antenna for practically nothing, as could any ham who happened to have 279 feet of 75-ohm coax, three insulators, and a pair of 150-foot towers in his junk box.

I am in full agreement that a dipole of a good material, hung over a half-wavelength in the air is a much better antenna than one made up on seventy-five or eighty meters, but Mr. Van Deren failed to solve for me the problem I have run into when I wanted to build such an antenna. What does he use for sky-hooks to hang that antenna 150 feet in the air?

Since you people printed this article, you must have seen something in it, but I don't see of what value it could have been to anyone. Did I miss the point? I have an article in the April issue of RF Magazine on a transistor modulator I designed, and I am open for criticism on that. — Monroe McDonough, K1DLC, A.P.O. 494, Seattle, Washington.

... This antenna system must be mounted 150 feet up in the air, in order to rotate the maximum gain. Mr. Van Deren made no mention of what he hung his wire from. Not every amateur can afford to have a pair of 150-foot masts in his back yard! — John G. Cozen, Montreal, P.Q., Canada.

... This belongs in a beginner's manual, not gracing a page in "Q Street." While we can argue the pros and cons of antennas until we're blue in the face, I never forget what Jeff P. said to me 25 years ago. He always liked a balanced antenna too. And so many of us have to use the antenna for at least two bands we don't want any coax-fed jobs. Open wire line, center feed, antenna coupler, low harmonic any credo. — Charles E. Gardner, W27TH, Bayonne, 01, L.I., N.Y.

... I couldn't see anything to it but a standard half-wave doubler until I looked up the data on RG-144U to see what made it so special. Yokes $4.37 per foot! I knew that we sometimes spent fantastic sums on their equipment, but didn't realize they could pick up $1000 worth of coax out of a junk box.

A triple grounded plate antenna instead — More Williams, VE7WX, Trail, B.C., Canada.

In RG-144U coax cable is deductible! — Fred Kroeker, W6DUN, Brooklyn, New York.

I have been looking all over for some of that RG-144U, particularly, the kind that will stand straight up for 150 ft. Sounds great for antennas poles, Where can I get some? — Harold J. Hebert, K1PQD, Brewer, Maine.

Last week I cleaned out my desk drawer (junkbox) and found two — yes, two — 300-ft steel towers. Thanks to the article by WA2EPO I knew what to do with them! I saved them in half, gave two sections to my good friend KN4NQ, and stored the remaining two sections on end in my back yard to support my newly constructed "More-Sock-For-Cents" antenna!

I could find only a few hundred feet of RG-144U so had to buy the remaining needed footage out of the XYL's grocery allowance. I had to lay out a few more pennies for another item — a box of handgards. Somewhere around the 87-foot mark my hands became blistered from stripping cable.


That "More-Sock-For-Cents Antenna" sure is PB, but I ruined the first 270 feet trying to cut the center conductor free. — Howard W. Triplett, W8BOI, Diamond Springs, Calif.

While the undersigned is, understandably, a little diffident about submitting a proposal for an improvement in the operation of the remarkable "More-Sock" antenna, perhaps it is not too presumptuous to suggest that a small sprig of poison ivy might be entwined around the center insulator as a means of discouraging unwanted signals. Just pick it off when you get your junk box. — George Applegate, W1LA, Oxford, New Jersey.

I have received an enthusiastic response to my article. In the earliest issue possible, would you please point out that it was presented to commemorate QST's annual celebration of April First? A dipole antenna, of course, is a point of reference for determining gain, not a means of attaining it. Maybe you ought to point the three paragraphs you deleted from my original manuscript — the explanation about the sky hooks. Again, I guess not. Some of these guys wrote to me and talked as if they were ready to use RG-144U to put up an antenna!

You might also mention, not necessarily in connection with this article, that it should be an inviolate rule to always enclose a stamped, self-addressed envelope whenever you expect a reply from an author in QST. Some think that authors in QST should pay their own postage since they are paid for the publication of the article. You and I know better — but it's a fairly well-kept secret, judging by those who sent me reply envelopes as, those who did not. — James B. Van Deren, W1EFPQ, Schenectady, New York.

CB COOPERATION

On the editorial page of April QST the League takes a hands-off policy regarding the 11-meter band. Since it is not a ham band, the article raison d'être, ban on the band should be of no concern to hams.

Most of us work hard for our privileges, respect the FCC, and if we abuse the law we can generally expect a citation in the mail. Many of the CB boys have no respect for the law and, as far as I can see, violate just about every paragraph of the regulations. For proof, just tune down to 11 meters yourself and you'll hear fellows swapping QSTs, calling CQ, raunching up, making transmissions with no call signs, and even conducting mobile hunts. The legal limit is 5 watts input, but they think nothing of running 50 watts or more.

Am I jealous? Why shouldn't I be? Why shouldn't the FCC be just as strict with our group as with another? If our ham license is to mean anything we should insist that this group be forced to stop calling themselves hams and exercising amateur privileges on commercial bands. As our spokesman, the League should take this stand and exert pressure on the FCC toward this end. — Herb Merrill, K1DJD, Portland, Maine.

The deplorable condition of the CB Service deserves more than just casual attention by the League and its members. The deliberate and/or unknowing violation of Federal Regulations makes the CB operator answerable to the FCC, but the Commission has other jobs to perform. The TVI caused by him often creates ill-feeling all over.
the neighborhood. And how many CBers have been mislabeled, having many hours, weeks or months of patient public relations work by the local club or individual amateur?

I would like to see the League make a substantial effort to assist the Citizen’s Radio Service. I am sure there are many CBers interested in good, clean and efficient operation. Why couldn’t the League help to establish, either as an independent or affiliated group, an organization similar to itself, but oriented to help the CB operators? Establishment of such a group would go a long way to bring order out of the present chaos on 27 Mc. The institution of a self-policing policy similar to the OOS would also help a lot. — Ronald M. Litt, K5MMA, New York, N.Y.

I want to commend very highly your editorial “CB TVI” in QST. CBers, generally, are quite eager to clean up their TVI problems. But, lacking a national organization, such as ARRL, the efforts are limited to local-level associations such as ours. Needless to say, wholehearted cooperation between amateur and CB organizations on a local level would benefit us both.

How many CB amateurs resent the very existence of CB and seem to want to make CB operate practices a subject of their personal investigation. Not all CB operators are mavericks. By far the largest number of them want good operating for the accessibility of the amateur radio service. But since we recognize that we have problems. These problems are basically ours and those of the FCC. No amount of criticism from amateurs will contribute to the clean-up of CB misuse. Nor will threats of sending tapes recordings to the FCC destroy the operation between CB and local amateur organizations...

Amateurs should remember that their ranks are being swelled by many operators who have graduated from the limited CB class D band to the more rewarding amateur bands. They should remember, too, that class D CB was born amidst a miasma of confusion, misunderstanding, and misinterpretation of rules. We’re trying to straighten things out. In time, we will. — R. L. Combs, President, Dayton Area Citizens Radio Association, Dayton, Ohio.

HAM CALLS

Enclosed with this letter please find my list of ham call advertisements as advertised by you in January QST. I hope you will have a good book for a ham call. I have been subscribing regularly to QST since 1947, and before the last war was also on your mailing list, I find it a very helpful magazine indeed.

You may also be interested to know that I was captured by the Japanese in February 1942 and spent 34 years as one of the few operators of the Burmese railway for 12 months. As one of a small group of ex-Americans, we treasured a copy of the ARRL Handbook which was read over and re-read by us few radio men until later in the form of a page by page we split the paper and used it to roll our cigarettes. A Ham Call file was kept and the same as is not made so well. But I mention this only because the Handbook did save some of us from going nuts. — A. Cassells, VKACB, Maryborough, Queensland, Australia.

For some reason the announcers of broadcasting stations with calls starting with the letters WN did not change the sound of the letter N, so that it is a perfect number ONE. Naturally that makes it sound as if a WN, say WIOB, or W1AE were doing the broadcasting. One station even had its call listed as a WN in a newspaper radio program section, Hi! No kidding coming here, but naturally a licensed amateur wouldn’t like it. This could be happening anywhere part of the country. — Samuel Kramer, W3AJN, Tidewater, Pa.

There is always some confusion, when hearing a ham station, as to its state of origin (with the exception of WA/K6). If you want to get a message, that any ham you tune through a large number of W0 or K4 stations looking for one in Wisconsin, I therefore suggest that each of our fifty states be given a number as a prefix for that particular state. It should have the country number assigned to it on an alphabetical system that the states would each represent a call area in itself. It would eliminate to a large extent the confusing WWA-WA-WN-KK-KXN, etc., assignments of call letters and would simplify the location of all transmitters or licensed stations. It certainly would lend a helpful hand when looking for that elusive state that is so hard to track and find for message-handling. — Harold S. Raies, W3VF, Plaistow, Penn.

PROCEDURE

I was first licensed at the age of 13, and didn’t know anything about how to operate an amateur station than I did about theory. I was sure that the SSB modes followed that have been in the same boat. If it wasn’t for a local ham, K8RXJ, I would have never learned proper procedure. But not a great number of amateurs-to-be have a helping hand...

...so I feel very strongly that the Federal Communications Commission should have at least half as many questions on their code-procEDURE as they have on theory and regulations. After all, what good is radio knowledge when you can’t get a station on the air and keep it in proper order? Therefore I feel that by adding such questions the hands would have less QRM, and many more enjoyable QSOs. — Stuart B. Peavey, K8WJ, Denver, Colorado.

WHY I BELONG

I would like to take this opportunity to express my appreciation for all that the League has done for amateur radio in general and for me in particular. During the eight years that I have been a member I have enjoyed many meetings of the League.

The code-procEDURE program helped me raise my code speed to the required 18 w.p.m. QST and the Handbook has provided many enjoyable construction projects as well as the latest in operating news and ham equipment. The League technical information service has come to the rescue many times when I have had equipment failure. But not least, the League has provided many invaluable services to amateur radio that no individual or small group could ever provide. Running contests, representing amateur interests at international conferences as well as in Washington...and providing self-policing services that have kept many operators from having to deal directly with the FCC are just a few that come to mind...

I keep up the social and work and when it comes time for my present membership to expire you can be sure that my renewal will be on its way to League Headquarters — George B. Jones, W1QIJ/H/WM2XK, Belmont, Massachusetts.

BV1US ACTIVITY

I wrote you a letter asking about the amateur radio situation in Taiwan (Formosa). You gave me some information, but I got the impression that you didn’t know too much about it.

I am now starting to write a letter to BV1US requesting more information on the matter. I received a letter from the Taiwan American Radio Club. The secretary is presently SPS John T. “Granat” Grantham, and the address is Box 241, USTDC, APO 68, San Francisco, California. This club is open to any American service person that enjoys radio, at a cost of $2.00 per year. Following is the information I obtained from Mr. Grantham, who holds the state-side call W6GNC:

1. Americans personnel may not hold any sort of license in Taiwan, except that they may operate the MARS club stations in the country. In other words, they cannot operate a private station.
2. A general, conditional, or higher class license is required to operate the MARS stations.
3. Hams going to Taiwan are urged to bring their gear with them, as they may operate it in the MARS station.
4. Permission must be obtained from the commanding officer of a MARS station in Taiwan prior to operating that station.

I would personally advise any U.S. ham going to Taiwan to correspond with the TARC, as they appear to be an extremely friendly bunch. — Donald J. Imboden, W6PGLD, San Diego, Calif.

FF4AL REPLIES

I am quite ready to believe that WIVCG’s open letter in April QST was not directed at FF4AL, but your caption-writer apparently had different ideas.

I do think the open letter calls for a few comments, however. For one thing, it is not the guys calling on my frequency who bother me for I skip about in listening quite a

(Continued on page 146)

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In DX Operating Give Due Courtesy: Observe Band Limits and Other Regs. U. S. amateurs undoubtedly want to put their best foot forward to rate high in the opinion of DX friends overseas. Yet, the operating news that reaches us is so often a complaint of impatient and hoggish behaviorisms that are less than tolerant or efficient... and are truly unbecoming in a hobby as sporting and democratic as our Amateur Radio. It could be said (again) that all DX operators can be completely in command and control pile-ups. At any rate the decent and truly experienced operator expects to be patient and to wait his turn. Additionally we feel in all justice, the North American amateur should sincerely try to put himself in the place of the distant operator and cooperate to the limit so that this DX friend also can get the values he seeks out of his amateur operating. It never seems to keep through the consciousness of some late comers in the amateur game that numerous operators are on the air to indulge in other "formula QSOs" and quick exchanges. To a lot of the DX fraternity, W and K QSLs are a dime a dozen. From time to time our friends across the water write to decry the unintelligent, rude, interfering, and improper procedures of American amateurs in their over-zealous drive for a QSO. You might think all this was related to getting "very rare ones." Not so, we hear this from the G's and DL's, as well as others. Many hams in DX places are as anxious to do some rag chewing on occasion as we are in U. S. A., where around 6,000 amateurs a year pair up for RCC qualifying or other "getting acquainted" type of fraternal contacts.

All this may be best understood if we quote from a typical informative letter, such as recently received from K2KLN/DL4RQ.

"DL4's love to work the States... this presents an opportunity to talk to someone from our own country..."

ROBERT L. WHITE, W1WPO, DXCC Awards
LILLIAN M. SALTER, WIZIE, Administrative Aide
ELLEN WHITE, W1YMM, Asst. Comm. Mgr., Phone

but some QSOs almost make one want to QRT. "Offers for... message delivery for us are cut-through-window. No third party traffic is allowed from DL land. Of course there isn't any amateur who can tap the American ham for generosity: (but it's important to us amateurs that we all operate correctly and within the rules)."

"Our major gripe is caused by those who can't wait for a QSO to end in order to break in on the frequency... sending call letters as though this was their last day on earth. When we call CQ from a foreign phone band on 15 meters it is amazing how many U. S. stations will zero beat... this even when we're 29 kw, below the American phone band! Our frequency standards are good to within 200 cycles, yet some of these operators are licensed if told that they are in the wrong. This gripe especially concerns the young amateurs who have just graduated from Novice. These make up the majority of offenders when it comes to breaking in and being out of the band. Of course these faults can be cured by experience. Furthermore they insist on a stereotyped QSO. They should listen to some DX rag chews so they can be more proficient in the art of conversation."

"About QSLs, patience is the word. Our replies must be by boat mail unless otherwise provided for. Air mail can occasionally be out this to 3-4 days. it's a pleasure to work the states. The Golden Rule is the order of the band here. Thanks to all the boys back home who operate in such a way as to make our lives and theirs a bit more interesting."

As the above letter emphasizes it is important indeed that third party communications be kept out of overseas contacts, excepting those with amateurs in the limited list of 14 countries where such exchanges, subject to agreements under ITU provisions do permit such work. Licensed amateurs of two nations ordinarily can communicate using code, voice or even RTTY, but not swap either formal traffic or informal communications for others, since these are, in fact, third parties to such a two-way. For further information on the prohibition against transmitting international 3rd party communications please see the pertinent text of Art. 42, in the License Manual chapter on International Regulations, also May QST, page 64, on Banned Countries.

On other points the above letter speaks well for itself. QSLs accumulate to one's satisfaction, this handsome trophy, the John W. Singleton Award, is being offered by the Granite State Phone Net of New Hampshire to net members who demonstrate the precepts of fine operating set by W1CDX. For full information on the award see page 110, this issue, in the picture the award is being displayed to Mr. Singleton's widow by SCM W1IQ, K1JDN, and PAA W1KVG.
perhaps slowly but admittedly this teaches one patience by the very nature of the mailing operation. The number of U. S. A. contacts is so great common recourse to QSLs. Bureaus is necessary for most foreign amateurs, as a proper economy measure. IRC's or other means to defray direct mailing or Air Mail ordinarily bring fullest cooperation from DX amateurs, such as the writer of the above. On the matter of going all out for QSLs it may be appropriate to close this discussion with a reminder. Never make the QSL what some say it is becoming, "the sole reason for a QSO." Make it as it always has been in amateur radio "the final courtesy of the QSO."

The ARRL Field Day June 24-25. Here is one of the really big operating events of the year. Don't miss the fun and fraternal and operating values in the FD!

We have been reminding you in this column to do some advance planning, and to write early for log forms. With this issue of QST you have the rules, and reference to the report in QST for last December will help you picture various aspects of Field Day. But you can never get the feeling and experience of operating afield, and the thrill of making a workable emergency hush-up go through the paces, unless you get some equipment together and test it on the Field Day.

While clubs do a grand job, and enter wholeheartedly into competitive groupings, don't forget that the spirit of the try-out is just as completely exemplified if you arrange to work by yourself or with another ham or two. Should full time operating be impractical for you, give yourself just a two- or three-hour setup, and it will still be a unique, profitable and rewarding experience. One page of called-and-worked log after getting set up helps you prove to yourself that you can do this test-afied, even if you have never seen the likes before. Get with a club, if that seems the best way to take part. Should you have mobile equipment in the car, and go with the club, be sure to set a time for cleaning a few personal contacts by this means to test that gear out too. What we're getting at is that this an operator as well as equipment test, that bona fide communication is to be proved, preferably from places where there are no wires, by amateur radio.

It's a demonstration that one has the know-how to communicate by radio with reliability even if there were emergency circumstances. We like to see and know about set ups that favor the light weight, and transportability, and are more than assemblages of commercial units, but there's of course a place for all workable gear to be tested, and gas-driven and battery emergency units earmarked so they would be put to use in any and every practical need for communications, just as in a Field Day. There are several legitimate ways to be in the FD, so we leave it to you to choose your own. Here's to a successful workout . . . and we'll be looking for your log, or that of your club group.

— F. E. H.

Florida SICs W41YT (Eastern) and W4ALL (Western) have gotten together, along with a number of other interested parties, on a "State of Florida ARERC Communication Plan. It's a real beauty of a job, having the finest qualities of brevity, simplicity and conciseness. Thousands of copies have been distributed and more are being printed, SICs who are looking for some ideas with which to evolve state-wide plans of their own would do well to have a look.

One of the best features of the plan, we think, is the designation of nets to handle certain classifications of traffic. That is, while certain nets will handle traffic only of an urgent, official nature, other nets will handle any traffic coming in or going out of the state, Stations reporting into the wrong net will quickly be referred to the proper net.

The plan is well fertilized with liaisons and alternative frequencies in case of propagation condition troubles. During an emergency, anyone with traffic for Florida will find an outlet for it on 3900 (alt. 7285), 3950 (alt. 7115) or 3910 (alt. 7275).

Missing from the Hurricane Donna Story (Feb. QST, p. 61) was a report from W4VMA, EC for Hampton, Va. This report has just come to light and we denote it herewith. At 1010 on the morning of Sept. 11 the local emergency net was called on 3850 kc. As soon as things were under way, W4VMA was relieved as NCS by Asst. EC K4GIE, who was subsequently relieved at times by K4a CPO CDO HDT and W4VMA. Liaison was established with K4NDI, at the radar station at Fort Story, who kept the net informed of Donna's approach, W4BOP and the Norfolk group kept a radar watch. When it became certain that the storm would hit the area and QRN get worse, the net was moved to 3835 to join the Norfolk group and the Virginia Phone Net, which were already in operation. W4a AGT RGN and K4SNS were operating mobile in the Burke-Fire Beach area; also K4a OHM and CMLN on six meters in the Grandview area operating under extremely difficult wind conditions.

As the eye of the hurricane passed and the wind died down, there was still much work to be done in assessing the damage. Many power lines were down, roads were impassable and some flooding had occurred. KH4DT took over as NCS and detailed K4DRQ to the power company business office, as their phone service was out. K4a KHR KUD HCU and W4IN were mobile surveying downed power lines, which were reported direct to the power company through K4DRQ. Fixed stations K4a FAM and Y2T assisted. Later, K4ZED relieved as NCS and this group continued operating until phone service was restored.

During the operation, service was also performed on behalf of the Newport News Police Dept., Burke-Fire Dept., Grandview Fire Dept., Hampton Red Cross and the general population. The net operated for 26 hours and

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

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During periods of communications emergency these channels will be monitored for emergency traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be vacated immediately to accommodate other callers.

The following are the National Calling and Emergency Frequencies for Canada: c.w. — 3545, 7050, 14,060; phone — 3765, 14,100, 28,290 kc.

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handled great quantities of traffic. Other stations participating, not mentioned above: K4S GKN CKN VFB ULV KKP OJU UOT FAL EHN KGO, W4S ONY DHZ.

On Sept. 13, when Gulf County, Fla., was declared a potential emergency area as Hurricane Ethel approached, amateurs in Port St. Joe and surrounding area put their emergency plan into action. Communications headquarters was set up at the city hall. K4KZF disassembled his station and transferred it to the City Hall where he established itself as NCS, later relieved by K4ZEP, W4WEB set up at the Weather Bureau in Apalachicola and kept all concerned informed of the progress of the storm. W4LMK operated mobile on the waterfront to monitor road conditions and high water damage in Gulf and Franklin counties. W4JOZ acted as NCS most of the night. W2ZKP operated from the upper mill. W4SOG was the only means of communication with the St. Joe Bench area. On the morning of Sept. 14, W4WEB relayed information on several small tornadoes in the area, none of which did any damage. On the morning of Sept. 15, Hurricane Ethel had turned toward the Mississippi and Alabama coast and the hurricane watch was discontinued.

On Jan. 24, a natural gas main was fractured by a trench digger in Parma Heights, Ohio, releasing millions of cubic feet of gas. A state of emergency was declared by the mayor and families were evacuated, in freezing temperatures, from the immediate area. The AREC/Red Cross network of Cuyahoga County was activated at 1045 EST and mobiles W4S JBS and URV reported to Parma Heights City Hall. Monitoring the net frequency and relaying traffic to the Red Cross were K4SBG, a PYT DQB and W8DQG. Net control was KSUFN, operated by K4S EXL YOA and W6NMW. The gas was finally shut off at 1640 EST and the net was secured at 1735 when the danger of explosion had passed. — K4EXL.

On Feb. 18 the Chagrin River overflowed its banks in the Eastlake, Ohio, area, making necessary the evacuation of 100 families. In response to a call for assistance from WSLS, the AREC/Red Cross Net of Cuyahoga County was activated at 0100 EST. Mobiles W4S KIN and JFD relayed communications from officials at the scene to KSURK, who set up portable equipment in the mayor's office and to KSAM at the school were families forced from their homes were being housed. Mobiles K4S UXGT and EXL escorted the Red Cross convoy through the flood area in heavy fog with food, clothing and medical supplies. Relay of traffic from the flood area to Cleveland was handled by K4S NZY DQB UPN GQD and W8DSO. Successful blasting of the ice-dropped the flood level and the network was secured at 0815 EST. — K4EXL.

On Feb. 26 at 1825, Clinton Co., (N. Y.) EC W2GCH was notified by W2NIZ that the Ellenville telephone exchange was burned down and the upper part of Clinton County was without telephone or electric service. He immediately activated the local AREC and for the next 12 hours a total of 16 stations were active on two meters. Later, 10 stations were in the 7-meter net and 7 stations on the ten meter net. Communication was maintained among the following points: Plattsburgh, Peru, Rossville, Saranac and Dannemora. This linkage served the police, county sheriff and fire departments and amateurs taking part: K6S UYM MIE TQV OPV VRX RPX, W6S NZY OZY, W4S GNZ JYY GLA GCH GPY JBY DAC HSB JOI KPU NVT PFR CRC RTP FPM JOH, K4BYJ, W1VSA. — W4GCH, EC Clinton Co., N. Y.

A disastrous snowstorm hit the southern half of Iowa on Feb. 17 at 0945, leaving parts of the state completely without communications. SEC W6EXN activated the Iowa AREC the following day. Approximately 260 stations participated in the net. Acting as NCS were K4S DUX EAA BSZ, W8S DDI JYV NXX 0ZO PZO HHG YDV GQ and N7T. Other outstanding stations were K4S QAQ VGG SLM UCP TWI, with K4S JYV CRF JUT CXP BTR JRV/mobile OXY GZ JPI, K9JLJ, Story County, under the direction of W8NWW, worked 14 hours assisting the Ames City line office; participants were mobile K4S QGK NVR and fixed K4S UAA and DUG. Union County operators participating in local duties were K4S REW and THG.

On Feb. 4 WJLON was snowbound on Route 128 near Peabody, Mass., along with hundreds of other motorists. Several times during the seven-hour wait, he walked along the line of snowbound cars, taking names and telephone numbers of the occupants. This information was passed from his mobile rig to a net formed in Danvers, Peabody, Salem, Beverly and Gloucester to let friends and relatives know the situation. — W7TTQ.

The Folk County (Iowa) AREC was called out at the request of the chief of police on Feb. 18 to patrol streets during the evening hours. W6ONT was activated at police headquarters with operation established on 29.6 and 95.05 Mr. under control of W6ON and K9ON. KC8ON, K4KZG and K0QXT as net controls. Mobiles reporting to police headquarters where they picked up an auxiliary policeman were K4S ZCA LUG TXL JRV CHD SVR LUP IEZ ALZ S4F, W8S QH8 WPS V8I, with KS8 AT8 P8C and R8H in supporting roles. — K6EKN, SEC Iowa.

On the morning of Feb. 25, Indians were hit by a snow and ice storm that closed many roads and cut off communications. The Kentucky County AREC moved into action with KC1MT/7 setting up a base station on 6 meters and an emergency generator to run it at county police headquarters. AREC members were activated and stood by. K8MIB/9 discovered a car that had slid off the road and into a pond; this information was quickly passed on to police through KOYFFL. — WC1TUB, EC Steuben County, Ind.

On Feb. 25 Montreal was hit by a severe wind, sleet and snow storm that brought amateurs into action, VE2ASW contacted VE2AUI and an urgent call to members of the Montreal Mobile Amateur Club received immediate response from mobile VE2QG AXU TY SC XI and AXU. Additional fixed stations VE2B RCT ARS RS and BDY also took part. Work conducted included reporting and recording of accidents, area and supplying of services to police radio system and supplying communications to the SG and army headquarters. An emergency net was functioning on 1750 kc during the entire period, some 30 mobiles and 90 fixed stations being active on VE1 and VE5 stations. Calls of stations not previously mentioned who were of material assistance include VE2AI UN CDA MS VTV AF7 AUE H8 GD AAH, VE2E AKL ABW, VE2ASR handling much hospital traffic. The south
Shore gang was also active, with YE5A GD AGM 1K/2 ER/2 and ABW/2 spending many sleepless nights. Outlying districts such as Peru-Rivieres and Quebec were not so much affected, but even here mobiles were alerted and ready to serve if needed. To indicate the extent of communications damage, some 18,000 poles were lost by telephone, telegraph and hydro companies during the storm. — VE9DR, SGM Quebec.

Add to the Chicago tornado emergency (Mar. 4) detailed last month, the following calls of participating amateurs: K9IKT, W9s EZM VU1.

Members of the Madison County (Ala.) AREC and cad unit were alerted at 0310 Mar. 8 that a tornado had struck Elly and Union Grove. Mobiles K6a DIB DQ7 OCN RSM, WA7 VY8 NIS and WA8VSC proceeded to the scene, approximately 25 miles south of Huntsville, while K6a VJ1 SSP and YUD maintained contact. Considerable property damage and personal injuries were found. The mobiles and Huntsville C.D. police patrolled the area, rendering assistance as required, arriving back in Huntsville at 1000. — K4RSB, EC Madison County, Ala.

The Albuquerque, N.M., AREC, including members of the Caravan Club, were called out, on Mar. 12, to assist in the search for a man and wife and three children who were missing in the Jemez Mountains north of Albuquerque. Although the AREC mobiles were alerted prior to 2200, the mobiles were not dispatched to the area until after midnight — this at the request of the sheriff. Shortly after midnight, W7IJOZ proceeded to the junction of highways 44 and 422 to set up the control point and maintain communications with WA7ZJBN in Albuquerque. As mobile units arrived, they were dispatched to strategic points in the search area. As the search area expanded, it was necessary to provide an additional relay, so K5CNX took over at the control point. Shortly, WA7ZJBN moved farther north, and at 0000, W6ONK took over the Albuquerque contact from WA7ZJBN. Shortly thereafter, K5SPU discovered the car of the missing people, bogged down in mud and abandoned. He and K5KDL followed the foot tracks from the car until they were forced to turn back because of severe conditions. Later, the state police and deputy sheriff of Sandoval County arrived and took over the search. Once the approximate location of the missing persons had been established it was a comparatively simple matter to locate and rescue them using jeans and a helicopter from Kirtland Air Force Base.

Other amateurs who participated in the search: K6a KWU XG7 YVR, W6a LQM LIE TAF WNU. — W7ZJBN, EC Albuquerque, N.M.

A lost 11-year-old boy found his own way out of the area around Mt. Hood, Ore., on Mar. 19, after a helicopter, airplane, trucks and mountain climbers had spent the night looking for him. Thirteen amateurs were also involved in the search: W7a 16G/1i 24B/QM 1X0/2m IGI SkV and YE2A/Z/W1 of the above top ten made BPL each month. The following also made BPL every month in 1960: W18MM, K2DEI, K4SHI, W6THY, W6DAE, W6GKA, W6DYG, W6IDA, W9TTT. And finally, here’s the rest of the “top 25” BPLers for 1960, with annual BPL points in parentheses: K1CF/MAJQ (168), W6IDA (160), W6VYGH (158), W6C7G (142), W7DIZX (180), K4SP (136), K4SHI (130), W6UPH (135), K0ONK (120), W3YR (121), W3TYS (117), W6WPP (111), W9TTT (109), W7TUS (104), W9DO (103).

In the past-war column, we have quite a few of the old-timers who stopped handling traffic long ago that probably are not familiar to newer traffic men. W3CU/L’s incredible 5,463 points is well over double her nearest competitor (W4P, with 2,122). Others in the top 25 cumulative since WWII fall into that category: W6BDR (1953), W6BCA (1915), W2KEM (1973), W2NZZ (1255), W3WIQ (1184), W5VYH (1137), W6CPI (1099), W9DO (1082), W7JVRU (858), W6LICG (840), W7PGY (922), W7C4OF, W7C4TV, K2UYT (840), W7DQ (800), W6LICX (749), W6PZH (683), W6UPH (659), W7DQ (624), K2UF (697), W4PNU (522), W2KFW (511).

Every one of the above amateurs is (or was) a giant in the traffic handling field and deserves a salute from us traffic dwellers. Ladies and gentlemen, we salute you! — HJNM.
March net reports.

Net

Ses-... Signs checking Traffic
E.A. Area Buryard........... 27 709 70
Hudson Traffic............. 30 268 119
Mike Farad E & T........... 30 588 1259
Early Bird Tramsoon........ 31 347
Eastern Area Show........... 31 183 72
Intestate SSB............. 41 999 394
7250 Traffic.............. 50 1581 59
20 Mtr. Intestate SSB........ 23 553 1809
Dixie Early Bird........... 27 597 217
Central New England........ 27 309 16

* Hudson Traffic Net and Eastern SSB Net have merged to form the Eastern Wireless System, operating on 7000 kc. at 1715 GMT.

National Traffic System. As you know, NTS is supposed to remain on local standard time throughout the year, according to CT-24. In practice, we have never been able to carry this out, as section nets and some region nets have insisted on going along with the time their participants are forced to live by. For ten years, this has foiled the NTS time schedule each summer.

In an E & T Bulletin put out last fall, we offered several possible solutions, chief of which was a proposal that the entire system move its schedule a half hour earlier by the summer, everybody change net time at half hour during the summer, instead of some changing a full hour and others not changing at all.

The only trouble is that, in sistema NTS change, any change has to be nationwide to be effective. Last spring, we actually drafted a letter to all region and area net managers and TCC directors, announcing the change of schedule for a trial season, but it never went out. Section nets have to be considered, too, and because there are so many of them there was no way of notifying them except through QST or a bulletin. Besides, although NTS is highly organized (we keep telling ourselves), it is not regimented. We cannot say it shall be done but-and-proc with full assurance that it will be done that way.

BRASS POUNDER LEAGUE

Winners of BPL Certificate for March Traffic:

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More-Than-One-Operator Stations

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BPL for 100 or more ordination-balls-three-electries.

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BPL medallions (see AEU, 1954 QST, p. 64) have been awarded to the following amateurs since last month's listing: W2H5X, W2NFZ, W2KVR, W2WV, W3CIC, W2L, W2LW, W2CBW, W2ABU, W2SGC, W2LW, W2CBW, W2LW, W2CBW.
WI4A OPERATING NOTE

The complete summer schedule of the ARRL Headquarters station appeared on page 97 of last month’s QST. See that issue for information on when to visit WI4A, have a QSO, or copy the various bulletin transmissions that are made daily on phone and cw.

Phone: NJN (N.J.); MSPN Eve, MSPN Noon, M6N & MIJN (Minn.); AEKB, AEKO, AEKP Morn, AEKP Eve, AEKP (Ala.); QM1 (2 Mf., 7:00); SGN (Calif.); IJO (I1); GBN (Ont.); WIN (Wis.); QO3 (Pa.); NJI, 5D, 2D (S.Dak.); SDak 75 Eve; MDDS (Md.-Del.-D.C.); BUN (Hub).

3 FCC functions reported, not counted as net sessions. Once in a while, we still manage to break a record. This month we exceeded all previous March’s in total number of net sessions reported. Total traffic handled and the rate at which it is being handled are showing slight decreases because of unfavorable atmospheric conditions.

WI4VG now sends monthly CAN summary messages to all NCS and region nets managers in the areas. PAP shows improvement each month; K5AEK has submitted his resignation to the Pacific Area NTS Staff. W1BYR says that 1RN is going to try to stick to the regular NTS timetable this summer (i.e., no "daylight saving" time). For the second straight month, 3RN has had 100% attendance from sections. W4PCH has received his 4RN certificate; K4AVU has decided to hang on to the membership until W8PJ gets back. BN5 is beset with difficulties; Asst. Mgr. W5CEZ reports that the younger element are afflicted with studies, VI-lities or rules laid down by PA and Ma, or a combination of all three. Alberta is now being represented in both the class and B.C. nets, so representation on IJN7 should be picking up. W0ZYK has issued a 4RN certificate to K9HG. Of TIN’s three sessions per day, most traffic is handled on the 1945 session, least at 2100. Ontario pulls down the percentage, percentage with its monthly scene.

B+WTP and WZLND have been awarded TWT certificates; Manager W8FEO puts out an excellent monthly comment and data bulletin to net members.

Transcontinental Corps. We had a pleasant personal visit with W8SMT (Eastern TCC Director) at the New England Division Convention, and discussed many NTS problems while monitoring taxes made from operations. W8HDR has been ill, we understand, but is back on the job again.

W8EOT’s monthly TCC report is copy of a bulletin to all stations in his area.

K5XMO is manager of the 7290 Traffic Net, which averages 40 sessions and 600 message handle per month and has an average check-in of 33 stations per session. She is OPS, ORS, and is the proud possessor of a BPL Medalion.

March reports.

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<tr>
<th>Area</th>
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<td>Summary</td>
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The TCC roster: Eastern Area (WI8SMU, Dir.) — W7s AW EMG NJM OBR SMU WKF, W7s APY COO, K9s SEX UFT UTY, W7s EMIL WQ WRE, W4DVT, W6s ELW UPH, W2AZL/2I, W6QWA, Central Area (W8HDR, Dir.) — K4AKP, W7s DYG CXY DO ZYK, W7s LCX SCA BDR, Pacific Area (W6GOT, Dir.) — W5GHN, W9s IHR ZY GIY, W6s EOT ELQ HC WFP, W9s ATB H8M ECF, K6WNP, W9s QMC DXX ZB K6s EBD EDK C18/6, W9s WAB EQO KE0 WFE/7

A.R.R.L. AFFILIATED CLUB

HONOR ROLL

With pleasure we present our Honor Roll ‘61 listing of those clubs that have 100% of their club members also ARRL members. Data for this listing, generally speaking, comes from the return from the recent Annual Club Report. The Board requires 51% or above ARRL membership in any club to be affiliated; when a club comes up with 100% League membership we think special recognition is well deserved. Each listed club is now receiving as a special recognition, and for club posting a 100% ARRL Club certificate.

As additional questionnaire forms are received indicating 100% ARRL membership, these clubs will be noted and included in an additional listing later this year. Clubs reporting favorable results of ARRL membership drives being conducted currently can also be included in this further Honor Roll if they qualify.

Aeronautical Center Amateur Radio Club, Inc., Oklahoma City, Okla.
Amateur Radio Club of Central Mo., Inc., Sedalia, Mo.
Amateur Radio Technical Society of St. Louis, Sts. Louis, Mo.
Amateur TV Hill Amateur Radio Club, Inc., Tucson, N. J.
Athens Amateur Radio Club, Athens, Ga.
Barnesville Affiliated Amateur Radio Club, Barnesville, Ga.
Birmingham Amateur Radio Club, Birmingham, Ala.
Blue Ridge Radio Society, Cleveland, S. C.
Chibiham Trall Amateur Radio Club, Duncan, Okla.
East Kootenay Amateur Radio Club, Kimberley, B. C., Canada
Emergency Radio Communications Assn., Milan, Ill.
Jacksonville Amateur Radio Society, Jacksonville, Fla.
Jefferson Baracks Amateur Radio Club, St. Louis, Mo.
Lowno County Amateur Radio Club, Lebanon, Mo.
Mummy Mountain Radio Club, Scottsdale, Ariz.
Norfolk County Radio Association, Norwood, Mass.
Northeast Nebraska Radio Club, Filmore, Neb.
Northern New Jersey Radio Association, Englewood, N. J.
Ottawa Radio Club, Inc., Ottawa, Ill.
The Palmetto Amateur Radio Club, Inc., Columbus, S. C.
Queen City Emergency Net, Inc., Cincinnati, Ohio
Radima, Lancaster, N. Y.
Rome Radio Club, Inc., Rome, N. Y.
Royal Order of the Left Foot, Stevens Point, Wis.
The Order of Boiled Owhs, West Hemstead, N. Y.
Starved Rock Radio Club, Oglesby, Ill.
Tusco Radio Club, Dover, Ohio
Wichita Amateur Radio Club, Wichita, Kan.

June 1961

81
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. This notice supersedes 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., 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 to the dates given below. 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, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status etc.

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

Communications Manager, ARRL.

[place and date]
38 La salle Road, West Hartford, Conn.

We, the undersigned full members of the ARRL Section of the
Division hereby nominate

as candidate for Section Communications Manager for this Section for the next two-year term of office.

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

— P. E. Handy, Communications Manager

<table>
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<td>June 9, 1961</td>
<td>George Weida</td>
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<td>Oklahoma</td>
<td>June 9, 1961</td>
<td>Adrian V. Rea</td>
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<td>West Virginia</td>
<td>July 10, 1961</td>
<td>Donald R. Morris</td>
<td>Sept. 18, 1961</td>
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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:

| Alabama          | Oct. 10, 1961 |
| Michigan         | Oct. 12, 1961 |
| Oregon           | Oct. 18, 1961 |
| Eastern Pennsylvania | Oct. 18, 1961 |

SS BRIEFS

The May Sweepstakes club tabulation should show the Tusco Radio Club phone winner as W8BM with 27,376 points and the club phone award.

The points score of W9SO should appear as 54,290-270-42-2-A-25 gaining him the phone award for the Allawaukee Radio Amateurs' Club and upping the club's aggregate score to 510,300 points.

A.R.R.L. ACTIVITIES CALENDAR

June 7: CP Qualifying Run — W60WP
June 10–11: V.H.F. QSO Party
June 15: CP Qualifying Run — W1AW
June 21–25: Field Day
July 6: CP Qualifying Run — W60WP
July 15–16: CD Party (c.w.)
July 21: CP Qualifying Run — W1AW
July 22–23: CD Party (phone)
Aug. 2: CP Qualifying Run — W60WP
Aug. 21: CP Qualifying Run — W1AW
Sept. 13: CP Qualifying Run — W60WP
Sept. 15: Frequency Measuring Test
Sept. 16–17: V.H.F. QSO Party
Sept. 19: CP Qualifying Run — W1AW
Nov. 11–12, 18–19: Sweepstakes Contest

OTHER ACTIVITIES

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


CLUB COUNCILS AND FEDERATIONS

Affiliated Council of Amateur Radio Clubs, Inc., William A. Bentzen, W7QGO, Sec'y., 4010 35th Ave. S., Minneapolis, Minn.
Cleveland Area Council Amateur Radio Clubs, Gertrude B. Maxon, W8OIS, Sec'y., 23944 Woodhill Drive, Berea, Ohio.
Los Angeles Area Council of Amateur Radio Clubs, Robert F. Drake, W6RUC, Sec'y., 7008 S. Sorenson Ave., Whittier, Calif.
Michigan Council of Clubs, Robert H. Pinder, K8NITE, Sec'y., 1577 Craddock Dr., S.W., Grand Rapids, Mich.
Ontario Amateur Radio Federation, Inc., A. E. Moon, VE3DR, Sec'y., Suite 409, 19 Richmond St., W., Toronto 1, Canada.
Ohio Council of Amateur Radio Clubs, Ernest E. DeAngelo, K8JAI, Sec'y., 3154 Ontario St., Columbus 24, Ohio.
San Diego Council of Amateur Radio Organizations, Bernard Bishop, K6SSX, Sec'y., 5900 Yorkshire Ave., La Mesa, Calif.

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 June 15 at 2100 Eastern Daylight Time (0530 GMT, June 16). Identical tests will be sent simultaneously by automatic transmitters on 3555, 7000, 14,000, 21,075, 28,080, 50,900 and 145,800 ke. The next qualifying run from W0WQ only will be transmitted June 7 at 2100 PDST (0449 GMT, June 8) on 3555 and 7120 ke.

Any person can apply. Neither A.R.R.L. membership nor an amateur license is required. Send copies of all qualifying runs to 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.

82 QST for
DX CENTURY CLUB AWARDS

HONOR ROLL

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U.S.-Canada Area and Continental Leaders

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DXCC NOTES

Announcement is hereby made of the addition to the ARRL Countries List of Malpelo Island. Malpelo Island is located in the Pacific Ocean some 310 miles west of Buenaventura, Colombia, at the closest point of Colombian territory to Malpelo Island measures 232 miles, thus placing it under Point 2 of the criteria (see page 80, April 1960 QST, DXCC Note). DXCC credit claims for this addition starting August 1, 1961. Confirmations for contacts with Malpelo Island must be dated November 15, 1964 or later. DXCC credit claims for this addition received before August 1, 1961 will be returned without credit.

June 1961
• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZQK-SEC; DUL, PAM, US; RM, AXA. New appointments: K3EHE and GOF as OBs: HWWK as OSC; 200 meters; K3FSA, New Gen. Dept.; NOH was QRL getting an Apache transmitter ready for the CD Party. K3HIN has a new 6-meter vertical placed atop an old, 10-meter antenna. A new folded dipole added K3CINN in getting a 559 report from UAA-3, The new club call of the Short Skip Club is K3CINN, and Rick E. COD is good stimulated an electronic keyer. NNL added a Q-Multiplex to his home-brew receiver and now hears more than he wants to. K37RO has a new 10-meter vertical last put experimenting with the v.o. K3HIX wants DX stations to be active in the VU-4 by the time this set is in print. FNK plans to go back up to the mountains with the Clark Summit boys for Field Day. Your SCM will be present at K3KNO/3 to receive any Field Day traffic. UIK was present at a formal dinner at the 300 point. CTS Susquehanna Valley ARC presented a public demonstration on emergency communications operating right alongside of 20 TV sets without any TVI. K3LXR operated portable in Chicago and Boston on 6 meters and had plenty of contacts. ERR is getting his share of 40-meter DX and worked his first VU1 on 40 meters in 28 years. RNJ now claims ownership of 21 certificate awards. K3JZG worked his first DX, an LB. New officers of the Lancaster Transmitting Society are K3IJT, pres.; JPS, vice-pres.; OV, secy.; K3DLVY, tons. HZ7 moved DX from back up after the winter storms, K3ACD received a birthday card from his father in Turkey. He is now on 2CW and K3AKU has reported that his report from Turkey stating there is no amateur radio certificate. K3PQT sent us his 4C-44 a cherry- next phone call of Cow Piddle Hotel. K3DXE, DXR, K3HHU and K3N3Z visited Morton, We want to wish Mr. Kiewel of Maryland gear but I3FZ refused to help load the stuff on DGGX's station wagon. Traffic: W3JCTU, 5182, ERM, 597, VU 841, IVS 653, K3GSG 749, K3BQ 32, K3MB 49, K3GQ 114, MLL 143, AXA 122, K3HHX 119, WSHU 86, W3CB 99, K3BB 34, TR 77, CRU 65, HTZ 9, W3KD 8, K3JW 50, JSX 50, BHN 49, MIO 32, W3WQ 22, WHK 22, JXN 29, K3EK 24, AXN 15, W3HPF 10, TTT 4, K3FJ 7, NBR 5, W3FAN 6, BNU 5, GYP 4, K3JXG 4, W3DUI 2, OY 2, EII 1, ID 1.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—SCM, Robert B. Brooks, W3KKB-SEC; K3BQI, WM2KD, W3PHY. MDD Traffic Net meets at 1015 EST Mon., Sat., and 3650 kc.; MDDS (slow mode) Net at 2030 EST daily on 3650 kc.; MDDSSB (slow mode) Net at 2030 Mon.-Wed., and 1300 Fri., Sat., and 0300 EST on 3650 kc. March appointments: K3APM, EAX and K3MSY as OBs. We would like to see an emergency supplies list. K3ACD reports conditions improving on 2 meters. AYD is trying e.o.w. for a change. HU3D is scheduled to visit DGS. K3AKU has worked the new station wagon. Traffic: W3JCTU, 5182, ERM, 597, VU 841, IVS 653, K3GSG 749, K3BQ 32, K3MB 49, K3GQ 114, MLL 143, AXA 122, K3HHX 119, WSHU 86, W3CB 99, K3BB 34, TR 77, CRU 65, HTZ 9, W3KD 8, K3JW 50, JSX 50, BHN 49, MIO 32, W3WQ 22, WHK 22, JXN 29, K3EK 24, AXN 15, W3HPF 10, TTT 4, K3FJ 7, NBR 5, W3FAN 6, BNU 5, GYP 4, K3JXG 4, W3DUI 2, OY 2, EII 1, ID 1.
Station Activities

PAM: WPWF, NYG, C.W. u.s.m. on 3651 kc at 1990, 3588 on 3590 kc at 1690, NYXPTEN on 3629 kc at 1890, NYS D.C. on 3310.5 and 3993 kc (s.t.h.), at 6000 Sun., TACN 2nd cell area on 3570 kc at 1990, IPN on 3890 kc at 1690, KWSCT on 3270 kc. WVXRF is being heard in the area for the first time limited so he has resigned as KAI. He has done on 94 job through a 7 years, ZWEEU has been appointed to take his place; they are the new ZVR station.

Appointments: K2AGC as EC for Schuyler Co., K2DVC as the Director of K2DVC, KOLES&B WUSA was the only individual who has accepted the position and has agreed to work on the station.

The Annual H.F. Show is being held at Great Valley Fire Tower July 22nd to 24th, K2VRK is invited to all interested ladies to attend. The Aiming ARA's new call is now K2JRR. K2AEM will be on the air this weekend.

Numbered, seqy, W2AEK, A.E., trans.; and W2OY, Publ., which are the ARRL State Convention will be held in the area. The S.P. is not to be missed.

The Niagara RC is doing a job on 2 meters and this is one you won't want to miss. K2EXY and W2AMGQ got their General licenses, W2AFW reports that the Adirondack RC will hold a DX contest on 2 meters June 4. He also has a new homebrew electronic key, K2KHH, who is on the way to the WANA "Miles Per Watt" Contest, W2WFL and W2XNIP finished 2nd and 3rd. W2ADW got his AKC. WAC New York State presented the Merrick County Executive's organization with a citation for organizing and maintaining communications network for c.d. W2GTA is RO in charge. Join in the Field Day fun July 25th and 26th, K2DZG, D., is happy that bands are now being used to perform service under emergency conditions. The ARRL's Board of Directors elected WP2Y. pres.; W2FJY, V.P.; W2AEK, treas.; and W2AEZ is conducting code and theory classes for the radio control boys in the Buffalo area so they can get off the air and test their own electronics.

June 10-11

The Binghamton Amateur Radio Association invites all amateurs to participate in the 1961 New York State QSO Party.

WESTERN PENNSYLVANIA—SCM: Anthony J. Mrozik, WA9NUN—SEC: OMA, RMs: KUN, NUG and GEG. The WPA Traffic Net meets Mon. through Fri., and 9:00 p.m. on Saturday. K9RBF has a new microphone on 2 meters and K2KJG is building a quad on 6 meters. K2JGK is on 14 meters and K2KSM is on 20 meters. W2BPK, K2Hexapod, TV, and K2AEY are the featured speakers. The CARC's new meeting place is Austin Town Hall. 1200 W. Lake Street, Chicago, and the CARC's new officers are: K2XV, J. B. ST. The Annual Hamfester Picnic will be held Aug. 13, at the same place as previous years. K9RBF has a new 51-10. K9RBF has had his first QSO, as the attending surgeon and K2KXX as the attending physician; the new station is now KNRK. A total of 311 messages was handled on the new Net. The CARC's new officers are: K2XV, J. B. ST. The Annual Hamfester Picnic will be held Aug. 13, at the same place as previous years. K9RBF has a new 51-10. K9RBF has had his first QSO, as the attending surgeon and K2KXX as the attending physician; the new station is now KNRK. A total of 311 messages was handled on the new Net. The CARC's new officers are: K2XV, J. B. ST.
Station Activities (Continued from page 85)


ANOTHER CASE FOR V.H.F.

Let us consider for a moment antennas for V.H.F. As they are physically smaller than a low frequency antenna, it should be obvious that for the same power gains they will be less costly. The converse is also true: that more dollars invested in a V.H.F. antenna will provide greater gain than on lower frequencies.

If the V.H.F. antenna provides 10 db of power gain, which incidentally is possible to accomplish with yagis of practicable size, the effective power is ten times greater than that radiated by a dipole. A good rule of thumb for comparing the effectiveness of an S.S.B. vs. AM signal, each under optimum conditions of receiver bandwidth, is a 2 to 1 gain in favor of S.S.B. In other words, 50 watts P.E.P. is equal to a 100-watt 100-percent modulated A.M. carrier. Hence, if we put 50 watts P.E.P. into the 10 db gain antenna, the radiated talk power would be the equivalent of 1000 watts AM in a dipole.

I'm sure you will all agree that 1000 watts radiated is a substantial signal on any frequency, but let's stick to V.H.F. With this amount of signal on 2 or 6 meters, amateurs should be able to get some scatter transmission effects and thus consistently increase their contact area from purely local ground wave of some 30 to 50 miles out to 150 to 300 mile range.

With these thoughts in mind, we at Hallicrafters have come up with two new transverters. The HA-2 is for two meters and the HA-6 for six meters. These units both function in the same fashion but provide different output frequencies. Here's the way you use them: Connect either one to any 10-meter receiver and transmitter and the transmitter signal will be converted to V.H.F. The incoming V.H.F. signal is converted to 10 meters to feed the receiver. On the transmitter side the transverter will take any input from 10 to 100 watts.

The transverter is a linear frequency converter so that no matter what mode you feed into it, it will convert the input signal to a new frequency. Therefore, if you feed it AM, out comes AM; feed it S.S.B., out comes S.S.B. Obviously it will also convert FM, CW and R.T.T.Y on 10 meters to signals on V.H.F. frequencies.

— R. W. "Bud" Drobish, W9QVA
here are typical reports:

"Sideband never sounded so good!"
"Excellent penetration and an outstanding signal!"
"Full-fidelity voice reproduction—picks up the lows for that 'natural' sound for the first time!"
"Sideband and carrier suppression is tops!"

Here's the transmitter with the sharp, penetrating signal you've been waiting for—plus more exclusive operating and convenience features than any other SSB Transmitter on the market today! A classic of modern communication equipment design, the "Invader" offers instant band-switching coverage 80 through 10 meters—no extra crystals to buy—no realigning necessary—delivers a solid 200 watts CW input; 200 watts P.E.P. SSB input; 90 watts input on AM! Unwanted sideband suppression is 60 db or better! Built-in VFO is differentially compensated. Exclusive RF controlled audio AGC and ALC (limiter type) provide greater average speech power—high gain push-to-talk audio system has plenty of reserve gain for either crystal or dynamic microphones. VOX and anti-trip circuits are extremely smooth in operation—built-in anti-trip matching transformer—adjustable VOX time delay circuit. Mixer-type shaped keying is crisp, sharp—click and chirp free. Single knob wide range pi-network output circuit—fully TVI suppressed. Blocking and operating bias for noise-free T-R switch operation.

Cat. No. 240-302-2—Wired and tested with tubes, crystals and crystal filter. **Amateur Net . . . $619.50

superior to phasing-type units

. . sets a new standard in filter design!

EXCLUSIVE—Now, for the first time, not only better audio fidelity—but balanced audio response in a filter-type transmitter. The only equipment on the market using a specially developed high frequency, symmetrical, multi-section band-pass crystal filter for more than 60 db sideband suppression—more than 55 db carrier suppression! Select either upper or lower sideband instantly with a front panel "mode" switch.
The sophisticated engineering and styling of the “Invader” is unmatched by other equipment within the amateur field—bar none!

Long recognized as the “first choice among the nation’s amateurs”... Viking transmitters achieved popularity in a solid and healthy way. Known the country over as the line that gives you excellent engineering and performance, outstanding dollar value and more features at a popular price... the Viking line now achieves a new pinnacle with the introduction of the “Invader” and the “Invader-2000”. We feel that the creative and imaginative engineering in the “Invader” sets aside “old fashioned” ideas that a unit is good simply on merit of the manufacturer’s name alone! It has to perform—and nothing outperforms the “Invader”!

EXCLUSIVE—Converts to the Invader-2000, an integrated desk top transmitter, with the addition of high power conversion unit. (Remote power supply can be placed in any convenient location.)

EXCLUSIVE—The only transmitter with both limiter ALC and audio AGC for an extra sharp signal! Reduces over-driving and flat-topping—increases average audio level for greater penetration and the best signal anywhere!

EXCLUSIVE—Single-knob wide range output circuit makes it possible to load into just about any conceivable type of antenna!

EXCLUSIVE—Full-time VFO heater element keeps VFO at operating temperature, even with the equipment turned off! No warm-up drift—rock-solid stability!

add hi-power conversion overnight for an integrated 2000 watt desk-top transmitter!

HI-POWER CONVERSION—Take the features and performance of your “Invader”... add the power and flexibility of this unique Viking “Hi-Power Conversion” system... and you’re “on the air” with the “Invader-2000”. Completely wired and tested—includes everything you need—no soldering necessary—complete the entire conversion in one evening!

Cat. No. 240-303-2... Amateur Net...... $619.50

INVADER-2000—All the fine features of the “Invader”, plus the added power and flexibility of an integral linear amplifier and remote controlled power supply completely wired and tested. Rated a solid 2000 watts P.E.P. (twice average DC) input on SSB; 1000 watts CW; and 800 watts input AM! Wide range output circuit (40 to 600 ohms, adjustable.) Final amplifier provides exceptionally uniform “O”. With multi-section power supply, tubes and crystals.

Cat. No. 240-304-2... Amateur Net...... $1229.00

FREE 8-PAGE BROCHURE...

Yours on request... complete specifications and photographs on the “Invader” and the “Invader-2000”!

FIRST CHOICE AMONG THE NATION’S AMATEURS

E. F. JOHNSON COMPANY · WAISECA, MINNESOTA.
FIELD ENGINEERING WITH A FUTURE

From Boston to Seattle

Raytheon field engineers Steve Herzog, K5RMA, and George Mayo, K1LYE, are shown here on a special technical evaluation assignment at one of the Raytheon Electronic Services Division's 17 service centers, situated in major marine and industrial communities from Boston to Seattle, Duluth to New Orleans.

This time they're testing commercial marine radar. Tomorrow it might be an installation project or overhaul and repair. For Raytheon field engineers tackle a broad range of tasks all over the country and overseas. And, with continuing expansion of services, there is plenty of room for advancement to executive positions.

Perhaps you can qualify for a Raytheon field engineering future. Requirements: previous experience plus an E.E. degree or the equivalent in practical experience with guided missiles, fire control, ground and bombing radar or sonar.

Benefits: attractive salary, insurance, educational programs and relocation assistance. For details, please write Ronald Guillarr, Electronic Services Division, 2nd & South Ave., Northwest Industrial Park, Burlington, Mass.
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Special “Bonus” Offer
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5 new-design Log Books and Handsome Cover FREE!

- Designed for round-table QSO's
- Eliminates unnecessary details
- Eliminates note transferring
- Each page is a QSO with basic data logged just once
- Each book is a permanent file
- Fits your desk; measures 8½ x 5½ closed

This new log book puts the fun back in operating by taking the work out of log keeping. Designed for round-table QSO's, you log basic data only once on a page and fill in spaces for each station's call, handle, etc. Each page has a calendar and spaces for traffic summaries, schedules, and notes. You get a neat log as you operate; no more laborious transferring of notes to another book for permanent filing. Get 5 log books and a handsome vinyl cover in which to keep the current book on your desk, FREE with your Heathkit Amateur Gear order of $50 or more!
HEATHKIT®... number one with Amateurs for quality with economy...

KIT HW-10 $199.95

Compare features, performance, and price... and you'll choose Heath's new VHF transceivers, "Pawnee" and "Shawnee"

- Output: 10 watts nominal CW, 8 watts nominal AM - Built-in VFO - Tracked exciter stages for single-knob tuning - 4 switch-selected crystal positions - "Spotting" switch - Built-in low pass filter - Built-in 3-way power supply, 117 vac, 6 or 12 vdc - Push-pull 6360 final rf amplifier - Dual-purpose modulator provides 10 watts for plate modulation or 15 watts for public address operation with external speaker - Push-to-talk microphone - Double conversion with first oscillator crystal controlled, first IF and second oscillator gang tuned - Voltage regulated oscillators - Illuminated slide-rule dial - Tuning meter automatically reads signal strength or relative power output - Squelch and noise limiter controls - Built-in speaker - Heavy-duty AC & DC power cables - Primary fused relay - Complete shielding - Compact, 6" h x 12" w x 10" d - Recommended for the experienced ham kit builder; time approximately 70 hours.

KIT HW-10 (6 meter), KIT HW-20 (2 meter)...$20.00, $17.00, $129.95 ea.

SPECIFICATIONS—Frequency coverage: (HW-20) 240-143.9 to 148.2 mc; (HW-10) 49.8 to 54.0 mc. Noise figure: (HW-20) 5.5 db or less; (HW-10) 6 db or less. Sensitivity: for 10 db S/N ratio, 0.5 uv or less. Squelch sensitivity: less than 1 uv. Selectivity: 15 kc at 6 db down. Image rejection: better than 70 db. IF rejection: 50 db. Output impedance: 50 to 72 ohms, unbalanced. Transmit & receive power requirements: At 6.3 vdc: 14.5 & 8.5 amps; at 12.6 vdc: 7.0 & 4.5 amps; at 117 vac: 120 & 60 watts.
Guarantees that you can build any Heathkit®!

HERE'S THE RIG THAT'S WINNING PRAISES AROUND THE WORLD... THE NEW HEATHKIT "WARRIOR" G-G KW LINEAR

The HA-10 is a completely self-contained desk-top kilowatt linear, loaded with special features! • Amplifier and HV, filament and bias supplies are built in. • Drives with 50-75 watts, no matching or swamping network required. • Grounded grid circuit puts part of drive in output for up to 70% efficiency. • 4 paralleled 811A's, fan-cooled, and 2-866A's. • Oil-filled, 8 uf 2 KV capacitor and 5-50 henry swinging choke for high peak power output with low distortion. • Neutralized, for high stability. • Best value in amateur gear. 100 lbs. 

Kit HA-10...$23 dn., $20 mo. ...$229.95
Assembled HAW-10...$33 dn., $28 mo. ...$329.95


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GREAT LAKES DIVISION

KENTUCKY—SCM, Robert A. Thomason, W4USD—
Asta. SCM: W. C. Albeck. W4CDA, SEC: W4BAY.
F4CE, W4ZSB and KQ5ZE, V.H.F. PALS: K4LOM, KA4
K4WQZ. W4ZSB reports SCM was not pata
nated at the Louisville 1961 Home Show. The public also
was given information on amateur radio, s.s. and Red
Cross activities. Generally it was most successful and
much was learned on how to make it even better next
year. W4KD handled 86 messages in March with good
state coverage. The May 10 net was well attended.
K4OLT and W4ZSB has a perfect attendance. W4RZH
is handling code practices Mon.-Wed.-Fri. On 51 Mc.
W4RQG is experimenting with beta on 15-16-20 mo-
ters. WN4AGH is starting out right with a trailer total
of his first month on the air. W4CDA is painting the
shark. W4WJ is working on CW with Handley and the
newly-formed Nathan B. Shubridge ARC, named in
honor of the earliest inventor of radio and present agent
of Murry, K4RKH worked K4SDC on the lake. K4WJ
was his first DX, ON4IE. K4HSB is rebuilding antennas.
K4COR consists of Frank F. RIFF. Our most active
00 is K4ZRA. ORS reports also were received from
W4RHZ and K4QGR. The Kentucky Colonel certificates
will be sent out back from K4KAT. K4JLF. K4UQZ, P. C. T.
and K4WJ are now back in place for spring. W4KDN
in VA, K4QZE. 14,55, K4LOM, K4WEP, W4WJ, W4KJP
in KY, K4KJZ. W4QVZ, 25, W4KRX, 25, W4ZSD, 25,
in KY 10, K4KCH 9, K4KOL 9, W4XDB 5, W4AGH 5.
2. W4WVU 2.

MICHIGAN—SCM, Ralph P. Tietema, W8FX—
SEC: ELS-1, K4CAO, V.H.F. PALS: D4CQ, 22, W6H
and JTQ, V.I.F. PALS: NOH and PT. Appointments:
PFE as EC: K4KJZ as ORS: JTQ. SWF and TIC as
ORS: W4GFP, W4JPL, W4CAO, W4KQK, W4ZLO and
W4KDL, PALS: K4KOE, vice-pres.: K4RBA, secy.: OY
trans. Oak Park ARC—K4JBLJ, pres.: K4KJE, vice-
pres.: K4KJL, secy.: V.H.F. PALS: K4LJY, 22, K4KOE,
K4BRL, 22, K4JBLJ, 22, K4KJE. 22, K4LJY. 22, K4KOE.
K4BRL, 22, K4JBLJ, 22, K4KJE, 22, K4LJY.
K4BRL, 22, K4JBLJ, 22, K4KJE, 22, K4LJY.
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Beautiful Beams By Gotham
AND THEY HAVE STOOD THE TEST OF TIME!

The Gotham beam shown above is our D103N, for ten meters and Citizens Band operation. Its performance is unexcelled. It sells for only $22.95, shipment by express, charges collect. As on all Gotham beams, the elements are a full half-wave, in a simple Yagi design; all tubing is aluminum alloy; and assembly is quick and easy.

FREE
Send a card for our valuable catalog of 50 different antennas with specifications and characteristics. Gives bands and frequencies covered, element information, size of tubing used, boom length, shipping weight, feed line used, polarization, and other data.

GOTHAM
1805 PURDY AVENUE
MIAMI BEACH, FLORIDA
IS K6INI THE WORLD'S CHAMPION DX OPERATOR?
Judge for yourself! Read his letter and count the DX he has worked—with only 65 watts and a $16.95 Gotham V-80 Vertical Antenna.

2405 Bowditch, Berkeley 4, California
January 31, 1959

GOTHAM
1805 Purdy Avenue
Miami Beech 39, Florida

Gentlemen:
I just thought I would drop you a line and let you know how pleased I am with your V-80 vertical antenna. I have been using it for almost two years now, and am positively amazed at its performance with my QRP 65 watts input! Let me show you what I mean:

I have worked over 100 countries and have received very fine reports from many DX stations, including 599 reports from every continent except Europe (589) I have also worked enough stations for my WAS, WAS, WJAD and ADXC awards, and I am in the process of working for several other awards. And all this with your GOTHAM V-80 vertical antenna!

Frankly, I fail to see how anyone could ask for better performance with such low power, limited space and a limited budget. In my opinion, the V-80 beats them all in its class.

I am enclosing a list of DX countries I have worked to give you an idea of what I have been talking about.

Wishing you the best for 1959, I am
Sincerely yours,
Thomas G. Gabbert, K6INI (Ex-T127G)

OR IS K4ZRA THE NEW CHAMP? Read his letter, and see his diagram of a typical installation and what it achieved:

2539 Christie Place
Owensboro, Kentucky

GOTHAM
Miami Beach, Florida

Gentlemen:
While I was at home last summer, I had occasion to use your GOTHAM vertical antenna on the air for about two months. I was quite amazed with the excellent performance of that inexpensive and simply installed antenna. It did everything you, K6INI, and others said it would, in spite of the generally poor band conditions during the summer months.

During the time I used this antenna, I worked well over 100 DX stations in 44 different countries, earned a WAS certificate, and worked the necessary stations for WAVE, receiving very fine signal reports from all. My rig ran from 7.5 to 100 watts plate input and the receiver was an old military ARR-7 (Hallicrafters reboxed SX-28).

The above mentioned contacts were made with the vertical mounted several inches off the ground, without radials, with only a simple ground connection to the coaxial shield. Later I raised the antenna up about 20 feet and installed the radials and this improved the already good signal pattern and enabled me to pick off another 12 DX countries and other DX contacts in a couple of weeks of good band conditions. In the latter part of August I used several single-band vertical and ground plane antennas and found that the single GOTHAM vertical equalled all these individual antennas.

Another attractive feature is the versatility of installation. It works high or low on ground, with or without radials, mounted in any space. Of course I did find that the best installations were the two mentioned above, but they were fairly simple to arrange, especially the first one!

The GOTHAM vertical is also a superior receiving antenna and I would strongly urge you to recommend that it be used for receiving as well as transmitting.

I just wanted to tell you how pleased I was with the overall performance of your antenna. For an inexpensive, easy-to-install, dependable antenna that really works for both DX and "local" W/K contacts, I don't see how one could ask for more and I would certainly recommend a GOTHAM V-40 to anyone desiring these features. Good luck in 1961 with those FB antennas!

Sincerely,
Daniel F. Onley, K4ZRA

K4ZRA'S INSTALLATION THAT WORKED WONDERS WITH A GOTHAM V-40 VERTICAL

![Diagram of a GOTHAM V-40 antenna installation]

Some Stations worked by K4ZRA using a GOTHAM V-40.
Call, RST, freq. nec. given:

C6IAD - 599-14 W1AW - 599-14 PX1PF - 599-14
C61NR - 599-14 KG1FR - 599-14 PYTAIO - 599-14
C65NI - 599-14 KG4AB - 599-14 SP2KDTJ-599-14
D2BE - 599-14 K1ITB - 599-14 YCGRN - 599-14
EARI - 599-14 K7PVR - 599-14 YASGM - 599-14
EARG - 599-14 KG3DR - 599-14 URFEL - 599-14
ELAM - 599-14 KG7W - 599-14 VPI8L - 599-14
FAEAR - 599-14 KD7DR - 599-14 VPI2L - 7 - 21
G6T - 599-14 K72DR - 599-14 VPI2L - 599-14
G5PPBM - 599-14 L6V - 599-14 VPI2L - 599-14
G6JER - 599-14 QA4OH - 599-14 VPI2L - 599-14
G6MDM - 599-14 KE1FH - 599-14 VPI2L - 599-14
G6YV - 599-14 KE2IE - 599-14 VPI2L - 599-14
H4AT - 599-14 OK9HO - 599-14 VPI2L - 599-14
H8IU - 599-14 ON3JG - 599-14 VPI2L - 599-14
H8JRO - 599-14 PA1MDU - 599-14 VPI2L - 599-14
H8KBP - 599-14 P2JAE - 599-14 YAV5APR - 599-14

All states were worked with very fine reports.

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FACTS
ON THE GOTHAM
V-80 VERTICAL ANTENNA

• If K6IN can do it, so can you.
• Absolutely no guying needed.
• Radials not required.
• Only a few square inches of space needed.
• Four metal mounting straps furnished.
• Special B & W loading coil furnished.
• Every vertical is complete, ready for use.
• Mount it at any convenient height.
• No relays, traps, or gadgets used.
• Accepted design—in use for many years.
• Many thousands in use the world over.
• Simple assembly, quick installation.
• Withstands 75 mph winds.
• Non-corrosive aluminum used exclusively.
• Omnidirectional radiation.
• Multi-band, V80 works 80, 40, 20, 15, 10, 6.
• Ideal for novices, but will handle a Kw.
• Will work with any receiver and xmitter.
• Overall height 23 feet.
• Uses one 52 ohm coax line.
• An effective modern antenna, with amazing performance. Your best bet for a lifetime antenna at an economical price. ONLY $16.95. 73. GOTHAM

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FILL IN AND SEND TODAY!

Airmail Order Today — We Ship Tomorrow

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Enclosed find check or money-order for

☐ V40 VERTICAL ANTENNA FOR 40, 20, 15, 10 AND 6 METER BANDS. ESPECIALLY SUITED FOR THE NOVICE WHO OPERATES 40 AND 15......................... $14.95

☐ V80 VERTICAL ANTENNA FOR 80, 40, 20, 15, 10 AND 6 METER BANDS. MOST POPULAR OF THE VERTICALS. USED BY THOUSANDS OF NOVICES, TECHNICIANS, AND GENERAL LICENSE HAMS... $16.95

☐ V160 VERTICAL ANTENNA FOR 160, 80, 40, 20, 15, 10 AND 6 METER BANDS. SAME AS THE OTHER VERTICAL ANTENNAS, EXCEPT THAT A LARGER LOADING-COIL PERMITS OPERATION ON THE 160 METER BAND ALSO.................. $18.95

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Address...................................................
City......................................................Zone......State......
GAIN ANTENNAS

BUSINESS MEN'S FREQUENCY
or TWO METERS
(144-170 Mc)

FIXED STATION
and MOBILE

Engineers in the Communication Field have tried and proven GAM VHF antennas to give users the ultimate in performance. GAM antennas will give you the "marginal" signal, in most cases eliminate the "dead" spots and cut down on "picket fence" effect. These antennas are end fed through an efficient hermetically sealed matching transformer that is part of the antenna. All models are light in weight and of heavy duty construction.

MODEL TG-3-S

FIXED STATION;
2 STACKED
9 db gain for $45.00

- Gain of 9 db over coaxial antenna
- Heavy duty construction
- Two half wave elements
- Can be cut to frequency
- Mounts on standard 1" pipe
- 52 Ohm impedance
- SWR less than 1.5-1

MODEL TG-2

MOBILE ANTENNA
6 db gain for $14.10

- Half wave resonant antenna
- Gain of 9 db over coaxial antenna
- 52 Ohm impedance
- SWR less than 1.5-1
- Functions without additional elements
- Reduces flutter effect and extends coverage

*As usually installed in mobile and fixed stations

J. C. Erickson, S.D.E., SEC.; NHP, RM; KEX, DAE, VY and K5QNG; P.A.Ms. HZ and KY and B.F.MY, The Queer City Emergency Net's 1961 officers are: K5DGE, pres.; SU, vice-pres.; K3BAQ, secy.; K5MGK, treas.; and HOK, councilor. K5XZ, director. K5RZT, director, and K5DK, treasurer, is the Ohio Council of Amateur Radio Clubs meeting in Lancaster, where your Great Lakes Director UPB and 29 club presidents attended. The OACRC distributed certificates to 10 local council chairmen, K5NCY, vice-chairman, K5DJJM, secy., and AL, treasurer, the 1961 officers. The OACRC is sponsoring another certificate for working Ohio L, which is known to be worked Ohio Ledges Award (WOLA). A national list or a list certified by the RC officer should be sent to K5QIN, 233 S. Armory Ave., Springfield, Ohio, with K5MZW assisting. K5BM and W5LP received their General Class licenses and the latter has a new NC (56). B. S. has a new Health "SQ-1." New appointments are N9H, K9RJY, K5XZ and 500 as others and HCR and K5BPZ as others. K5XZ and K5PZ are new members of the W5G party, and its new 5K5R
delivered the hospital for a police officer. TNR and K9STP both sent me a copy of Smoke Signals from the Ingersoll Ski Club which, like the others, are now available. K5FMR officers are K5SFT, pres.; K5RJQ, vice-pres.; K5PZ, secy., and K5STP, editor. At a special meeting a color film was shown of the receiving tube plant of General Electric showing their manufacturing process, which was: new technicians are K5JF, K5ZD, K5NK, K5QY, K5ZD, and K5FMR which states that OJG spoke to them on "Field In-Hospital Surveillance" at the first meeting and at the second meeting a sound color film entitled "The Tender Win White," a tour picture of the receiving tube plant of General Electric showing their manufacturing process, which was: new technicians are K5JF, K5ZD, K5NK, K5QY, K5ZD, and K5FMR which states that OJG spoke to them on "Field In-Hospital Surveillance" at the first meeting and at the second meeting a sound color film entitled "The Tender Win White," a tour picture of the receiving tube plant of General Electric showing their manufacturing process.

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HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EEF—SEC; W2KGC; RM; W2FPLX and K2QJL; P.A.Ms. W2GQ and W2EQQ in the U.S. and K2LWQ, ke. at 1000; NYSPSTEN on 1025 ke. at 1800; ESS on

(Continued on page 100)
room in your shack at a premium?

THE GONSET GSB-201
RF LINEAR AMPLIFIER GIVES YOU BIG POWER IN SMALL SPACE

★ 1500 watts P.E.P. input gives full peak kilowatt for sideband.
★ 12½ inches wide, 8 inches high, 17 inches deep. No external power supply needed.
★ Industrial-designer styled, soft gray enamel, all controls up front, full-vision metering plate MA. and relative power output.
★ Full bandswitching, 80-40-20-15-10 meters.
★ Four 811A tubes, grounded grid.
★ Can be driven by exciters of 65-150 watt class.

$399.50

*P.E.P input is approximately twice average d.c. input.

Division of Young Spring & Wire Corporation 801 South Main St., Burbank, California
HOW FAR do you think your voice would be heard with a five dollar rig? Not very far! For the same amount of money invested in the American Radio Relay League your voice, no matter where you are located, can be heard in Washington, D. C., in Atlantic City, in Geneva, or wherever Amateur Radio is cussed and discussed. As a bonus you get the best balanced magazine in amateur radio; each edition with something for almost everyone from beginner through the most advanced ham. Your investment gets stretched even further when you consider the many services which the League makes available to its members: technical aid, license information, legal advice, literally dozens of awards and contests, and the opportunity to participate in the organization through a myriad of field appointments, such as EC OO, etc.

THE LEAGUE is “Of, by and for” the amateur. Its board of directors is elected by the membership and is responsible to them for its actions.

ACH AMATEUR is as important as the next and when he speaks his voice is heard. If you are not already a member join now and LET YOUR VOICE BE HEARD. Non-hams are invited to join also. They don’t have the right to vote but they do get QST and can become full members as soon as they get their licenses.

QST and ARRL membership $5—additional licensed family members at the same address $1. $5.25 in Canada, $6 elsewhere.

THE AMERICAN RADIO RELAY LEAGUE, INC.
West Hartford 7, Connecticut

3500 kc. at 1800: MHT (Novice) on 3761 kc. Sat. at 1300. Appointments, W2DQW, W2H2Z, W2AJD and W2FHTC, GBS; W2BAIU as GES. Endorsements: K2EIU as ORS and OPS. A 5-kw. gas-driven generator is reported by W2KUS. Active in traffic is W2LTP with a T-50 and a home-made receiver. The Wannam Club solved its housing problem and now is meeting in a school. With code and theory classes, the Upper County Club had three moves at its March meeting. Boston Division Director W2KR was a guest of the Schenectady Club. K2DEM will be operating K1PGQ with traffic from New England. Paul, at a boys’ camp during the summer, K2EIU/3 is completing his senior year at R.P.I. Congratulations to K2ML, our new R3, who is manager of the ENS Net. W2JSZ now is operating from a new shack on the campus with construction assistance from club members at R.P.I. The A. B. Davis HS Club, W2YSU, is having a monthly operating contest for members. W2GMB is a new General Class licensee in Pelmam Manor. New officers of the Upper Co. Club are W2BYG, vice-pres.; K2ION, treas.; and K2WN, board mem. The family team of W2AHZ and W2AJZ has a new DX-60. Not a new rig but a new harmonic in the addition at W2AGF and W2DBH. RACES citations for service were given to W2DJST, W2KAE, K2JSN and K2ZJD by the New Rochelle C.D. Director. New officers of the New Rochelle Club are K2JSN, pres.; W2AJZ, vice-pres.; W2AFC, secy.; and W2DJST, treas. K2BYC was first to qualify for the Q Century Club on 220 Mc. Traffic: K2BB 163, W2THI 162, W2AJQ 163, W2FEU 163, W2KUS 85, K2Z7Y 43, W2QF 17, W2PHX 12, K2KRY 10, K2K7P 17, K2HYD 16, W2KPK 9, K2EUI 8, W2XPA 4, W2LTP 4.

NEW YORK CITY AND LONG ISLAND—S6CM, Harry J. Dannles W2TUK—SEC: W2ADO, R3M; W2GXC, PAM; W2UOF, V.E.P. PAM; W2EW, Section note: NLI, 3600 kc. at 0000 GMT nightly and 3015 GMT on Sat., NLI (early) 3600 kc. at 2300 GMT nightly; NYC—LIC, 3008 kc. at 2300 GMT nightly; Traffic Net, 143.8 Mc. at 0130 GMT Tue., Wed., Thurs., BPL cards were earned by K2UBG, W2EW, W2GPT and W2KUS, the latter club also received QSLs. W2GPT has now earned her BPL medal and becomes the second YL medal holder in the section. CQ—fascinating. W2GPT passed her Class exam and hopes to send her brother, W2AEJ/9, in Indiana. Now that W2GKZ has completed his last station of the 20.15 and 8 meters, Phil, W2GPT, wants to work you if your school is interested. K2QBW is engaged in amateur space communications planning. New officers of the Amateur Radio Society of CCNY are W2PVG, pres.; W2DQW, vice-pres.; and W2HJSK, secy.-treas. K2HJTX reports the formation of a 6-meter RACES net.

NEW YORK STATE QSO PARTY

June 10-11

See page 85

in Huntington Township, which meets at 0100 GMT Mon. on 50.460 Mc. K2MEJ now is using a four-element beam 10 meters. W2AEJZ is a new call in Dix Hills. Officers of the Culhoun HSARC, W2KCR, are W2IAXC, pres.; W2KPK, vice-pres.; and Sharren King, secy. W2BWO reports the 12th BPL on the W2C Traffic Net. Our section is ideally suited for traffic-handling on 2 and 6 meters and all license classes can participate. Pls. let us not run in on 40 mc. and see enjoyment you can find in handling traffic. W2FMP is the new 6-meter EC for Kings County replacing K2JAL, whose services were greatly appreciated. Many QSLs are being received relative to 229-Mc. activity in our section. If you operate on this band, please inform this office so that I can publicize the activity for others to see. A 5894 final for 482 Mc. is under construction at W2EUE. K2WPW is putting the finishing touches on his 180-watt transmitter for 2 and 6 meters. W2NID keeps raising skeds with his dad, W9VNN. Put a big red circle around the date Oct. 14! The Hudson Amateur Radio Council will hold the 1001 Hudson Day Conv. on that date. I will be operating at W2YKQ/2 on Field Day if your club wishes to send its QSO message direct. If you can’t participate in the ham rig and give the fellows and gals at their portable sites (Continued on page 1025)
Put your signal—

WAY OUT YONDER!

—with

STATIONMASTER®
Base Station Antenna
Cat. No. 200-509

- FREQUENCY RANGE ...................... 144-174 Mc
- OMNIDIRECTIONAL GAIN .................. 5.8 db
- MAXIMUM POWER INPUT ................. 500 watts
- NOMINAL INPUT IMPEDANCE .............. 50 ohms
- BANDWIDTH ........................... ± 0.3%
- VSWR .................................... 1.5:1
- RATED WIND VELOCITY ................. 100 MPH
- WEIGHT .................................. 30 lbs.
- ELEMENT HOUSING LENGTH ............ 19'

Communication Antenna Systems for American Business

Communication Products Company, Inc.

MARLBORO  •  NEW JERSEY
BAND-SPANNER, an exclusive Webster design—distinctive—fine looking on any car—a top performer on 80-40-20-15-10 meter bands (and MARS frequencies)—one of the finest antennas for use with multi-band equipment. Easily handles transceivers with power inputs of 100 watts or more: Collins KWM-2, Sonset 6-75 among others.

Loading inductor is wound directly on upper portion of strong, lightweight fiberglass support column. Exact resonance anywhere within any band is obtained by simple, plunger-type adjustment of stainless steel top whip. Winding is contacted internally, is encapsulated in durable epoxy for lasting exterior protection. No exposed joints to corrode, no frilly plastics involved. Strong! Durable! Unaffected by moisture.

NORTHERN NEW JERSEY—SCM J. Sparka received the FIACC Award for the best QSL card of the year. His card featured a new antenna design—BAND-SPANNER. The antenna is lightweight and easy to install, and it provides excellent performance on all bands from 10 to 80 meters. The QSL card also included a message from SCM Sparka thanking the FIACC for the award.

MIDWEST DIVISION

IOWA—SCM Russell R. Marcus, WBQDR—Asst. SCM: Walter G. Porter, OJUIC, SEC: KEBK, PAM: KEOE, RA: PZ00, March contest for the IOTC is 28 sessions, 202 QSOs, 329 QTC. The 160-Meter Phone Test will hold its Annual Festival at Webster City June 11. Webster City—WQEK and WQER have a new home at 124 N. 1st St. (Marx). WQER 250, WQKB 240, WQHJ 220, WQJK 200, WQKA 180, WQKY 160, WQLE 140, WQMD 120, WQME 100. Webster City—WQER 91, WQEB 78, WQFB 62, WQGC 58, WQPD 54, WQPH 50, WQPK 42, WQPL 38, WQPM 30, WQPP 22, WQPR 16, WQPS 8.

WEBSTER Mfg. 317 Roebling Rd, South San Francisco, Calif. Gentlemen: Please send free booklet, "Mobile Antennas—Simple Steps to Peak Performance."
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FREQUENCY COVERAGE
3.5 - 4.5 MC
6.5 - 7.5 MC
13.5 - 14.5 MC
20.5 - 21.5 MC
27.7 - 29.7 MC

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POWER INPUT: 200 watts PEP on SSB
175 watts on CW, FSK, PM
100 watts on AM

CHOICE OF: LSB, USB, AM, PM, CW, FSK

INVERSE AUDIO LIMITER
PERFECTED AUDIO FILTER
POWER OUTPUT CONTROL
SILICON RECTIFIER POWER SUPPLY
21 MONITORING SCOPE
LOAD MISMATCH PROTECTION
DOUBLE HETERODYNE CIRCUIT
NEW MIXER CIRCUITS

CARRIER SUPPRESSION: At least 50 DB.
SIDEBAND SUPPRESSION: 50 DB.
CALIBRATION ACCURACY: 1 KC.
UNWANTED MIXER PRODUCTS: Down in excess of 50 DB.

AUDIO RESPONSE: Approx. 200 - 3800 Cycles.
OUTPUT inherently matches load impedances of 52 - 72 ohms.

 REGARDLESS OF PRICE....

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IN CONSTRUCTION, WORKMANSHIP, EASE OF
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**DK60 SERIES COAXIAL RELAYS**

(4 different models, A.C. or D.C.)

**STANDARD RELAYS INCLUDE:**

- DK60 — SPDT r.f. switch.
- DK60-G2C — SPDT r.f. switch with DPDT auxiliary contacts.
- DK60-G2D — DPDT r.f. switch with DPDT auxiliary contacts.

**r.f. SPECIFICATIONS:**

- **Low VSWR:** less than 1.5:1 from 0 to 1500 mc.
- **Losses:** 1.5 db or less at 1500 mc.

**MECHANICAL SPECIFICATIONS:**

- **Contact Open:** least 10,000 cycles.
- **Contact Resistance:** 500 ohms.

**DOW-KEY COMPANY**

Thief River Falls, Minnesota

**KANSAS—SCM—Raymond E. Baker, WOFNS—
KCN, Net. SEC.: LOW, KEM, OGK, ONF, V.H.F. PAM: HAJ, Section nets: KPN, 3300 kc. Mon., Wed., Fri., 1240 Z, Sun. 1400 Z, NCs KQEQ, Ear, WOOF, ORR, OGS, 3300 kc. daily 0000 Z. SAF, TOL, BYV, KOBX, Kansas Storm Net, 3300 kc. Mon. through Sat., 0000 Z, NCs are the SEC and ECs. The Net has been active and the Net has been active since it was founded, 1947, and has now been active since it was founded, 1947. We wish to thank all the members who have been active and the Net has been active since it was founded.


**NEBRASKA—SCM—Charles E. McNoel, WOEXP—
SEC.: KOTB, The Nebraska Emergency Phone Net, EGQ NG, ham QNI 1062, QTC 72, informal traffic 131, QTC 72, reporting Nebraska, KORL NR, QNI 1333, QTC 627. The Nebraska 57-Meter Morning Phone Net, KODC NG, reports QNI 1333, QTC 627, QTC 72, reporting Nebraska, KORL NR, QNI 1062, QTC 72, reporting Nebraska, KORL NR, QNI 1062, QTC 72.

**NEBHAF—SCM—Raymond E. Baker, WOFNS—
KCN, Net. SEC.: LOW, KEM, OGK, ONF, V.H.F. PAM: HAJ, Section nets: KPN, 3300 kc. Mon., Wed., Fri., 1240 Z, Sun. 1400 Z, NCs KQEQ, Ear, WOOF, ORR, OGS, 3300 kc. daily 0000 Z. SAF, TOL, BYV, KOBX, Kansas Storm Net, 3300 kc. Mon. through Sat., 0000 Z, NCs are the SEC and ECs. The Net has been active since it was founded, 1947. We wish to thank all the members who have been active and the Net has been active since it was founded.


**NEW JERSEY—SCM—Raymond E. Baker, WOFNS—
KCN, Net. SEC.: LOW, KEM, OGK, ONF, V.H.F. PAM: HAJ, Section nets: KPN, 3300 kc. Mon., Wed., Fri., 1240 Z, Sun. 1400 Z, NCs KQEQ, Ear, WOOF, ORR, OGS, 3300 kc. daily 0000 Z. SAF, TOL, BYV, KOBX, Kansas Storm Net, 3300 kc. Mon. through Sat., 0000 Z, NCs are the SEC and ECs. The Net has been active since it was founded, 1947. We wish to thank all the members who have been active and the Net has been active since it was founded, 1947.
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144-174 MC BAND

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6.1 DB GAIN STACKED JAYPOLE ANTENNA

The first mass produced stacked dipole array — the Hy-Gain Model ED-150 — available at amazingly low price. Produces highest gain (6.1 db) of any commercially manufactured stacked dipole 150 mc antenna. With 9.5 db gain in one favored direction with a slight reorientation of staggered dipole positions. All aluminum (wt: 18 lbs.); complete factory preassembly. Constructed to withstand 100 mph winds with ½" radial lee load. Iridite treated for resistance to corrosion.

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COMMERCIAL DUTY GROUND PLANE

Hy-Gain Model GP-150 is an extended 3/8-wave ground plane developing 3.4 DB omnidirectional gain. All aluminum (wt: 4 lbs.). Ruggedly built to withstand 100 mph winds at ½" radial lee load. Completely Iridite treated.

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Lowest cost base station antenna available — yet built to commercial duty standards. All aluminum — Iridite treated. Ideal for small two-way systems when price is important. Model GP-150, $5.40

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New design stainless steel Model MW-150 1/4-wave rooftop mounted vehicular whip. High impact cycolac molded base mounts easily from top of roof with unique positive grip locking mechanism. Solderless connector for RG8/SU cable. Whip only is easily replaceable.

3.4 DB GAIN 1/4-WAVE ROOFTOP MOUNTED WHIP

Double effective power both receiving and transmitting with the Hy-Gain MWG-150 mobile whip. Extremely flexible stainless steel whip only 52" high. Hermetically sealed matching inductor. Single hole top mounting base and solderless RG8/SU connector.

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NEW ENGLAND DIVISION

CONNECTICUT—SCM Henry B. Sorage, jr., WICH—SEC; FOR, RM: KYQ, H.P. PAM; YBH, T.E.F. PAM; PHP. This section's net schedules and frequency are the same as reported previously. KNYQ has 34 PLP again and advises the UN held 31 double sessions handing 356 messages. The averages were 12.8 for the first session and 3.1 for the second session. The second was 15.0 on the first and 5.1 on the second. High QNI were Ks KZM, LQW and WIRFJ. KSSPD 1 is Asst. Radio Officer. The Daytime Communications in Greater\nVV is back after a two-month Florida vacation. BDJ attended conventions and visited clubs. KIVR is getting interested in traffic work. EFW as 4OS; KMOV regular alarm for his car to protect his mobile equipment. KAN had a run go out from under him while 43 feet up his tower. Fortunately, he did not fail. RFJ reports the following new hams in the Stratford Area: KNJc REP, QVX, QHU, QCR, QCP and KIDOE, KHTY worked four new counties, thus bringing him over the 100 mark. He has a new 20-meter ground-plane too. KQY operates KITY Sun., mornings on 3640 ke. KIS is building a new exeter and modulator. FCH and MFX are erecting a 65-11, fruit-juicer-man-vertex. Wow! YBII has a new HJ-190 and reports the CPN handled 216 messages in 31 sessions for an average of 7.1 Averages: Daily attendance 22; net time 51 minutes. Mi-\nted net: Salton Roll: KIOQR, YBH, KIOQR, BHP, DAV, KIMBA, KBIII, MLT and VHR. PHP says (CVN) handled 25 messages in 14 sessions with a total of 58 stations calling or working in. High KDX in KJZC, KIRC and JZA. New stations were KNRKZ and KIOQV from Tor-\nton. KRCFW says that the COQ had 4 sessions with 4 stations end 4 stations working in. KAINX had a new receiver. BBS is active on 160 meters, KLA VNV and KML have new trimmers. The Spiritian ARC now has the end of their CQ. Its members are now working on the net work. Connecticut had 507.9 per cent attendance at 1K sessions during March. Let's make that 100 per cent in the future. Results received: OQ 01, KITHD 01, KGHU, KABH, KIVW, VEQ and RAN; OQs from KVYV and KIMIX. New appointments: KIVR as ORS, Ap-\pointments renewed: HJG and FCH as ORS; FOM and HJQ as ORS; Traffic: (Mar.) KIVYV 5050, AV 220, YBH 228, KIVQ 223, KOSOKA/K 26, 2M, WRCI 161, KICSH 163, WJNJI 161, KIDQ 102, QVW 90, KIVX 81, KIVT 61, WCHW 57, EPW 57, HFP 45, KIMIZ 51, AQK 41, KINJI 27, KIDUT 31, MBA 24, WIRFJ 21, CFT 25, NTH 19, KBII 16, QY 12, YV 9, CUSH 8, KIDQ 5, WJNJI 3, Feb.) WJNJI 188.

MAINE—Acting SCM, Herbert S. Merrill, KJDIA—\nNew appointment: YYV as ORS. Certificate endorsed: KQVQ as ORS. The PTN meets daily at 1900 on 3556 ke. The SQG meets daily at 1730 on 3726 ke. The Maine AREC Net (released net for ECGs) meets Sun., at 0500 on 3940 ke. Don't forget the Augusta Herald. Maine at a Picnic Club, West River Road, Highway 104 North. Advance reservations ($2.00) should be mailed to YVU at 1131 Cozy St. by June 30. With ORS as chairman and WMF as MC, it promises to be quite an event. An innovation this year will be an auction by ORS. TVP has been operating portable transmitters around Jacks. He has land miles 20 miles off the coast. KVI (the PAWA station) operated portable from the Portland Sportsman Show and created a great deal of public interest. SQG is a new DX-190 and has the spring mobile fleet. Also new are KIkKX, KIMX, KINQ, KIOQ, KICSH and YVY. TOZ, QIO and GPS have each here on a spring cruise to Jamaica. KIBWB has moved to Vermont. FCS is on with an HJ-39. ROB is making plans for a ham-\nfest in August. The Cumberland County Net has elaborate plans to load up the world's tallest verti-\nical with a kw, for Field Day. KIROQ is in the 18-\nmeter beam. KJN and UDD are both home and doing fine after a stay in the hospital. KIMBA has worked two thud sessions for his WAC. Recent reports: KINQI at Togus VA Hospital are KFY, WRZ, ZLT, KIHAU, KIBAV and KIDFC. The Sea Gull Net re-\nsults 192 pieces of traffic with 37 sessions. ORS, KICSH 167, MZB 95, MIP 27, KSSG 69, WQOJA 69, GQG 69, KIN X 49, WIPW 36, KIMD 31. BEZ 17, KKMID 16, KIVVP 16, WIO 16, QX 11, KLHE 10, WLNK 9, KIOQ 9, YW 9. KIRV 3. PKH 2.

EASTERN MASSACHUSETTS—SCM, Frank L. Basker, jr., WIALP—SEC; AQG. We still have many towns that do not have an EC. Any Radio Officer who is a member of ARRRL and whose town does not have an EC is welcome to write us. Heard on 7 meters: QVQ, KIRK, RJC, DXQ mobile, Ks KED, JAD and ORA. Heun on 2 meters: VQI, UQQ, YPH, MJP, MJP, MJP, LCBM, KNIs QEQ and QQI. KID5 is on 10 meters. KJ5 and KIDF are on 6 meters. BVP is in Coast Guard OCS at Yorktown, Va. KIVCH has a Valiant (Continued on page 108)
ASK THE MAN WHO OWNS ONE...

AND LISTEN TO THE DIFFERENCE!

HAMMARLUND
HX-500
SSB TRANSMITTER

★ SSB, DSB, CW, FM, FSK for RTTY plus 40 cps identification keyed shift.
★ Carrier suppression 50 db or better.
★ Unwanted sideband suppression 50 db or better.
★ 3rd and 5th order distortion down 30 db or better.
★ Spurious frequencies down 50 db or better.
★ 80, 40, 20, 15 and 10 meter bands.
★ Tuning accuracy better than 200 cps.
★ AND POWER THAT COUNTS—OUTPUT POWER OF 100 Watts P.E.P.; 100 watts CW; 25 watts AM; 100 watts FM; 100 watts FSK.

It doesn’t take long to hear the superiority of the HX-500 SSB Transmitter as any owner will tell you. He’ll tell you about the true TALK-POWER first—resulting from the restricted speech range... then he’ll get into the details about operational features such as separate dial scales for each band, the fact that all crystals are included at no extra cost, and all about the built-in antenna changeover relay. Most of all, he’ll brag about the solid contacts he’s made with his HX-500. In fact, if you don’t change the subject, you’ll never get away from him.

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Experienced engineers can enhance their careers in this expanding program by providing professional engineering services on complex electronic and electro-mechanical equipment at military installations throughout the United States. A few overseas assignments available after initial assignment in Continental U.S.A. Dependents are permitted at all times.

Challenging positions are available for those who possess a degree in electronics or an equivalent education, including experience in the design and/or maintenance of analog computers and radar. A knowledge of the theory of flight, navigation, aircraft piloting techniques and instrument flight is desirable.

All qualified applicants will receive consideration for employment without regard to race, creed, color or national origin.

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Model S-402 Features...

- Excellent Forward Gain and F/B Ratio!
- Efficient Link Coupled Feed!
- 100% Rust Proof!
- Heavy-wall 6061-T6 Aluminum Boom and Elements!
- 2 Elements for True Beam Performance!

"Forty" is the hot band now and the all new Mosley Signal Master Beam is the antenna to give your signal real authority! This rugged beauty is designed and engineered to provide the performance you need whether you are DX hunting or relaxing in a pleasant rag-chewing session.

You'll want a Mosley Signal Master Beam... see it at your favorite Ham Equipment Dealer's store!

Amateur Net, $124.50

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EQUIPPED FOR SERVICE

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TRADES—Liberal allowances for commercially built ham equipment, especially late models in particularly good condition.

USED GEAR—A diverse inventory of late model used equipment, realistically priced. Our list is frequently revised and we guarantee satisfaction.

TERMS—We carry our own contracts. We're flexible, our charges low, $6.00 per hundred per year on the unpaid balance over as long as 24 months or more.

RESPONSE to your inquiry will be rapid, will be by mail. We'll give you our best offer first and no high pressure. We would like very much to have the opportunity to quote on your requirements.

REQUEST FOR QUOTATION (Please Print)

I have the following used gear to trade: (Please use this code to describe it.) 3. Like new, little use; 4. Minor signs of use, no major blemishes; 5. Good condition, with minor modifications; 6. Has major modifications, or requires major repairs.

I am interested in purchasing the following equipment:

New □

Used □

No obligation to buy is implied.

Name: 

Street No. of R.F.D.: 

City: 

State: 

RHODE ISLAND—SCM, John E. Johnson. 11AY—SEC: PAZ, RM; 8MU, PAN; TXX: Endorsement: WED 11 on OBS, RISP, report 21 sessions, 206 QRM, 120 traffic; OBS reports: TXXL and 8MU, OBS reports: KIDZ and PNP. The NRCC of Newport had as its program for the month KLRB and OTRH, ex-BPM, who spoke of their activities in amateur radio. Newport Area home taking part in the C.D. Training Program and TXXL, inceptor, JFK, JHP, ETFM and KIDPS. The WIAQ Club of Rumford issued WRI Cert, No. 8 to KI2JE. HXV was elected to membership and KINST received the General Class ticket. The WIAQ Net meets at 29.2 Mc. every Wed. at 2100 hours, has been very successful because of the efforts of KIIHOMO, LGX, NRS, C. LEE, CZD, R0N, WKIZL and KIDZ. The KIDQI Club of Tolman H.S. has completed its DX-40. At its last meeting three of the new members took the Novice class exam. TXXL has a 24 hour class exam for 80 and 40 meters. KIDZ has a new home-brew transmitter on 6 meters and JYO has a new HQ-110 receiver. CFT in a hurry looking for his box on the RISP, Traffic: W8SMU 788, TXXL 295, KIGRC 42, DX2T 26, K0I 26, BWC 8.

(Continued on page 118)
...For your convenience here is the latest list of OCDM certified TMC Equipment by classification...

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<td>SSB 205</td>
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<td>OCDM R-02</td>
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<td>OCDM SE-100</td>
<td>SBE-2</td>
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Wire mounted, plated crystals for use by amateurs and experimenters where tolerances of .01% are permissible and wide-range temperatures are not encountered.

Just any crystal in any oscillator will NOT combine to produce spot frequencies. These crystals are designed to operate into a 32 mmf load on their fundamental between 1000 kc and 15000 kc. Overtone crystals operate at anti-resonance on 3rd mode and series resonance on 5th and 7th mode crystals.

- **HOLDERS**: Metal, hermetically sealed. FA-5 and FA-9 are HC/6U pin type while the FM-9 is an HC/18U pin type.

- **FREQUENCIES** (Specify crystal type and frequency when ordering.)

<table>
<thead>
<tr>
<th>Fundamental</th>
<th>FA-5 and FA-9</th>
<th>Price</th>
<th>FM-9</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 - 1499 kc</td>
<td>$5.75</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500 - 1799 kc</td>
<td>$4.95</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1800 - 1999 kc</td>
<td>$4.40</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000 - 9999 kc</td>
<td>$3.30</td>
<td>8000 - 9999.999 kc</td>
<td>$5.00</td>
<td></td>
</tr>
<tr>
<td>10000 - 14999 kc</td>
<td>$4.40</td>
<td>10000 - 15000 kc</td>
<td>$5.50</td>
<td></td>
</tr>
<tr>
<td>15000 - 20000 kc</td>
<td>$5.50</td>
<td>15001 - 19999.999 kc</td>
<td>$6.50</td>
<td></td>
</tr>
<tr>
<td>Overtone (3rd)</td>
<td>10 - 14.99 mc</td>
<td>$4.40</td>
<td>Not available</td>
<td></td>
</tr>
<tr>
<td>15 - 29.99 mc</td>
<td>$3.30</td>
<td>20 - 39.99 mc</td>
<td>$5.00</td>
<td></td>
</tr>
<tr>
<td>30 - 59.99 mc</td>
<td>$4.40</td>
<td>40 - 59.99 mc</td>
<td>$5.50</td>
<td></td>
</tr>
<tr>
<td>60 - 75.99 mc</td>
<td>$4.95</td>
<td>60 - 89.99 mc</td>
<td>$6.50</td>
<td></td>
</tr>
<tr>
<td>76 - 99.99 mc</td>
<td>$7.15</td>
<td>90 - 100 mc</td>
<td>$8.50</td>
<td></td>
</tr>
<tr>
<td>Not available</td>
<td></td>
<td>101 - 110 mc</td>
<td>$10.00</td>
<td></td>
</tr>
<tr>
<td>Overtone (7th)</td>
<td>100 - 137 mc</td>
<td>$9.35</td>
<td>Not available</td>
<td></td>
</tr>
</tbody>
</table>

Overtone crystals are calibrated on their overtone frequency. They are valuable for receiver-converter applications and are NORMALLY NOT UTILIZED IN TRANSMITTERS, since only a small amount of power is available under stable operating conditions.

- **CALIBRATION TOLERANCE**: ±.01% of nominal at 30° C.
- **TEMPERATURE RANGE**: -40° to +70° C, ±.01% of frequency at 30° C.
- **DRIVE LEVEL**: Recommended, maximum 3 milliwatts for fundamentals; up to 80 milliwatts for overtones, depending on frequency.

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Stacking Kit AS-62 $2.19

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2—Reflector
2—Directors

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Stacking Kit AS-6 $2.19
A2-10 2 Meter 10 Element Amateur Net $118.88
Stacking Kit AS-2 $1.83
A14-15 1 1/2 Meter 10 Element Amateur Net $118.88
Stacking Kit AS-1/2 $1.26

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Meetings are held the 2nd Tue. of each month. Officers are ELL, see.; KTHSF, vice-pres.; QGF, sec.; KTHI, ass't.; KTHM, val.; KTHW, rec.; and KTHN, treas. The WARTS Picnic is scheduled for July 8 and 9, possibly at Lake Watauga, where it has been held in previous years. JTR has a new 15X-500 transmitter and Command reader. ATINP dropped the "N" from his call. KTHP has returned to his old stomping ground in Spokane. KTNLD has an Apache with an 8B-10 a.s.o. generator. Nine clubs out of fifteen have ratified the constitution of the Puget Sound Council Amateur Radio Clubs (PSCARC). The Ray Johnson Co. donated two full-size beams for 10-15-20 meters to the Boeing Club of Seattle. KNYLIC is able to receive DX contacts and has received a Code Proficiency certificate for 35 w.p.m. KLJCCR 1, ex-WTRZP, is renewing old acquaintances at Seattle. KTRH is preparing for the construction of his 80th state. NXF has a new tower and rebuilt his quad. KN7s OPX and OFW are having a race to get 15X. KTTR is working on a new quad. K7BQ and K7DET, a husband-and-wife team from Missoula, Mont., recently moved to the Richland Area. K7CDQ, mobile, assisted by W7s JHH and ORS, obtained special Medical-Hospital attention for a Mount Vernon Boy Scout who received a broken leg while on a skiing outing near Mount Shasta. The VARC had eleven successful Novice and two General Class licensees from its code and theory classes. K7JY was named FD chairman of the VARC to defend the National Championship. YFO is on a yearly roundup of all his ARCC members in Hawaii County. DZM still is having trouble, K7KCI is home from the Coast Guard and tending to his S.O.S. and P.S.S. K7KKNZ is starting to look for NCSs. QZY is covering the Whitman County Area for new ARCC members. AP7 joined the ranks of Silent Keys Mar. 29. At a recent meeting of the Twentyn Echo Club, the members made a visit to Pacific Lutheran University to view the closed circuit on TV. The club also will assist with the communications in the Driftwood Parade. K7AXD is chairman of the FD program for DK, the Tacoma Radio Club. BTB has a new tribandiner and is working on. BC purchased a new transmitter says he might go on the air after three years. CWM says he is very QRL MARS. AMC is all hopped up over the Annual Hamfest to be held in Bremerton. The Lewis County ARC would like to encourage a competition with some other radio club in the state. Traffic: (Mar.) W7BA 1118, DXZ 797, QLH 238, GYF 375, K7KTY 149, W7APN 121, W7HDX 99, AMC 88, KTNLD 64, W7XWJ 38, JZB 38, USO 29, AIB 20, K7BBO 15, W7BDB 10, IST 5, OMO 4, JCB 2, (Feb.) W7QGL 16.

PACIFIC DIVISION
NEVADA—SCM, Charles A. Rhines, W7VIII—The NARA had a fine talk by John Kippen on "New Developments in Infra-red" at its March meeting. K7NUF and KNOHY are new hams in Reno, K7KLY is making use of a Slide Mt., recently K7KZG is back in Reno. AHA and family visited in Elko. C7ZJ is building a DX-60. OHB was in an auto accident—no injuries, except the heater, but is active again and has been repaired as an OO. BJY joins the Boulder City gang on 144. M. Your svt. JD, had a perfect year for reports during 1960, but because of your SCM's other duties, he will not get reported in April QST. Traffic: W7KHZ 31, K7CZJ 2, ETN 2.

SANTA CLARA VALLEY—SCM, W. Conley Smith, K6QIX—KEEY marries Dorothy Florence on Mar. 24 and sailed for a Hawaiian honeymoon aboard the Matsonia. On board was W6ATC, Dorothea, who volunteered as chef for the Palo Alto Club's Field Day. The club plans to enter the; five-transmitter class with a well-organized schedule for all operators. W6IHY will be in charge of SCCAR's Field Day. W6LW, the new SCCAR station, is activated each Thurs. night. New gear, new antennas and operator scheduling add up to fun for all. K6BDB is static, K6DMW, K6GID, W6NGG, W6GGMX and W6GGE keep their rigs hot and receivers open on 144.5. It's a sort of continuous round-table. K6BDB has a new BI47 Gain very 70c. W6VHM has his RTTY set up in full operation. K6GZ has returned to RX8 as regular APO liaison. K6BDB has his BI47 in industrial management and finds all the more time for the hobby. Traffic: K6KBC 456, W6OLQ 211, W6VBY 132, W6DEF 121, W6ATT 164, W6AOQ 91, K6KZG, W6ABN 89, W6XM 37, K6GZ 54, K6GZ 62, W6UAC 45, K6YVG 34, W6ZLO 24, W6AKG 17, W6OII 11, W6PLG 6, K6QZE 3, K7SMH 2.

EAST BAY—SCM, B. W. Southwell, W6OJW—SEC: K6QDM. Ecs: K6TYX, K6VXK, K6ESE, W6FAR. (Continued on page 118)
CX2CO, "one of the world's top rated phone DXer's," writes us that his new E-V Model 664 microphone has resulted in "better and more consistent QSO's." Considering his DX record—over 270 countries—this is indeed quite a statement. He adds that, even under "severe conditions of propagation and interference," most contacts report "normal reception and 100% understanding" of his transmission. This, CX2CO claims, is due in large measure to the improved modulation provided by his new 664 mike.

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Our May issue, for example, contained 40 pages including "10" watt 6 Meter Transmitter" by the Radio Society of New Jersey (K2AP); an article on Satellite Scatter by K2GWB; Propagation Forecast, "2 meters with an 829B" by K1CXX; "Customizing your SIREX" by WAZGWB; "VHF Combine" by WA2CWA; 'Rabbit Ears for 6" — a revolutionary approach to old ideas; plus a regular running W.A.S. column, free "Trading Post", pages after pages of pictures, an Author's Contest, APX-6's and where to get them and countless other articles of worthy note.

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W5WAI and K6HTJ, KOGGEY/6 is located at the missile site in the Bay Area and is going on 144 Mc. W4ALVX/6 is a new ORS in Arroyo and made BPL Jan. and Feb. March. Congrats. Many operators state that some s.s.b. operators are not identifying properly. W6BNX is getting some 30-Mc. gear together. Trailing ales are needed for NOON-25. Another VHF Global is 899-A and is going up to 4-watt high power. W6PZC is warming control circuits for his RTTY gear and antenna-equip patch panel. The K5ARC used W5M, 10 at 10 John H. and during the annual auction Mar. 17, the HARC's TVI Committee received a nice letter from the FCC office regarding the agency's cooperation in handling Trailing. W6BTE and W6KTI in the 30-Mc. beam with 50 watts, W6ADD is recovering from a burn injury. Get well quick, O.M. W6TUE is in the hospital with a broken knee, W6AIC lost his antenna because the retarder cut the guy wires, W6JNO still is heard on e.w. while awaiting his new DX-60, K7IDH/5 has opened new office space in the old weather shack. HARC's club paper, K6QFL has a Viking Vulcain 2, a Matchbox and an 8X-7 receiver, W6ALY has an ARS-12 and 44-20 receiver, in Heber Memorial Hospital, Trailing; (Mar.) W6ALVX/6 928, W6BNX 107, K6GK 155, K6ZV 64, W6NFI 33, W6MID 2, (Feb.) W6ALVX/6 241, (Jan.) W6ALVX/6 216

SACRAMENTO VALLEY—SCM, George R. Babson, W6BTE—sec., K6KIV, E.S.C., K6BXX and K6GTO, ORS: W6AF. P.M.: W6GGS, O.O.: W6WLI. K6GDO and K6BGR, ORS: W6CRI, ORS: W6PVI, O.PS.: K6EIL, W6PH and W6GQS. The SCM will welcome radio operators from the many clubs throughout the section with reference to their elections, meeting times and places and activities. This month we spotlight the Northville Radio Club which, its president says, is the smallest but one of the most lively of the ARRL groups in the Valley. Officers are: W6PHW, pres.; W6WLI, vice-pres.; W6VIEZ, secretary; W6VIEZ, activities. The club is kmeen-in-field in Deep Valley and expects to make a big splash from Groveland. SCM will hold their 3rd meeting of each month at the Oak Community Clubhouse. Your SCM will attend the Pacific Division Director's meeting Apr. 8 and learn of the visit of ARRL Sec.-Gen. Mgr. Hinton to Sacramento in June. Check with your local radio club presidents for the exact data, time and meeting place. We are fortunate to have a man who can address us, so let's all turn out and give WILLY a big welcome. (K2AP) on article on Satellite Scattering to the South Sacramento Exchange Club recently. W6BNK is on the air with a KW6I-2 and the trimmings and expects to put up his new KW6I-2 soon. W6WLI has a new 20-meter home-made converter, W6GGS transmits Bulletins on 14,000 kc at 0100Z, K6ER is leaving plate-power transformer troubles. W6GQV is active in the Call-Covering Emerson Emergency net on 19900 kc. Traffic: W6CRI 10, K6GF 6, K6ZV 2

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPI—The Tulare Amateur Radio Club holds every Wed., night from 7:30 to 9:30 at the c.d. office. The Tulare Radio Club also is re-conditioning parts for W6BHO, and theory classes every Wed., night from 7:30 to 9:30 at the c.d. office. The Tulare Amateur Radio Club, also is rebuilding parts for ORs who are required to relearn their work, in order to build up a transmitter. Anyone who has something good, send it to Box 186, Jamestown, Calif. K6MKS worked 7 new counties in March. W6GRH has a 54-ft. crank-up tower with a 20-meter beam. The NOC is looking for outlets in the Modesto, Merced and Yosemite Areas. 3836 kc 300 watts on 77 meters. The Tulare County Radio Club has changed its meeting nights to the 4th Fri. The K6BBA had 27 sessions, 445 contacts and a check-ins and a traffic count of 100. W6GKS is putting up a new 80-meter antenna. W6MNS has a 625 W6HMR, 2-W6HMR is running a 4-diplex power in his mobile with 100 watts, W6FIS and W6GGS a new car and a new rig for mobile work. W6PWEI has worked 33 states, W6GGS transmits on W6GGS's mobile. W6VJZ is rebuilding his KW6I-2 S.S.B. K6GTO got his mobile receiver working. W6BSS is on 40-meter s.b. with a 65A. W6SVK is back in Fresno, attending Fresno State College, and is on the new HT-37. K6GISD is having trouble with power W6EPH changed all filters in his final power supply and is back on the air using his NC-290 l.s.b. K6GTO got his mobile receiver working. W6BSS is on 40-meter s.b. with a 65A. W6SVK is back in Fresno, attending Fresno State College, and is on the new HT-37. K6GISD is having trouble with power...
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ROANOKE DIVISION

NORTH CAROLINA—SCM, B. Riley Fowler, W4RHE—PAM: W4RBC, V.H.F. PAM: W4ACY, RAJ: K4CPRX, The Tar Heel Emergency Net has been organized, with W4EYZ replacing W4QC as net manager. W4DUL replaced W4TTA as net secretary. K4CPRX is the new Net Manager of 540 stations. The net operates on the second Sunday of each month at 2000 W4CPI, of District 8-A (Winston-Salem, Forsyth County), sends a very interesting report on local T-Bone RACES activity. These nets are doing a swell job with their service to the community. Other ECs should contact them to get some excellent ideas. W4BFW, W4DUL for AREA 1-A, reports on a MARS event attended by 75 members with 75 full members, 6 mobile units and 3 emergency units. I would be happy to hear from other ECs on similar projects as I do from W4CPI. Some of the traffic routes list needed help when I see it. I cannot help it. I can’t be a WICX, QSL photo, photo of the people, etc., etc. I am always interested in new ideas.

SOUTH CAROLINA—SCM, Dr. J. O. Dunlap, W4DGY—SEC: K4PJE, PAM: K4HLE, RAJ: PED, W4CIXO has a new linear on HT-32A using three 8812s. C.D. 3-meter activity is booming around Columbia. W4CPI and W4TTW are on 6-meter until further notice. W4DUL for Florence, W4TTW has been re-endorsed as OBS. The Charleston ARC, with W4YVG as president, entertained W4DUL on his recent visit. The ARC of Greenville has a class of seven to take the Novice exam; the club has 35 members—well above their usual 40.

VIRGINIA—SCM, Robert L. Folmar, W4DQY—SEC: W4VMA, PAM: W4GDP, RM: W4L, K4XMC, K4KDP, W4QDY. March brought some interesting changes in our sectional leadership appointments. W4VMA, who was the EC of Hampton Roads Peninsula, is now our new SEC. W4L is the new 40-Meter Net Manager over from K4QER, who has resigned. Ann did a nice job as V8N mg. and later as VN leader. The Roanoke Club sent their AREC applications from 37 of their members! This is great and now we need an EC to take care of this group! The club has 60 full members and 14 associates. The following clubs publish their AREC papers: Roanoke, Lynchburg, Tidewater and Alexandria. The T4ARC ran a contest for a name for its paper, which K4AJ won with the name The Tidewater Times. Unfortunately, our section rose to 4th place in the national standing with AREC! We lost the services and presence of K4LBP, who was transferred to Philadelphia, Pa.

WASHINGTON—SCM, Donald B. Morris, W8RM, The West Virginia Hamster will be held at Jackson State College on July 10 and 9 with VMP of North Charleston, as general chairman. Better plans to attend. The (Continued on page 120)
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NO. 900 10-15-20-40-75
NO. SSB-156 40 & 75 M.
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11 Met. 5 Ft. L $8.95
11 Met. 35 In. L $8.95
11 Met. 45 In. L $8.95
15 Met. 5 Ft. L $8.95
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40 Met. 6 Ft. L $9.95
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Also see Collins KW-2 at Harris Radio Corporation Fond du Lac, Wisconsin on Friday, July 7, Sat., July 9.

WYN C.W. Net publishes a swell Newsletter to net members. The Bliemhorst Radio Club has received its club call, K8101. Three members have received General Class Novice licenses: K8219, K8VU, and K8XK. The 4th member, K8YI, is on Techs; K8PHE, K8UEH, and K8VAI. New Novices are K8WDJ, K8MTY, K8M18, K8YBQ, K87T2Z, and K8TUNA. GWR is in and operates frequently from Ritchie Co. K8CSS, V8M, K8BIT, and T80 visited the East River ARC. K8DUO, the editor of the East River ARC Bulletin, states that in California, SEC is for W5A, as new recruits ARRC members. GIU, the editor of the Elkina Radio Club and the members publish a very informative Bulletin each month. K4AVU, president of the Clubs Club states that "they plan to win the '61 Field Day. Anyone interested in helping should call us up." With plenty of knowledge, W9Q and N9Q are finding DX at 40 and 7 Me. V.f.f. activity is increasing by leaps and bounds throughout the state, with Clarksville, Parkersburg, Chariot, Weirton, Wheeling, and Bridgeport reporting active sets. Traffic: K9XYN 79, W9H 68, K9CNB 39, W9QX 21, UYR 12, K8JLF 8, JRX 4, W9SUB 2.

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COLORADO—SCM, Donald S. Middleton, W0NIT—SEC: SIN, PAM; C9X and IJR; RMs: MBX and WM9E, O8B8; K9DCC and K9OPD. Send news and reports to 208 W. Adams. The new Denver Metroplex in Area EC is KOOQ, HNN established a QNI record on March 23 of 33, WYX and DCW were 1st and 2nd winners of the Rocky Mountain Campaign. Denver Hamfest is to be held July 16 and the Pueblo Amateur Radio Hamfest June 3 and 4. CCQ reports that the ARRC membership has now reached 20, W9VW and WQ9 new Glee Club names. They are organizing the Glee Club. EC CEZ is writing an ARRC Disaster Manual for Boulder County, VLS, and KOVL of Denver. W7M1 uses her commercial 1st-class phone ticket in March, NIT was speechless when the PARA president presented him with a silver cup and a certificate for 28 years of service. W7DZ handled 9120 W2 messages in March, WWJ is preparing a 100-watt signal. YLA, CPN editor, says they could use some more subscribers. KINQ reports a 2- and 4-letter contact between Thornton and Colorado Springs. SIN and others participated in the Denver Easter Parade for crippled children. Traffic: K9WDY 884, QCC 885, H8B 832, WOBS 814, QEO 828, K9DCC 112, WO6MY 84, K9QY 847, W7W 35, W7CCH 83, K8KTY 16, EKV 14, K9DZ 2, K9CQ 8, W9WY 2.

UTAH—SCM, Thomas H. Mill, K7ZV—Ass't SCM: Col. John H. Sampson, W7CCX. SEC: R7HEL, OFV/7 found a lucrative position in W0-Land and has left a hole in the state's traffic-handling chores. March was a good month for the Beehive Utah Net. BRAT awards went to OCX, Q9Z7, QJU, K7S 1MB, COAL, and IQQ. OCX also earned the BRAT Award on W2VY. It has been suggested that BUN be run on W7VY. Plans for the Rocky Mountain Division Convention have been completed and it promises to be a big affair. A program of top-notch speakers has been arranged. Entertainment for XYLs and children has been arranged. Remember the date: June 15-18. See announcements elsewhere in this magazine for further details. Traffic: K7WP 486, W7OXC 183, W9WV 21.

NEW MEXICO—SCM, Newell F. Greene, K5QI—Ass't SCM: Carl W. Franz, ZH111, SEC: BQC, PAM; W7U, VHF, PAM; FBQ, RM; ZH11. The Breakfast Club meets Mon. through Sat. at 0900 MST on 3580 kc. NMVEPN meets Tues. and Thurs. at 1800 and Sun. at 0700 on the same frequency. The NWMP meets Mon., Wed., and Fri. at 1300 MST on 3570 kc. Our Director, OCX, was a visitor in Albuquerque and met with the Caravan Club and the RAITTS. LEP and party trekked to Four Corners where one can operate 5/10/D at one time. K3ZCA hopes the DX on 40 meters will come back to the new Invader. VC has a new Zedus on 8 and 10 meters with a potent signal. Don't forget the Rocky Mountain Convention in June 17-18. How about more reports? Traffic: W7ZIN 812, UWB 106.

WYOMING—SCM, Leland D. Branson, W7AMU—The pony express W7AMU net meets every other Thursday on 2000 Mhz on the Wyoming Jackalope Net Mon. through Fri. at 1300 MST on 3555 kc; traffic: the YO Net is a c.w. net on Mon., Wed., and Fri. at 1300 Mhz on 3550 kc. Exciting Hamfest dates will be July 22 and 23 at Deer Haven in the Big Horn Mountains between Buffalo and Worland. WYX, AXG of Basin, WY, who was 83 years old, passed away on March 30. The funeral was held at Basin on Apr. 3. He had been a ham for about 25 years. The WYX Net is on 2000 Mhz. K7MRX and K7XML were visitors at the Casper Radio Club meeting on Apr. 4. K7MAT ships CX2CX, Montevideo, Uruguay, on 10 meters. The Casper Radio Club publishes...
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EASTERN FLORIDA—SCM: Albert 1, Humel, KESIH-SEC; WHWH, RA1, K4KDN, PAMs: WADD (Continued on page 124)
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**WESTERN FLORIDA** — SCM, Frank M. Butler, Jr., W4RKH-SEC: W4MLE, PA4: W4WEB, RM: K4UBR. St. Petersburg: A group of W. Florida hams met to hear WINJ, National Ec, speak. W4H6C handled traffic for Industrial Arts teachers during a meeting at F.S.U. These and many more W4WEB, K4AJP, K4AR, K4QV, W4MLE and W4RKH attended the F.S.U. C.D. Comm. meeting in Jacksonville and met with the SEC and other SECs of E. Florida. W4LJ-SEC, SR, for a good FD site, W4DIY and W4MLE are working on plans to tie together the Ga. and Fl. Emergency Nets. Quincy: K4QV is the new SEC for Gadsden County. K4QV built a new 65-watt e.w. rig. Chatnooga: W4P7 will be active on 75-meter phone soon. K4M7E is on the air, but operates 40-meter e.w. on his vangs. Port St. Joe: A phone net similar to that of QFN, is being considered. Send your ideas to W4WEB. Monticello: K4DIA (K4IQ) is OLR school radio. K4DIA is College, plus announcing at the local HC station, PL: Walton: The KARS is buying a 2-meter transceiver to better the work it has in c.w. W4ERS is equipped with s.s.h. soon to plans work out. W4UBB is experimenting with v.h.f. while W4ATA takes over QFN. Pensacola: The NASO classes are going well. K4FOG writes an interesting column in Goosnart, the NASO paper. W4LAH has a new KWM-2, V.H.F. club members mixed out of the communications of the sports events near Pace. W3HU/J-4 is a contributor to Highbinder. Trailing: (Mar.) K4BDR 233, W4MLE 155, W4WEB 134, K4VD1 100, K4DBF 20, K4QD 4, K4ran 11, W4MLE 2. (Feb.) W4MLE 28, (Jan.) W4MLE 75.

**GEORGIA**—SCM, William F. Kennedy, W4CFJ—SEC: W4PAJ, PAPA: W4LXE and W4CH, RM: W4DOY. The GECN meets on 3955 ke. at 1830 EST. The air Thurs., and at noon Sun. The GSN meets on Sun. at 3955 ke. at 1900 EST and 2200 EST with W4DIY as NEC. The 74-Meter Mobile Net meets each Sun. at 3955 ke. at 1330 EST with W4DIY as NEC. The GSN meets each Thurs. at 2200 ke. at 0900 EST with K4QV as NEC. The Atl. Ten-Meter Phone Net meets each Sun. at 2000 ke. at 1900 EST with W4HEGE as net mgr. The Ga, S.S.B. Net meets Mon. through Thurs. at 2000 ke. at 2000 EST with K4QV as net mgr. The Atl. Radio Club Phone Net meets at 2100 EST, 21.30 ke., each Sun., night with W4DOAC as NC. On March 31, many RACES in Ga. These require emergency communication were Unadilla, Ga., Columbus, Ga., and West Point, Ga. W4FPC operated as net control station for the GECN from 1140 GMT Fri. until 1800 GMT Sat. April 1. Staci...

(Continued on page 125)
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- And that's exactly what you get!
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Club was held at the home of W8RCD in April to host one-day visitor MABPBW of Middle-East sideband fame. The regular meeting of the DX Club was held at the home of W8BESL. W8BFD worked PYTLY on 7 Mc. on a new country. Kentucky DX Covair, recently enjoyed a two-month vacation. The Annual Newport Spring Banquet, held in Santa Ana in mid-April, was a success. The Covair Club held a swap-night, and much gear changed hands. K86FI has helped two Navy patients with back injuries by using them as electrode amplifiers and backbuck- on how to work for their licenses. K82KL reports problems from the North Country after a trip. He can't find a good hill for Field Day, W619W is still on s.s.b. with an FT-247. W82AD was No. 27 for W6LRI. K63HBM has a Heath linear he was building driven by his 100-watt amp. K62V converting his rig to s.s.b. with an 850-10. Trailing W81YDLK past K65EKI, W856J, W8CJD 359, K6KBD 177, W6ATB 118, W6JLQ 56, K6KRC 46.

SANTA BARBARA—SCMC Robert A. Henke, K8CM—SCMC is busy building a 75-meter s.s.b. rig something like W4IP is using. The York Mountain ARC's officers for 1961 are W81WD, pres.; W8ALKU, vice-pres.; W81XV, secre-tary-treas. FC for the 900-meter area is W82XGA. K8CMO has his 2-meter antenna up and is now on 2 meters for good. W821QV0 will be on 2 meters when the bugs are out of the transmitter. W81JRA finished building the 2-meter Heathkit transmitter and is putting out a FB signal on the node. W82XDR is just getting a code and the class at his shop in San Luis Obispo. K81KRP is planning a trip to the South Pacific to F0-land. He plans to be on the A8BRS with 10-meter s.s.b. This is quite a switch for an n.m. operator. Field Day is coming up so let's have a big turnout from the Santa Barbara section. Traffic: W81YCF 34, W81WU 6, W8LV 2.

WEST GULF DIVISION

NORTHERN TEXAS—SCMC L. L. Harbin W8NBB—By the time you read this the tornado season will have come and gone in the West Texas area, we hope, and it is good to know that the hams in that part of the country were again all there. It is prepared for any emergency that might come up. Much interest is being shown in AARC and RACES and attention is being given power plant equipment and power supplies. When I stop in Tulsa, Osawata County, the Mid-Plains ARC has several mobile units with easily-located dipole antennas and a 3.5-kw. portable power supply. When I requested K7RIL to try to get more news from the East Texas area I did not expect him to stir up a hornet's nest but he almost did. Thanks, Dell, and I will get the news as soon as I have room for it. I am working on the assumption that news is news if you have not heard it. K7XVZT is still on s.s.b. with a 100-watt FM-3 receiver. "Morris won a Collins 755A-1 at the West Gulf Convention in Dallas and his YGQ gave him a new HT-77 for Field Day. Our biggest advantage is we have the only HT-77 in the state and have been able to provide the operating time. We have several mobiles in service. And we have the dipole antenna. Did you know that there are more than 175 licensed and active hams in the Tyler and Smith County areas? Many of them have mobile equipment. K8HIB, advisor, Harrison County has a new c.d. communications director, R. Z. Rozman. Mr. Rozman has been active in communications work since 1949 and is a holder of commercial phone and telegraph as well as amateur Extra Class license. To date he has published 398, K8NBB 185, W8RY 130, K7ILJ 77, W8NKE 72, K8NBR 55, W8YW 32, W8WI 27, K7PH 19, W8CF 18, W8IL 3, K5KZA 8, BDKX 4, W8CF 4.

OKLAHOMA—SCMC Adrian V. Reno. W8DRZ—SEC: W8NPS, W8NPZ is the SW Section. W8KHH, Holdenville, KS8NHX is a new Novice in Tecumseh. A new Novice in Temple is KNNHL, K3ZCK is now on 20 meters. W8KHD, who was recently in contact with Peru. PAA has a new 300-A and an 840-A. The Northwest Oklahoma V.H.F. Society is now an affiliated club. I was recently at the Poteau, Okla., call-in. Congratulations. New officers of the Wheatlake Amateur Radio Club are K8IER, pres.; M. A. Roanes, vice-pres.; S. T. Ewels, secre-tary-treas. K8KDR, assistant editor, are doing a fine job on the Oklahoma Central Club V.H.F. News. The Tulsa Electra- nomic Bureau is a unique group of people who do a fine job. The Tulsa Amateur Radio Club is putting out a new Tulsa amateur information book. The Oklahoma City Amateur Radio Club, K8ZEP, is doing great. K8EVP, Henley, Okla., has a 930-A and an 840-A. On Mar. 10, TIV came out of the YL-OM Contest with a T1CC certificate. K8ZBS was high-score operator in the Sweepstakes. K8IPA was the Oklahoma City V.H.F. Club, K8ZEP, P.W. RIW-30 and W8VDE are now on 2 meters. Traffic: K8HIZ 283, W8NDS 231, W8ZJ 165, W8JZ 12, K7LJ 77, W8AD 65, K8AUX 65, W8KY 46, K8LZF 37, D8U 3, K8IFX 39, 8514, K8LEG 28, W8WAF (Continued on page 139).
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Council Bluffs, Iowa

21. KADLP 21, WAMBX 10, PNG 18, KVJOY 17, OOV 15, WSADD 14, GIQ 13, KLHRRX 8, 13, KTVYR 12, WAWX 12, KSHARK 10, WBNQ 10, KXTHY 10, INC 9, WIPSW 8, KCBC 6, WEBC 4, KJJO 2.

SOUTHERN TEXAS—SCM. Roy K. Egginton, W1SSG, PO Box 310, Shreveport, La.; W1SHE, W1SHEI, KM10, K2RRF, are the EC at Port Lavaca. K1LJ is the president of the Edna High School Radio Club. K2PP is the proud owner of a new Warneki Kilowatt. The 7200 Trans-Net had 46 sessions, 1501 station checks-in and 369 messages. We are sorry to lose K4SHS/3 from our traffic nets. Notice is due out on another new key for the club's work.

We are also losing DHR, who is moving to Fort Stockton. Hurry back, tellers. ZPD and ITA soon will be heard on this new key. finals of the Houston Amateur Radio Club are DSH, pres. P. M., vice-pres. K2PP, secy. AB2RD, program; K2DOL, members. Don't be glad to report them to the club, Kiwi walking, after being in the hospital with a broken leg. THTT and his DXF visited in Houston. JHT, a confirmed hambasher, as thought, finally told to Dan Cupid. Congratulations. Don't forget the STEN Convention at Victoria on June 9, 10 and 11. If you miss it you will miss one of the best. Trufle: K2MKO 91, JFP 40, WSZPD 14, K2WQ 6.

CANADIAN DIVISION

MARITIME—SCM, D. E. Weeks, VE1WDB—Ass't SCM; SCM, H. O. Hilliard, VO1CH; A. W. Street, VE1CH; VE1CH, W. H. Hare, R.H. We work promo meetings at 9:00 p.m. YQ8K. 9508K is re-entering the post of Ass't SCM. The St. Croix Valley Club plans to hold an informal get-together and dinner at the Lampoon Hall, St. Stephen's Church, on July 6th. Further details are available from any member of the club. The NARRA plans to hold its Annual Meeting and Program on Grand Lake during the latter part of July. OZ and XIII have returned from an interesting vacation in Florida. QV 6 is on 6 meters. AHB is active on 11-MHz. AHB, ARRL, Congratulations. on A-3, and A-8. ADM is on 80-MHz, with an HT-37. The Fredericton Radio Club has been reactivated and interest is keen. Field Day preparations are nearly completed. Maritime clubs, Trufle: VE1ADD 40, OM 28, VQ 16, DB 12, 9ZB 4.

ONTARIO—SCM, Richard W. Roberts, VE9ING—Activity was at its highest in March. The Sky-Wide ARC operated the booth at the Sportsmen in Toronto and your SCM was very pleased with the results. CWA hit his fourth BPL and also has an A-1 Operator Club certificate. VE9AD is on 44-MHz. VEK9D, BGB and DSR also are on the same frequency. Carleton University has a new club at Ottawa with S6K, pres. L. M. Gay, secy. VEK9D, VEK9S, Duc has an FCC phone. FOV is active. Windsor is getting ready for the Ontario ARRL Convention to be held Sept. 29 and 30 in the Prince Edward Hotel. The club is housed in a house recently purchased. Y3U is back after a trip to Florida. BMB works PB DX on 80-M. The Ottawa Valley Mohawks have a new cub callert. BHA and WAB also are now mobile. Y5U is back from Florida. 5GO visited the Ottawa gang. The Skywide ARC, came up with an 80-MHz bulletin. BCB is editor. ASA is now a resident of Bermuda. DMK is active. DVK is Class A. Northshore hold a DInner May 6 at Pickering. HEN is off to Belleville. CQZ is to the coast, also ATL. AIVZ is on 2-meter mobile. VEY is now Class A in N. Bay. AML is Ontario SEC and is available with us as a speaker. Contact him well in advance. TO and JU were guests of the Niagara Club. CHF is a Silent Key. He will be missed by many and remembered by all. DTA, DVK, NMQ and others from Philadelphia, Pa., at a convention. NG, DZA and AAA were mobile at Meaford during Easter. TX is getting the goods again. AML is managing the Laurence Net, on 2755-ke. phone. Our QSL manager, requires your self-addressed stamped envelope to send you your QSL cards. DXE take note, please. Trufle: Atl 741, BZB 177, DPO 109, NG 122, CYX 179, AIL 68, BAG 66, CFR 57, EHT 54, NO 59, COO 27, DTA 32, DTV 20, BJR 28, AML 22, KAM 20, BZU 15, VP 10, ANT 7, DLC 7, DU 4.

QUEBEC—SCM, C. W. Skarstedt, VE2DDB—Our thoughts now turn to the great event of the year. Field Day. The South Shore gang, last year's winner, hopes to repeat last year's wins. Jules Ralino, KH2RR, will be the award circle. Three QSLs from stations displaying the club stamp, plus 50 cents, will entitle you to a diploma. All members are ARRL Log B. Members are all, W2AOZ, BCB, BQO and RM, W7QMU/VE8, who has done line traffic work up North, expects to return to the

(Continued on page 118)
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32S-1 Transmitter .................. 666.00
516F-2 AC Power Supply ......... 115.00
516E-1 12V DC Power Supply .... 270.00
75S-1 Receiver .................. 520.00
312B-3 Speaker .................. 32.00
312B-4 Speaker Console .......... 195.00
30S-1 Linear Amplifier .......... 1556.00
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2 AND 6 METERS ON ONE CHASSIS
WITH SEPARATE RF SECTIONS
LETTINE MODEL 262

Powerful 45 to 50 Watt VHF Transmitter
With Mobile Connections and A. C. Supply

The 262 contains the identical RF sections of the 2 meter
212 and the 6 meter 212A transmitters on one chassis, with
a single 212 audio and power supply section. The only
switching necessary to change bands is in the filament cir-
cuit. The separate RF sections make RF switching unnec-
esary, providing the same high efficiency of single band
transmitters. Each IF section has its own tubes and circuits,
xcluding the 0-250 grid tank and detector. Each tube has
its own filter, 12AT7 erasal mike amplifier, 6H6 audio
crane, 250-W class K 100% push-pull plate modulator.
574G rectifier. Two separate antenna outputs are provided
with coaxial connecters on the front of the transmitter. These
are connected to switch boxes, controllable from the front
panel, matching antennas from 50 to 100 ohms. The 262 uses
standard 1 inc. crystals and will operate with the Lettine
VFO. A socket is provided at the rear for relay connections.
Cabinet 9 x 12 x 4 inches. Weight 35 lbs. WH ether mobile
from a Pe-108 dynamotor. Completely wired and ready to
operate.

Price with eleven tubes and two crystals—$137.50.
Send Full Amount or $25 With Order—Balance O. D.

LETTINE RADIO MFG. CO.
62 BERKELEY STREET VALLEY STREAM, L. I. N.

States in June, C1 and DR helped JF get his "untele-
ligible speech" working. DR's fleet storm beam效率
will be replaced by a new TM-8, while WY is investing in
a 2M-4. LZ, who signed /W for some time, is now
back and now he concentrates on 20 and 40 meters, c.w. and
phone. EC reports TK and HO are reliable members of
the Quebec Phone Net. BG, AZ and JF are planning a
field trip to the La Tuque, Min. QG plans to
travel and secure her ticket and now signs SW. The
Annual BERU Test saw much less activity despite
outdated rules and heavy baggage from a recent storm. WW appears
to be a top score, while YU, NY, AYY and many others
were reported. JF's signal on 75-meter phone has increased tremendously since he acquired
a new Apache transmitter. WT reports increased activity
in the QCN C.W. Net, with 25 sessions and 200 messages
handled. Ml spent some time in the hospital but is
back on the air. AGA, a new OGS, is a very ac-
tive transmitter now. AGU is looking forward to summer yachting.
E0s mobile installation is almost ready.

Trailie: W7GLU/VE3M 115, V2QAM 12, WT 121, DR
107, EC 19, DJG 14, AJT 12, AFS 9, JZ 9, AGG 8, QG 7,
APR 6, AUE 4, BVD 3, ED 1.

BRITISH COLUMBIA—SCM, H. E. Savage,
VE7FB—ASC, Chilliwack ARC, operates a DX-35
and an HQ-19X receiver with many active members on
the air. R8, BFW and AOG are active on 25 meters. KN
won the Federal Competition for Regional Superinten-
dent of Radio Regulations DOT for B.C. AEW took his
bride, S8, to his bride, B8, to his bride, B8, to his bride,
and his bride, B8, to his bride, B8, to his bride, B8, to his bride,
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and his bride, B8, to his bride, B8, to his bride, B8, to his bride.
The Royal City ARA's call is RR. A man of Shirbey, B8, has
a real 34M-12 in Medien, Sask., DK has completed his Cheyenne
and RETSM/A course. For information on the OK Hamnet to
be held in OK on July 25-26, contact F8BUX, F8BCB
and OHS, laments no DX on 10 meters. A8G has re-
tired from the BCAEC Net to the garden for the summer.
He is now growing to Island culture. IR, his XYL and
his XYL had a serious mishap with their car. Both are doing well. Net reports: RM AIG has
awarded the SNC to AIG. BFW and AGY. Before you leave us, AOT, we all want to thank you
for the hard work you did on the BCCN, BCAEC Net reports: March 27, check-in 1330, traffic
94, verbal messages 334, BCCN manager BAZ re-
ports: Sessions 60, traffic 172, RM AAF reports the slugs are gone. MW reports on 2000 kc. Net Privacy
will see if we can see how traffic is handled before going to RCTN
on 2850 kc, which works at 15 words but will go slower on request. FF confirm. Trailie: VEZAMW 19, FB 18,
DH 11.

MANITOBA—SCM, M. S. Watson, VE4FY—The
WARA is sponsoring demonstrations of ham radio to
some of the Winnipeg high schools. A successful 5-
meter transceiver hunt was held in March with CT,
KP and FY taking the honors. The March meeting of
the NECC was featured a demonstration of RTTY by BJ. Both the beginner and advanced classes
are arranged by the ARLA in cooperation with the Win-
nepeg School Board and are in session. France McClen
and RT, as instructors. RR, of The Puma, has
been appointed PAM for Manitoba to replace JW, whose
term has expired. UX, FQ and JQ have been
asked to take up bamboo poles for qdrs. It is with deep regret that we record the passing of
AY of Morden, Man., on May 12 after a brief illness. Trailie: VE4FY 32, KN 15, PE 18, QD 8, TE 6, RR 4.

Keyboard-Controlled C.W.

(Continued from page 48)

After the operator has struck the AR key and & or
KR keys to conclude a transmission, he should
(1) strike the BLANK TABE key three or more
times, and (2) commence the sequence for the
next transmission by perforating the distant

(Continued on page 134)

TRI-BAND-QUAD

$1.00

COMPLETE PLANS

M N O

No Slubs
High F to B
Very Broad

High Gain
Low S. W. R.
30 lbs. Max.

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AMERICAN GELOSO V.F.O.’s
Wired, tested, calibrated, ready for use. Mod. 4/104 for driving one 607 or 6146 final in AM or CW under Class “C” conditions. Mod. 4/102 for driving two 607’s or 6146’s final. Has 5 bands, supplied with Mod. 1647 dial ass’y. Mod. 4/103 for 144-146 mc bands. Combines VFO primary freq. of 18 mc with xtal fundamental freq. of 12 mc. Supplied with Mod. 1647 dial ass’y.

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Sub-Miniature 0-200 Microampere Meter
A high quality instrument made by International Instrument Co. (Model 100). Only 1” in diam. Ideal for limited space applications. A natural for transistORIZED grid dip oscillator as described in QST.

DYNAMOTORS
Brand new, recent military production, high efficiency, compact
12 Volt Model Rated output: 625 vdc @ 225 ma. 9” long, 5” dia.
Wt. 16 lbs.

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“Wonder Bar” 10 Meter Antenna
As featured in Nov. 1958 QST. Complete with B & W 3013 Miniductor. Only 8” long for 10 meters. Wt. 5 lbs.

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Versatile Miniature Transformer
Same as used in W2EWL SSB Rig — March 1958 QST. Three sets of CT windings for a combination of impedances: 600 ohms, 3200 ohms, 22000 ohms. (By using center-taps the impedances are quartered.) The ideal transformer for a SSB transmitter. Also uses: interstage, transmitter, high impedance choke, line to grid or plate, etc. Size only 2” h. x 3/8” w. x 3/4” d. New and fully shielded.

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MAIL ORDERS PROMPTLY PROCESSED
SAME DAY SHIPMENT FROM STOCK

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525 Jericho Turnpike, Mineola, N. Y. • Pioneer 6-8686

TRADE-INS WELCOMED
station's call letters three or more times, or his own station call letters three or more times. Then as a given transmission nears its conclusion, the following action takes place in this order:

1) Transmission comes to an end by signing to the distant station.

2) Blank tape reaches the keyer sensing pins, stopping the keyer motor and positioning all equipment units to "receive."

3) The next transmission to follow from the keyer is already headed up, and will instantly engage the keyer sense pins the moment the operator strikes the "start" key.

Of course, there will be variations from these suggestions, depending upon rates of speed being used and other factors.

The operational methods outlined above have definitely proven that tape keyer operation is expedient and convenient in most phases of c.w. activity.

---

**HBR-16 Product Detector Circuit**

(Continued from page 81)

longer overdriven at the signal levels developed by the HBR-16 when the i.f. gain is advanced to the point where the i.c. and S meter become operative. The resultant audio reproduction on s.s.b. signals is distortion free, for all practical purposes, even though the over-all receiver gain is such that the S-meter readings are off scale."

Ted also has been asked frequently about the advisability of broadening out the i.f. a la W7P1K's letter in December QST (page 45). His reply is that all fellows want the selectivity that goes with the ordinary method of alignment. But it doesn't cost anything to try it both ways if you're interested.

---

**Field Day Rules**

(Continued from page 61)

are connected to transmitter or receiver voids the "independence-of-mains" and "battery power" multipliers.

Multipliers do not apply to Class D and E entries.

*Final Score:* The final score equals the total "points" multiplied by the "power multiplier" multiplied by the "independence-of-mains" multiplier (multiplied by the "battery power" multiplier, if applicable). Where different multipliers apply during the Field Day period, points are multiplied by the multiplier in effect at the time the points were earned.

II. Club Aggregate-Mobile Scores: Entries under Class C may be combined to form a "Club Aggregate-Mobile Score." The club name must be noted on the individual reports, and the club secretary must submit a claimed aggregate score. Credits to the extent supported by the reports submitted to ARRL will be allowed. Only bona fide members of the club, residing in the club territory, may contribute to the aggregate-mobile club listing.

12. Reporting: Mail reports or entries on or before July 24. Reports must show starting and ending time of FD operating period, bands used, dates and contact times, calls of stations worked, signal reports sent and received, and ARRL sections or locations of stations worked. Reports must also show power inputs and sources of power, number of transmitters in simultaneous operation, location of station, number of persons participating, class of entry, and score computations.
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NEW 30L-1

order it now for early delivery. Collins new 30L-1 Linear Amplifier is a compact unit with 1 KW PEP input. It’s the same size as the famous Collins KWM-2. The 30L-1 is compatible with any 100 watt exciter. Other Collins features include: RF inverse feedback; automatic load control; self-contained power supply; silicon rectifiers; and high/low power switch. Amateur net price: $520. The demand for this unit makes it necessary for you to place your order with Electronic Wholesalers now for early delivery.

Stop in soon and see the complete Collins line of amateur equipment. Invest in equipment that protects your investment—Collins.

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THE LAFAYETTE ROUNDPUP OF HAMSHACK VALUES

MODEL HE-25 "VOYAGER" TRANSMITTER
Single knob bandswitching 80 through 6 meters with a full 120 watts CW or 70 watts phone operation. High Q pi-network filter. Checks antennas from 40-600 ohms.

109.50

MODEL TM-15 WAVE METER
Checks transmitter output for harmonics, parities, and out-of-band operation. Perfect for mobile. Provided with magnetic feet for the novice.

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37.50

HE-28 RF Wattmeter
AND SWR BRIDGE
150 watts full scale—Built-in dummy load—Wattmeter ±5% to 54 mc, SWR ±3% for in line use.

IMPORTED

6.95

MODEL TM-14 FIELD STRENGTH METER
Complete, no wires to connect. Monitor transmitter output, check antennas, etc. Perfect for mobile, provided with magnetic feet.

IMPORTED

AN UNHEARD OF BREAKTHROUGH IN THE COMMUNICATIONS RECEIVER FIELD

THE LAFAYETTE HE-30

- TUNES 550 KCS TO 30 MCS IN FOUR BANDS
- BUILT-IN Q-MULTIPLIER FOR CROWDED PHONE OPERATION
- CALIBRATED ELECTRICAL BANDWIDTH ON AMATEUR BANDS 80 THRU 10 METERS
- STABLE OSCILLATOR AND BFO FOR CLEAR Cw AND SSB RECEPTION
- BUILT-IN EDGewise S-METER

THE DREAM RECEIVER FOR TODAY'S CROWDED BANDS AND AT AN IDEAL PRICE

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$ Down Payment Enclosed for Stock 
Lafayette Easy Pay Application Will Be Forwarded Upon Receipt of Down Payment

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Address
City Zone State
This 12V input dc to dc transistorized converter is conservatively rated for continuous output of 120 watts at 600V or 300V, or any combination of 600 and 300 volt loads totaling 120 watts.

High efficiency, small size, and light weight, plus freedom from maintenance, conserve your battery and increase the enjoyment of mobile operation.

V.H.F. Sweepstakes
(Continued from page 67)

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Northern Texas

Display and protect your choice DX-QSL cards in the new DX-QSL transparent card packet. Made of strong, long-lasting clear polyethylene to hold ten cards. Only 49¢ postpaid per ten-card packet. Ten packets for $3.95. Satisfaction guaranteed or your money back.
THIS MONTH WE ARE FEATURING SOME NEW UNITS WHICH SHOULD BE AVAILABLE BY THE TIME YOU READ THIS—
ALSO WE HAVE A FAIR AMOUNT OF THE SPECIAL NEW AND USED UNITS WHICH HAVE BEEN FEATURED FOR THE
PAST THREE MONTHS LEFT IN STOCK! SO, WRITE US FOR COMPLETE LIST IF YOU DON'T HAVE THE PAST THREE
ISSUES OF QST!—73 AND CUL—UNCLEDAVE, W2APF.

**MOSLEY TA-36**
4 Elements on 10
3 Elements on 15
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Price ............................................ $129.50

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Power input: 200 watts PEP, 200 watts CW, 90 watts AM
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Power input: 2000 watts PEP (twice average d.c.), 1000 watts CW, 800 watts AM
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**COLLINS**
30L-1
Linear
Power output 500 watts PEP
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Transmitter
Complete coverage of all amateur bands 80 through 6 meters
Maximum d.c. power input, 75 watts
Price (wired and tested) ................................ $99.95
Price (kit) .............................................. 79.95

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**ELECTRONICS**
200V
Power input: 200 watts PEP on SSB; 175 watts on CW,
FSK and PM; 100 watts on AM
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Receiver
Complete coverage of all amateur bands 80 through 6 meters
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W2APF
with your needs
and problems.

TRADE-INS ACCEPTED AND
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TIME PAYMENTS 18 Months to pay. Life
Insurance at no extra cost

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RADIO SHACK
A SUBSIDIARY OF
FORT ORANGE RADIO
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Order Today for a New Pleasure in Ham Radio!

4 and 5 BAND ANTENNAS
- Designed for a lifetime of use
- Coils moisture-proofed with Scotchcast Resin
- Designed to withstand 10kV RF
- No leads to switch, no coils to change; change bands with your transmitter in 10 seconds
- Can be fed with coax, tuned feeders, etc.
- Only best quality parts used!
- All antennas include coils, twin lead, heavy duty insulators and copper clad wire

FIVE BAND OFFSET ANTENNA works 80 thru 10 Meters, Covers 40, 20, 15 and 10 meters. Overall length 111", Twin lead 88" 8'.

HI-POWER
1 KW 5C-F 5-Band KW coils (pair)...
SSB 5A-F 3-Band KW antenna...
6C-F 3-Band KW antenna...

LA-POWER
1/2 KW 5C-E phone coils (pair) or
5C-C CW coils (pair)...
3A-F phone antenna or
5C-C antenna...

FOUR BAND ANTENNA works 40 thru 10 Meters

HI-POWER
Covers 40, 20, 15 and 10 meters. Overall length 56' 8" Twin lead 80'
1 KW 40M-C 4-Band KW coils (pair)...
SSB 40M-A 4-Band KW antenna...

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DOW-KEN CONNECTORS
 PANEL MOUNT
Durable, silver plated, precision made, Only 5/8", hole is needed, no screws, ea....70 ea....1.25

DOUBLE MALE
Favorite everywhere, precision made, rugged locking type, silver plated, ea....70 ea....1.25

DOW-KEN COMPANY, Thief River Falls, Minn.

THE LEAGUE EMBLEM
With both gold border and lettering, and with black enamel background, is available in either tin (with safety clasps) or screw-back button type. In addition, there are special colors for Communications Dept. appointees.

- Red enameled background for the SCM.
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THE EMBLEM CUT: A mounted printing electrotyping, 3/4" high, for use by members on amateur printed matter, letterheads, cards, etc.

Pin, Button or Cut: $1.00 Each, Postpaid

AMERICAN RADIO RELAY LEAGUE
West Hartford 7, Connecticut

Correspondence from Members
(Continued from page 75)

bit. What annoys me is the operator who hunts down and zeroes-in on whatever station I am working on whatever frequency, and then proceeds to call me—zero beat with my contact—the whole time the latter is transmitting. This has slowed things down considerably for, being a stubborn class, I insist on going right back to the station being worked and having him repeat his transmission as many times as necessary until I get it solid.

And then there is W1VG's recommendation that the DX station give out no more information than his name, call and serial number—or the amateur equivalent—before moving on to the next contact. Now, for my part (and there must be many another DX station in the same situation), I do not consider my operations here as the DXpedition variety. I have spread the word around pretty generally that I shall be here for the next two years or more. I thus hope to be able, eventually if not immediately, to QSO practically all stations desiring an FF4 contact. I am fully aware that the hoys are anxious to "get a new one" as soon as possible and I try to oblige, but under the circumstances I do not think it unreasonable of me to pause from time to time to have a short chat with an old friend. After all, I would like to get a little fun out of this business. DX contacts are fine, and I've enjoyed many from both ends of the fence. But when you have the impression of having been in a DX contest every day for two months running, and with no end in sight, it begins to pall on you a bit.

... I won't even go into the matter of directional QC's except to note that two nights ago I called "CQ New York City" and got immediate replies from every U.S. district (except the 6th and 7th, which were not coming through at the time) plus, in the middle of it all, a very loud YU with a Te4 note.

I do not mean to imply that all the boys resort to the operating tactics described above. In fact, the vast majority of amateurs cooperate magnificently in the smooth operation of the DX station. But there are always enough who don't make life pretty difficult at times.

So you see, the DX station is not always master of the situation as you imply. There are situations when you can't handle from his end, and he is much too far away to make effective use of a Rettywite, - Rumert A. Lloyd, jr., PFAAL, Abidjan, Ivory Coast.

... I approve of W1VG's sentiments 100%. Have gone through the same agonizing baloney about name, QTH and address repeated several times to each caller. Also, I view with concern the m.n. system—how are we to contact a W2 who is mailing an FF5—ground wave or telephone? Maybe I'm selfish—all DXers are. But there should be better techniques than now employed.—Ted Mikolsky, K1GUD, New Britain, Conn.

... True, we have our own backyard to clean up, but many of our own yards would become clean if some of these DX stations would let us have the air and let us know who's the boss. I think it's important to note that not all U.S. stations heed the DX operator's "call 5 down," etc., but that's mainly because, as you said, the DX operator will answer those who call even on his own frequency.

I'm glad you made the point of not wasting time with the transmission of name, QTH, QSL info, etc. You're absolutely right—we do know all that!

Most important, I'm extremely happy that you suggested a DX station give both calls at the end of the first transmission! Many is the time when after calling a DX station, I can't even hear him, because some guys are still right on the frequency calling him! When I do hear him, he's in the

(Continued on page 123)

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Plate Transformers: Pri: 115 VAC @ 60 CPS, with taps. Sec: 1200 VCT @ approx. 300 Ma. Overall Dimensions: 8 ¾" x 4 ½" x 3 ½" D. Wt: 21 lbs. Mfd. by RCA. $10.50.
Hughes Swing Choke: 20 Hy. @ 50 Ma. DC, 3.5 Hy. @ 250 Ma. D.C., 75 Ohms D.C. Resistance, Herm. 51 ⅞ lbs. Overall Height: 4¾" x 3 ⅛" W x 3 ½" D. $1.95.
RCA Mica Capacitor: 4,000 Mmf, 300 V. Peak. $1.95.
RCA Plate Xfmr: 1200 V.CT. @ 300 Ma. Pri: 115 V, w/taps. 60 CPS, Herm. $4.95.
RCA Plate Xfmr: Pri: 115 VAC @ 60 CPS, Sec: 905 V, 50 Ma. $3.95.
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Cathode Ray Tube Shield (for tube type 2BP1) $2.95.
Cathode-ray Oscilloscope 4 Mfd @ 4000 VDC Oil Capacitor, $9.95 (for $27.00.)
Hughes Swing Choke: 20 Hy./.5 Hy. 65 to 250 Ma. 75 Ohms. $1.95.
UTC Type S-32 Swing Choke: 5/25 Hy./.225 Ma./120 Ohms. $4.95.
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COMPACT 125 Watt Modulation Xfmr: Pri: 10,000 Ohms Plate-to-Plate. Sec: 4500 Ohms (has screen winding. 400 Ohms, Open frame, enameled impregnated. Winding insulation to ground 5000 Volts Peak, Drug., designed for 1K P.E.S.A. Dimensions: 3¾" H x 3¼" W x 3½" D. Wt: 3 lbs. $6.95.

UTC Choke: 6 Hy. @ 500 Ma. (27 Ohms) $8.95.
UTC Choke: 6 Hy. @ 1 Apm. (33 Ohms) $11.50.
Jennings UGS Vacuum Variable Capacitor: Capacity: 10 to 100 Mmf @ 10 KV. Complete, new shaft, $49.00
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middle of his transmission and at the end he says BK. Now, how should I know whether he means me, Joe or my next door neighbor?

I sure hope some of those DX operators catch on. They have to know they really are king! — Steve Berenci, K3YI, Laurelton, New York

4. I sincerely hope that the "open letter" by one of your staff in April QST is not a true indication of ARRL thinking. The charges and insinuations must be taken as an insult by the persons to whom the letter was so obviously addressed. The expressions used were certainly a shock when compared to the usual high caliber of writing found in the pages of QST.

What right has W1VGY or any or all of us to tell amateurs in other countries how to operate so as to increase our enjoyment of the hobby? For years QST has tried to point up the many facets of radio as enjoyed by amateurs, and to encourage a broader outlook in our operations. DX is certainly not all things to all of us. I have had QSOs with all of the people to whom that letter was addressed and know that working us is not their compelling reason for being on the air. I also know that a courteous approach to them will result in a QSO and a QSL. Surely that is not "time wasted."

To me, the opportunity to get on the air and communicate with others with similar interests is one of the greatest privileges of the modern world, especially since practically worldwide contacts are permitted. To keep this privilege let us, in this country, try to understand the man on the other side; he is trying, hard, to understand us.

To clarify my position, I belong to both RRC and DXCC and have been an avid supporter of ARRL for some 25 or 30 years. — George W. Holland, W1QM, Essex Junction, Vermont.

Silent Keys

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

K1EAD, Cdr. Herbert Davies, Hingham, Mass.
W1MRP, William F. Vornikal, Westport, Conn.
W1QNC, Walter Hall, Lawrence, Mass.
W2BCY, William A. Dixon, New York, New Y.
W2DFI, Paul D. West, Albany, N. Y.
W2EZB, Robb L. Millham, Liverpool, N. Y.
K2GIF, Henry G. Bawden, Lincroft, N. J.
W2GJH, Floyd C. Denen, Lisle, N. Y.
K31RE, Ashley L. Brockett, Elderton, Penn.
W3ITV, Robert E. Clark, Washington, D. C.
W3J2I, Earl R. Gable, College Park, Md.
W3SLT, John F. Telford, Minerva, Penn.
K4AFX, Lawrence P. Alberg, Hailea, Fla.
W4GBP, John R. Joyner, Richmond, Va.
W4CA, Arthur L. Rackete, Alexandria, Ky.
W5CPS, Hilary E. Lindsey, Tyler, Tex.
W5DUF, John N. Ellis, Cleveland, Miss.
K5JAW, Bill W. Martin, Ringwood, Okla.
K5YES, Paul T. Kodler, Fayetteville, Ark.
K5JYI, Dale W. Doerr, Atascosa, Tex.
W5ACG, Leonard G. Hayden, Los Angeles, Calif.
K6PK, Ernest L. Petit, Los Angeles, Calif.
W6QDT, Antonio J. Silva, Modesto, Calif.
W6RXC, William C. Evans, Glendale, Calif.
W7GZN, Robert O. Hedden, Buena Park, Calif.
W7APC, Wylie M. Sheets, Seattle, Wash.
W7XAG, Hubert C. Averin, Bain, Wyo.
W7GLY, Jesse T. Calvyn, Great Falls, Mont.
K8AKT, William F. Beriz, Ann Arbor, Mich.
ex-W9AXO, Herman C. Hughes, Terre Haute, Ind.
W3OCC, Ralph H. Knopf, Richmond, Ind.
W8EY, James T. Roberts, Kearney, Neb.
W1LZC, Clark H. Moore, Anchorage, Alaska
VE1XZ, A. F. Tauter, Sydney, N. B., Canada
VE2SM, Jack W. Allen, Melville, Sask., Canada
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W3, K3 — Jesse Bierberman, W3KT, P.O. Box 400, Bala-Cynwyd, Pa.
W4, K4 — Thomas M. Moss, W4HYW, Box 644, Municipal Airport Branch, Atlanta, Ga.
W5, K5 — Bred. A. Beard, W5ADZ, P.O. Box 25172, Houston 5, Texas.
W6, K6 — San Diego 10X Club, Box 1600, San Diego 16, Calif.
W7, K7 — Salem Amateur Radio Club, P.O. Box 61, Salem, Oregon.
W8, K8 — Walter E. Musgrave, W8NGW, 1245 F. 187th St., Cleveland 10, Ohio.
W8, K8 — Alva A. Smith, W8DMA, 38 East Maine St., Caledonia, Minn.
VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.
VE2 — George C. Goode, VE2AY, 186 Lakeview Avenue, Pointe Claire 33, Quebec.
VE3 — Leslie A. Whetham, VE3QE, 32 Sylvia Crescent, Hamilton, Ont.
VE4 — Len Cull, VE4LC, 86 Rutland St., St. James, Man.
VE5 — Fred Ward, VE5OP, 89 Connaught Ave., Moose Jaw, Sask.
VE6 — W. R. Savage, VE6EO, 833 10th St., Nethbridge, Alta.
VE7 — H. R. Hough, VE7IR, 1210 Simon Road, Victoria, B. C.
VE8 — Earl W. Smith, VE8AT, P.O. Box 844, Whitehorse, Y. T.
VO1 — Ernest Ash, VO6AA, P.O. Box 8, St. John's, Newf.
VO2 — Douglas B. Ritchey, Dept. of Transport, Goose Bay, Labrador.
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