Radio amateurs designed and built this versatile VHF converter. Specifically designed to extend the range of any communications receiver through the 6, 2 and 1¼ meter amateur bands.

The VHF 126 is an independent receiver with its own power supply utilizing the low-frequency IF stages and audio of your present receiver. Simple to install, it requires no circuit modification to select either VHF or standard communication ranges.

**Here's Why You get "Top-of-the-Hill" Performance**

- Extends effective usefulness of any receiver to 225 megacycles
- Performance equals that of costly astronomy receivers
- Dual Conversion eliminates images
- Dual-speed tuning: 1 to 1, 75 to 1
- Heavy, steel cabinet
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**Range:**
- 48.4 to 54.2 MC; 143.4 to 149.2 MC; 219.4 to 225.2 MC.
- Noise Figure: 50 MC—2.5 dB; 144 MC—4.0 dB; 220 MC—6.0 dB.
- Calibration: Direct, MC subdivided in 100 KC divisions.
- Panel Controls: Antenna changeover switch, band selector, tuning control, line switch.
- Dimensions: 16½" wide, 10" deep, 10" high.
- Weight: 32 pounds.

**YOURS NOW FOR THE FINEST VHF RECEPTION. $239, Amateur Net!**

GET THE FACTS about RME equipment—built by Hams, for Hams. Write Dept. Q88 for Bulletin 244. See your RME-Electro-Voice Dealer.
Complete Specifications

General description: The SR-34 is designed for either AM or CW and combines, for the first time in one compact package, the complete functions of a two and six meter radio station. It operates on 115-V. A.C., 6-V. D.C., or 12 V. D.C. and features a highly efficient transistorized power supply for the 6 and 12 volt operation.

Exclusive features: The perfect unit for short-range portable, fixed or mobile communication, the SR-34 meets—and exceeds—F.C.D.A. matching-fund specifications. The crystal sockets and transmitter tuning controls are concealed behind a panel which may be sealed to prevent tampering. Instantaneous selection of desired voltage possible and also “crossbanding” between the two and six meter bands. The specially designed cover has mounting clips for two-band antenna, owner’s microphone, and cords.

Both receiver and transmitter may be used for C.W.; key jack and adjustable B.F.O. are provided. Drip-proof case is specially designed for safe outdoor use.

The transmitter is crystal-controlled; up to four crystals may be switch-selected. A fifth position on this switch permits external V.F.O. operation. Band selection also is front-panel controlled.

The receiver is a double conversion superheterodyne, having a quartz crystal controlled second oscillator. This offers outstanding selectivity and high image rejection. Highest stability is obtained through separate oscillator and R.F. sections for each band.

All receiver functions provided—S-meter, B.F.O., ANL, etc. Sensitivities average 1 microvolt on both bands. Transistorized power supply eliminates noisy, erratic operation encountered with vibrator-type power supplies.

Front Panel Controls: Receiver: Band Selector (49-54 mc., 143.5 to 148.2 mc.); Main Tuning; Sensitivity; Audio Volume; B.F.O. Pitch; Squelch Level; Headphone Jack. Transmitter: Function Switch (P.A., Rec., Cal., AM, CW); Power On/Off; Band Switch; Crystal Selector and V.F.O.; Oscillator Tuning; Doubler Tuning; Tripler Tuning; Final Tuning; Final Loading; Meter Switch.

Power output: 6 to 7¼ watts on 2 meter, and 7 to 10 watts on 6 meter AM or CW, 100% mod. negative peak clipping. Rear Apron: Speech input level control; key jack; P.A. speaker terminals; mic. selector (high Z or carbon); mic. input; A.C. and D.C. fuses; power plug.

Available with convenient terms from your Radio Parts Distributor.

Export Sales: International Operations—Raytheon Manufacturing Co.—Waltham, Massachusetts
The versatility of the KWM-1 mobile/fixed SSB Transceiver has made it the natural choice of the amateur operator on the move. It is the most compact traveling companion available, yet it runs 175 watts input on SSB. Besides hundreds in operation from cars (and even light airplanes) all over the United States, the KWM-1 is fast gaining an impressive reputation with amateurs who take the transceiver with them overseas. Representative of areas visited with the KWM-1 are Africa, the South Pacific, Europe, South America, Canada, Greenland, Alaska, the Arctic, English Channel islands, Saint Andres Island, the Dominican Republic, Saint Martin Island and Anguilla.

The KWM-1 is also scheduled for expeditions to Galapagos, Barbados and the Boy Scout Jamboree in New Zealand and for a round-the-world cruise.

*P.E.P.*
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The Ideal Approach to SSB...

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<th>4CX300A</th>
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### Section Communications Managers of the ARRL Communications Department

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

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<th>Region</th>
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<td>C. B.</td>
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*Official appointed to act temporarily in the absence of a regular official.*
HERE'S HOW WE SOLVED IT!!!

After we design and produce and test a piece of operational equipment like that shown we hit a common problem —

Usually the equipment is wrapped in cellophane which in turn is encased in a vapor proof bag with a dessicant (high class word for moisture prevention). Then it may go into another carton, and then into a case made of 3/4" lumber. Now this packing is heavy (sometimes more than the equipment) and takes a lot of space.

So we've come up with these cases ... They're moisture proof ... moulded of fiberglass, which has tremendous impact strength but is quite light.

In the case —
the TMC SBE-2
AN/URA-23 A
Request Bulletin 195

Also when unpacked it requires more handling and unpacking with heavy tools, so we've come up with these cases ... They're moisture proof ... moulded of fiberglass, which has tremendous impact strength but is quite light. When the equipment arrives all you have to do is take off the covers and plug it in. Simple, huh? Dimples on the top permit stacking a number of units one on top of the other.

Bulletin 217 has the story but call us for the full possibilities of TOC.

The TECHNICAL MATERIEL CORPORATION
IN CANADA
TMC Canada Ltd., Ottawa, Ontario

Main Office MAMARONECK
NEW YORK
THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

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

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs. Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

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

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LEAGUE ELECTIONS

Seventy thousand radio amateurs — that's how many of us there are in the ARRL — gathered in one place certainly would make a joyful noise, with QRM worse than 75 meters on a winter night. Clearly it would be impossible to run our affairs on a membership-meeting basis; we are spread from Hawaii to Halifax, from Jacksonville to Juneau. Yet every one of us has a part in the management of our organization through the democratic process of nomination and election of representatives to serve on the ARRL Board of Directors. The Full Members in each of the League's sixteen divisions choose a director every two years to represent them in the determination of policy and the overall direction of the League.

To ensure that some experienced men are present at each Board meeting, and to lessen confusion at election time, the elections are staggered: half of the divisions elect in even years, the other half in odd years. This year the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern, and West Gulf Divisions speak up. Details on the nominating procedures are in the "Happenings of the Month" column, on page 53.

Particularly since each director now represents an average of over four thousand members, these men should be the best available, men fully familiar with amateur radio, and enjoying the confidence of the majority in their division. They should be mature men of ability and stature, for they direct the affairs of an organization whose budget runs well over a million dollars per year.

It is up to members to ensure that good men are nominated, before the deadline of September 20th. Don't assume that someone else will send in a petition for the candidate of your choice; it has happened that good men have failed of nomination because of a "Let George do it" attitude. It is also wise to file the petition as soon as possible, too. Sometimes less than ten of the signers can be located in the membership file, thus making the nomination invalid; in the middle of September it's rather late to start another petition and get it to West Hartford by the deadline.

Each director has the responsibility of keeping himself aware of League affairs in his division, and of learning the needs and desires of his constituents, through personal contact, club visits, hamfest QSOs and letters. A proposal you make in a note to your director may well result in an action at the annual Board of Directors meeting, and if the other fifteen divisions concur, an idea of yours may result in some significant change in the amateur structure. Therefore it is important that you take part in the choosing of this director, and in keeping him informed.

Once more we would like to emphasize that you, the 70,000 voting members, are the League. Basically, you decide policy; you recommend changes in regulations; you keep the League's organizational structure up-to-date; and you oversee the total work of the League — all through your own division director. It's true that the routine business, technical and operational matters are handled by a professional staff of more than sixty, but only in accordance with the wishes and directives of the Board of Directors, who in turn derive all their authority directly from you, the members.

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

NATIONAL CONVENTION

Breathes there a ham with receiver so dead (and stack of QSTs so unread) he hasn't heard something about the 10th ARRL National Convention in Washington, D.C.? Impossible! But if this brief article reaches such a person, we urge him to drag out QST for April, June and July and feast his imagination on the program outlined on pages 50, 53, and 66 respectively. The rest of you, already scheming to attend, can get further inspiration from the new dope on page 53 of the present issue.

Fourteen Washington-area clubs, bound together in the Foundation of Radio Amateur Clubs, have been toiling strenuously to make the August 15-17 affair the most memorable ever. There are sideband, traffic, YLRL, DX, military, v.h.f., technical, and ARRL meetings for the hams; cruises, fashion shows and luncheons for the wives; parties, dances, floor shows, tours and the grand banquet for everybody.

Not only will all the ingredients of a first-class ham convention be present, but the city itself is fascinating to visitors, and the sponsors have arranged tours to practically every corner of it. Raid the piggy-bank, pack the suitcase, grab the XYL and we'll see you in Washington!
COMING A.R.R.L. CONVENTIONS

August 15-17 — ARL National Convention, Washington, D. C.
August 30—September 1 — Maritime Provinces, Truro, N. S.
September 20—21 — Dakota Division, Sioux Falls, S. D.
September 26 — New England Division, Providence, R. I.
October 4-5 — Midwest Division, Des Moines, Iowa
October 10-12 — Southwestern Division, San Diego, Calif.
October 11 — Hudson Division, Albany, N. Y.
October 18 — Ontario Province, Hamilton, Ontario

A.R.R.L. MARITIME PROVINCES CONVENTION
Truro, N. S.—Aug. 30—Sept. 1

Truro Area Amateur Radio Operators cordially invite all ham brasspounders, rag chewers and others to attend the ARL Maritime Provinces Convention at the Canadian Legion Hall in the hub town of Truro, N. S., over the Labor Day week end, Aug. 30 through Sept. 1. The convention registration will open at noon Saturday followed by a motor parade through the town late in the afternoon. The official opening banquet Saturday evening will start an evening of speeches and social competitive activity. A chicken barbecue will be held at the formal closing of the Convention Monday noon, Sept. 1.

Registration fee of $5.00 will include all banquets and hamfest participation but all must be made in advance. Banquet reservations cannot be guaranteed unless registration is received not later than August 20. Accommodation reservations and hamfest registrations may be made through the Secretary, Carl Crowell, VE1TT, P. O. Box 164, Truro, N. S.

Alabama — The North Alabama Hamfest Association will hold its annual hamfest at Spring Park, Tuscaloosa, on Sunday, August 24. For further info, contact Howard G. King, W4QGP, Box 301, Florence.

Georgia — The Confederate Signal Corps will hold a hamfest on the Southeastern Fair Grounds at Lakewood Park in Atlanta on August 17. Plenty of activities and prizes. Registration is $1.00, plus barbecue ticket of $1.50. For further info contact Virgil D. Baker, Jr., K4CFN, 150 W. Archibald Ave., Florence.

Illinois — The Hamfests Radio Club is holding its 25th annual picnic at Santa Fe Park, 9100 South Wolf Road, on Sunday, August 10. From the west, take Route 4A (Archer Ave.) to 87th St., in Willow Springs, and turn west to the grove. From the west, take Route 99 to 79th St., then east to Wolf Rd. The park has modern facilities, parking, tables, shade. There will be radio displays and lectures, food and refreshments, events and prizes. Swap tables. Advance donation $1.00, or $1.50 at the gate. For further info or for tickets, write to R. R. Balfour, W4PBN, 8213 Kingston Ave., Chicago 17.

Iowa — The Central Iowa VHF Club is sponsoring a hamfest on August 31 in Alexandria, but we have no other details.

Kansas — The Kansas-Nebraska Radio Club will sponsor its annual hamfest on Sunday, August 10, at Mineola, on Route 14, south of Holdrege, Nebr., at the National Guard Armory in Concordia. This is an all-day affair, with a picnic dinner at noon and games and prizes in the afternoon. For further info contact A. B. Reeves, W8JEO, 108 Hillside Drive, Concordia.

Louisiana — The Contra Amateur Radio Club is sponsoring a hamfest on August 23 in Alexandria, but we have no other details.

Michigan — The annual picnic of the Saganaw Valley Amateur Radio Association will be held Sunday, August 3, at Ojibway Island Park in Saginaw. No advance registration. For further info contact Max W. Thomas, W8SMJ, RFD 2, Lawrence.

Minnesota — The Saint Cloud Minnesota Radio Club will hold its annual picnic hamfest on Sunday, August 24. Registration will start at 1000 at Wilson Park on the east bank of the Mississippi. Mobile field strength contest, hidden transmitter hunt on ten and seventy-five, oldest and youngest hams present, games and prizes. Huge shelter house in case of rain. Bring your own lunch — free coffee provided. Playground, swings, slides and swimming. Registration of $1.00 per call includes the family. For further info, contact Bob Molitor, W8NOV, 351 7th Ave. N., St. Cloud, Minn.

Mississippi — The Biloxi Amateur Radio Club will hold a hamfest on 23–24 August, at the Community House

(Continued on page 84)
For the past twenty years or so the conventional wide-band TV system and various mechanical-scanning facsimile systems have been the only common methods of transmitting images by electrical means. Recently, however, another method has been used to transmit images over wire lines. This method involves using television type pick-up and reproduction devices with slow scanning rates to produce narrow bandwidth video signals.

The Bell Telephone Laboratories' 'Picture-Phone' System uses a single pick-up camera to generate the video signal, a magnetic storage drum to freeze the action, and special 'latron' image-storing cathode-ray tubes to reproduce the image. A 60-line picture, 40 lines wide, is scanned once every 2 seconds and can be sent over ordinary phone lines.

Dage Electronics developed a system for use with 'high-fidelity' phone lines which are flat from 60 c.p.s. to 5000 c.p.s. or higher. Both these systems employ expensive components and, consequently, have not been widely used.

Upon reading about these 'wired' systems the writer became intrigued with the possibility of utilizing the slow-scan principle for image transmission by radio. In September, 1957, he started the design and construction of a low-cost slow-scan system which is especially adapted to the transmission characteristics of amateur phone equipment. This work was undertaken as a personal project in an independent problem course at the University of Kentucky.

Briefly, the system uses a cathode-ray tube flying-spot scanner to develop a 120-line picture, scanned once every 6 seconds, from a slide em-
bodying an inexpensive photographic negative. The video output of the scanner amplitude-modulates a 2000-c.p.s. carrier, resulting in an audio-frequency signal consisting of the 2000-c.p.s. carrier and video side bands extending both ways in frequency to 1000 and 3000 c.p.s. This signal is then fed to the radio transmitter's modulator. At the receiving end, the audio-frequency output of the communications receiver is processed and the picture is presented on the screen of a low-cost electrostatically-deflected cathode-ray tube with a long-persistence P7 phosphor.

The system can be used with almost any amateur phone transmitter and receiver with no changes necessary in the regular station equipment. The slow-scan unit merely plugs into the transmitter mike jack and receiver headphone jack. Air tests on the 11-meter band indicate that conditions and equipment which give good phone transmission, with a reasonably good signal-to-noise ratio, will also transmit satisfactory pictures. The actual type of modulation used in the transmitter seems to be relatively unimportant so long as the audio output of the receiver is a reasonably good replica of the input to the transmitter modulator. Plate modulated a.m. was used in all the tests made so far with good results, as the pictures show. Eleven-meter s.s.b. was nonexistent in the Lexington area during the testing period, but this mode of transmission should be quite satisfactory, and the required frequency accuracy of the reinserted carrier should actually be less than for phone reception. N.f.m., with limiter stages in the receiver, could be used to reduce the effects of fading on picture transmission.

While the system presents a less detailed image than conventional facsimile it is adequate for many purposes, and the system is superior to existing facsimile in certain other respects. For one thing, the transmission time is a few seconds instead of minutes. This increases flexibility of operation by permitting rather rapid alternation of voice and picture transmission over the same circuit. This would, of course, be of vital importance in emergency work where all transmissions must be kept short. Also, the slow-scan system uses inexpensive and readily-available components, and if cost is not a factor a live-pickup Vidicon camera could easily be added to the system. The slow scanning rate, of course, requires that all images be still, but this should not be too great a disadvantage with the type of material which the ham is likely to transmit.

**The System**

The important system characteristics are listed below:
- Number of lines: 120
- Aspect ratio: 1:1 (square picture shape)
- Vertical repetition rate: 6 seconds
- Horizontal frequency: 20 c.p.s.
- Modulation: Amplitude-modulated 2000-c.p.s. subcarrier. (White level, 0-20 per cent of maximum amplitude; black level, 50 per cent to 75 per cent of maximum; sync level, maximum amplitude.)
- Pass band required: 1000-3000 c.p.s.
- Synchronization: Maximum-amplitude carrier bursts coinciding with retrace periods. (Approximately 0.015 second for vertical pulse and 0.0015 second for horizontal.)

Many possible combinations of sweep times, aspect ratios, and audio carrier frequencies were studied in an attempt to find the most suitable combination. The maximum possible vertical sweep time is limited to about 6 seconds because the brightness of the P7 phosphor on the receiver cathode-ray tube face decays too rapidly to

![This picture shows the kind of resolution that can be obtained with the 120-line scanning system described here. Taken off the monitor during transmission.](image-url)
The 1:1 aspect ratio is a picture shape which makes efficient use of a round cathode-ray tube screen, and does not favor the viewing of horizontal objects as the usual 4:3 aspect ratio does. The band-width requirements of the flying-spot scanner video output are d.c. to approximately 1000 c.p.s. The 2000-c.p.s. subcarrier frequency was chosen because it permits the upper video side band to fall within the 300–3000-c.p.s. pass band considered representative of current amateur practice, and provides at least two cycles of carrier for each cycle of modulating frequency.

Modulation polarity was selected to make low level represent white and high level represent black, for two reasons. First, the synchronizing pulses, being at the infrablack level, will blank the cathode-ray tube retrace if the receiver retrace and sync trigger time is less than the duration of the sync pulse. Second, strong noise pulses appear black rather than bright white as they would if high amplitude represented white.

Simple rectangular pulses lasting the duration of the retrace period permit synchronization of the receiver sweep oscillators. Since the vertical pulse is only about one-third the length of a scanning line, it is completed well before the next horizontal sync pulse starts. This avoids the need for serrating the vertical sync pulse to prevent upsetting the horizontal sweep, as is necessary when the pulse is over one line in length.

The picture transmitting and receiving circuits were combined in a single unit with common power supply and sweep circuits, in order to keep the cost as low as possible. As shown in the block diagram of Fig. 2, send-receive switches make the appropriate sync connections and, on “transmit,” also feed the output signal into the video receiver to permit the outgoing picture to be monitored on the receiver cathode-ray tube (V₃). The simplified block diagrams in Fig. 1 represent the circuit connections on “transmit” and on “receive.” These diagrams, along with the details of the Fig. 2 block diagram, will be explained in the discussion to follow. Actual circuitry and mechanical details will be described in Part II of this article.

**Picture Transmission**

The flying-spot scanner consists of a lightweight aluminum box with a 908-A cathode-ray tube (V₂) mounted at one end. The tube faces the other end where a 331-A photomultiplier tube (V₁) is mounted so that light from the cathode-ray tube will strike it. A slit in the side of the box directly in front of the cathode-ray tube allows insertion of a slide, which consists of a size 120 or 620 photographic negative mounted on a 3 × 5-inch cardboard frame. The slide is held in position in the scanner by its cardboard edges in such a way that the transparent portion of the slide is in intimate contact with the glass face of the 908-A cathode-ray tube. Thus any light which appears on the surface of the 908-A passes through the photographic negative before it strikes the photocathode of the photo-multiplier tube, some 8 inches away.

In operation, a small bright spot on the cathode-ray tube face is caused to sweep across the tube in raster fashion by the horizontal and vertical sweep voltages. The 908-A is a 3-inch electrostatically deflected tube with a P₅ very-
short-persistence screen, whose brightness decays to 1 per cent of its original value in 35 microseconds. The spot, therefore, remains a spot at the sweep frequencies used and does not leave a "tail" of undecayed brightness behind it as it sweeps across the tube. The spot faintly illuminates the cathode of the 931-A photomultiplier, and the intensity of the illumination is inversely proportional to the photographic density of the negative at a point directly in front of the spot. The small photocathode current is amplified approximately 40,000 times by the secondary-emission action of the dynodes. The voltage across the multiplier anode load resistor is, then, a video signal whose instantaneous amplitude follows the variations in picture brightness as the negative is scanned.

Plate-coupled 6SN7 multivibrators are the heart of the sweep and sync generation circuits. The 20-c.p.s. horizontal multivibrator \(V_1\) is synchronized with the 60-cycle power line, not only as a convenience in keeping its frequency constant, but to insure that any hum in the video will result only in variations in picture shading, not diagonal hum patterns. The vertical multivibrator \(V_2\), with a period of about 6 seconds, is triggered by the horizontal oscillator during a horizontal retrace period. This insures that the vertical retrace will always occur at the beginning of a line, which is necessary for proper positioning of the vertical sync pulse.

Sweep capacitors, charged through resistors from B+, are discharged during retrace periods by current from the multivibrators, channeled through isolating diodes \(V_3\). The saw-toothed voltage developed across each capacitor is coupled directly to the grid of its associated sweep amplifier, half a 6SN7 \(V_4\). One of the horizontal and one of the vertical deflection electrodes of the 908-A are internally tied to the tube's anode which is returned to a positive centering potential. The other deflection electrodes are connected to the \(V_6\) plates, putting the varying saw-toothed plate potential directly on the deflection electrodes.

The rectangular pulses developed by the multivibrators during the retrace periods are combined in a dual-diode tube \(V_10\) to form a composite sync signal. This signal is coupled to the photomultiplier load resistor where it is added to the video signal. The grid of a d.c. amplifier \(V_11\) — triode half of a 6U8 is also connected to this point. Since the sync pulses drive the triode beyond cutoff, the output voltage

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**Fig. 2—Complete block diagram, showing transmit receive switching and stage functions.**
consists of video during the sweep period and of sync pulses, clipped to constant amplitude, during the retrace periods. The ratio of sync level to video level is controlled by the cathode-ray tube's brightness control, increased brightness raising the video level and reducing the ratio.

Since the video signal at this point has important components from d.c. to 1000 c.p.s., it is evident that it cannot be applied directly to the ordinary transmitter modulator which attenuates frequencies below about 300 c.p.s. To surmount this difficulty, the video is directly coupled to the control grid of a 6AR8 sheet-beam tube used as a balanced modulator \( V_4 \). This tube can be thought of as a miniature beam tetrode with two plates and two deflection electrodes. In operation, the 2000-c.p.s. output of a synchronized electron-coupled Hartley oscillator \( V_{3b} - \) penteode half of the 6U8) is applied in push-pull to the deflection electrodes in the 6AR8. This causes the electron beam to be deflected back and forth from one plate to the other at the 2000-c.p.s. rate. The beam current is controlled by the grid voltage and is therefore proportional to the level of the video signal. The output is taken from the plates through a push-pull transformer. The balanced push-pull connection prevents the original 0- to 1000-c.p.s. video signal from appearing in the output, the only output being the 2000-c.p.s. carrier and its side bands. This output may be connected directly to the transmitter modulator. It should be noted here that, although the image source is a photographic negative, signal polarities have been handled so that the transmitted image is positive — that is, clear negative is black level, dense area is white.

**Picture Reception**

A three-stage audio-frequency amplifier, using a 6SL7 \( (V_6) \) and a 6F6 \( (V_7) \), amplifies the signal from the communications receiver (or directly from the video generator) to a peak level of about 100 volts. This signal is coupled through an isolation transformer to a full-wave diode detector \( (V_8) \). The output of the detector is fed to the grid of the 5UP7 cathode-ray tube through a low-pass filter which passes 0-1000 c.p.s. without attenuation or excessive nonlinear phase shift, but which effectively removes the ripple.

The 100-volt signal is also applied to an i.f. type full-wave triode sync separator \( (V_{10}) \) which separates the sync pulses from the composite sync and video signal. These pulses (actually a series of short pulses; one for each alternation of the 2000-c.p.s. carrier) are amplified by the two halves of a 6SL7 \( (V_{11}) \), one output going to synchronize the horizontal multivibrator, the other to an RC integrating circuit. The vertical pulse is approximately 10 times as long as the horizontal pulse, and the higher integrator output voltage, when driven by a vertical pulse, is sufficient to separate the vertical from the horizontal.

In conventional TV the vertical oscillator is brought into sync by changing the oscillator frequency slightly. This could be a lengthy process with an oscillator that makes only one sweep every six seconds. To solve this problem the integrated vertical sync pulse is used to fire an 884 gas triode \( (V_{13}) \). The 884 plate is directly connected to one of the vertical multivibrator plates, providing positive triggering action during almost any part of the vertical sweep period.

Since the retrace times on receive are the same as on transmit, and since an appreciable time is required for vertical sync pulse integration, blanking of the receiver cathode-ray tube is not assured. To insure blanking, a neon-bulb relaxation oscillator, fired by the vertical multivibrator plate voltage during retrace, is coupled to the receiver audio amplifier. The burst of tone signal from the oscillator is amplified, detected, and fed to the cathode-ray tube where the voltage extinguishes the beam for the entire retrace period.

**Tests**

Since the transmitting and receiving circuits use the same power supplies, sweep oscillators, and sweep amplifiers, it was impossible to have the actual picture transmitter located at one point and the picture receiver at another. In order to conduct tests, therefore, it was necessary to tape record the audio-frequency picture signal. While even the home-type recorders have adequate frequency response, some of the less expensive machines have appreciable "wow" or other forms of instantaneous speed variation which cause a slight skewing of lines in the picture. The effect is most noticeable when viewing an image containing vertical lines, and appears slight in an image of a face.

Incidentally, tape recordings could be a big help in getting started with this mode of trans-
Mobile Converter — No B Plus

Many of the newer cars are equipped with transistor radio receivers having no B supply that can be used to power a mobile converter. WSZCC solves the difficulty with a simple fixed-tuned converter using 12-volt tubes.

75-Meter Unit for Transistor Car Receivers

BY WILLIAM E. LaFARRA,* WSZCC

* P. O. Box 43, McGehee, Arkansas.

16 QST for
The 12-volt converter is assembled in a 3 X 4 X 5-inch aluminum box. The 12AF6 is to the left and the 12AD6 converter tube to the right. The shielded lead to the right goes to the broadcast antenna jack.

proper operation of the oscillator.

Once the oscillator is working, it is a relatively simple matter to move the incoming signals up or down to the desired spot in the b.c. band by adjusting $L_4$. Relatively weak signals should be used while adjusting the slugs of $L_2$ and $L_3$ for maximum strength. If you have waited until night, you should hear several out-of-town signals coming through. These signals should preferably be around 3800 kc. (900 kc. on the car radio). Peaking the converter up on 3800 kc. should provide complete coverage of the 75-meter phone band. However, if most of the operation is to be around some particular frequency, adjustment of the slugs on a weak signal there will give peak performance on that frequency.

After a final adjustment, the sensitivity was compared with that of a commercial converter and the comparison was very favorable. Filament current constitutes practically all of the drain from the battery, since the plate current of the 12-volt tubes is in microamperes. The filament drain is 150 ma. per tube. This converter and our transistor radio combined draw a total current of less than one ampere, which is a very desirable feature for mobiling.

If you are interested in a more elaborate converter of this type, I refer you to a previous article in QST for September, 1956. For my purposes, the simpler 75-meter converter described here was entirely adequate since this is the popular band in this area. However, this type of converter could be made for any other single band desired.


Inside view of the 12-volt converter. $L_n$ is in the upper left-hand corner with $L_2$ below it. $L_1$ (above) and $L_2$ (below) are to the right. The antenna connector at the right-hand end is a b.c. antenna input jack.

Strays

What's in a name? W6BES tells us that W3DUZ lives on Lux Lane.

The annual field day of the Radio Society of Bermuda will be held on August 9 and 10. The VP0s will be competing for the Phillips Challenge Cup, and hope that all hands will be watching for them on phone and c.w., 10, 15 and 20 meters.
Keeping Equipment Cool  

Heat Disposal in Low- and Medium-Powered Electronic Assemblies  

BY RONALD L. IVES*  

There was a time when the problem of eliminating excess heat in amateur equipment was rarely given any consideration. Layouts were generous with space, enclosures were rare, and operation was intermittent enough so that high operating temperatures were only occasionally responsible for component failures. Not so today, what with the necessity for good shielding. As this article shows, there is a great deal more to effective heat disposal than simply adding a fan.

Whenever the power input to an electronic device exceeds the power output, the “lost energy” must be disposed of somehow, usually as heat. As no electronic device is 100 per cent efficient, the problem of heat disposal is always with us.

Most engineering texts on heat disposal are too involved and theoretical to be of much use in solving practical problems. The majority of practical works, of which there are many, give rather good empirical data for installations involving kilowatts and megawatts, but are strangely silent regarding the problem of keeping an assembly 17 by 8 by 10 inches, with an internal dissipation of 55 watts, at a temperature below 180 degrees F.

Practical heat disposal may be divided very roughly into four broad categories, which are somewhat interrelated and overlapping. Any improvement in one category will usually result in some improvement in at least one of the others. These categories are:

1) Over-all heat reduction.
2) Localized heat reduction.
3) Localized thermal stabilization.
4) Heat exclusion.

The primary aim in over-all heat reduction is to make an assembly that will run cooler. To have a minimum of heating in any assembly, keep the power input to a minimum, and use the most efficient circuits possible. Don’t overload any component, for the heat output of most electrical devices increases faster than the useful power output after the optimum operating point is passed.

Electrical Efficiency

Use of efficient components suggests employment of selenium or silicon power rectifiers in place of tubes; LC rather than RC filters; semiconductor diodes in place of thermionic diodes; minimum-drain bleeder resistors; low-drain voltage regulators; capacitative, rather than resistive, a.c. voltage dividers; and even use of high-voltage filaments in some cases. Operation of tubes at minimum practicable voltages (such as 150 in place of 300) reduces not only heat production but also power-supply requirements.

To cite only one way in which heat production can be reduced in an electronic assembly, let us take the case of a power supply using a 5U4 rectifier. Heat production here will be 15 watts from the filament, up to 4 watts plate loss, and a minimum of 1 watt core and copper loss in the transformer — totaling about 20 watts. If we sub-

Fig. 1 — Air vents to permit convective cooling of a monitor receiver.

QST for
stitute selenium rectifiers, heat production will promptly drop to about 5 watts, because we have eliminated the filament heat from the assembly entirely. Selenium rectifiers are both bulky and costly, particularly in the higher voltage ranges, but produce much less heat in operation than a thermionic rectifier. If we now replace the selenium rectifiers by silicon rectifiers in appropriate voltage range, the four watts of plate loss produced in the original 5U4, or its equivalent produced in the selenium rectifiers, drops to about 0.5 watt, because of the very low voltage drop in silicon rectifiers. We have also raised the output voltage of the rectifier-filter system for the same reason, and the total heat production from the power rectifier and transformer is now in the neighborhood of 1.5 watts, or about 7 per cent of what it was at first.

Chassis

Use of a conductive chassis, with as large a surface area as possible, will facilitate equalization of internal heat and rapid cooling by conduction — aided by convection in most instances — as well as by radiation, which occurs at the surfaces of all components and over all parts of the chassis. Most rapid conduction will occur with a copper chassis, but steel, which also furnishes magnetic shielding and mechanical rigidity, is usually the optimum material. Aluminum, although a fairly good conductor of heat, has somewhat unhappy mechanical properties for many applications.

Use of chassis brackets not only increases mechanical strength but also adds to the surface area of the chassis, facilitating cooling by radiation and convection, provided there is a conductive bond between the chassis and the end brackets. In general, if the bond between chassis and brackets is a good electrical conductor it will be a good thermal conductor also.

Air Vents

Last, but by no means least, adequate vents for convensional air circulation, and hence convensional cooling, must be provided. If an electronic assembly is completely boxed in so that convection cooling does not take place or is sharply restricted, cooling will occur only by heat conduction to the enclosure, and thence by radiation from it. As the thermal conductive path to the enclosure may be of high resistance, and since the trapped air between the assembly and the enclosure is a poor conductor of heat, the assembly will tend to operate at a very high equilibrium temperature.

If adequate paths for convensional cooling are provided, as by inlet and outlet vents with an uninterrupted air path between, convensional cooling will take place automatically, appreciably lowering the equilibrium temperature.

Arrangement of air vents in a medium power assembly — a 10-tube, six-band monitor receiver which consumes 65 watts — is shown in Fig. 1. Upper-level vents permit heated and expanded air to escape, lower vents allow cooler air from the environment to enter. Rubber feet on the case bottom keep the bottom vent unobstructed. It is important that both top and bottom vents be provided. If the lower vents are omitted convection will not take place, because there is no inlet for cooler “replacement” air. Remember that a chimney will not draw if the stove draft is closed!

Venting arrangements for a smaller assembly, dissipating only about six watts but somewhat temperature sensitive, are shown in Fig. 2. A similar vent is provided in the chassis itself, to permit “through” air circulation.

Vent apertures should also be provided in the tops of chassis and other “inverted box” structures to prevent entrapment of heated air. Unless these are provided, localized “hot spots” may occur under the chassis, leading to seemingly mysterious failures of components even though the entire assembly operates at an average temperature far below the maximum for the specific items.

Local Heat Reduction

Localized heat reduction is desirable or necessary in most electronic assemblies because some components will operate indefinitely at relatively high temperatures but others will fail promptly.
Fig. 3—Thermal shielding in a pulse amplifier.

if heated to much lesser values. For example, ceramic-insulated fixed resistors will operate satisfactorily above the melting point of soft solder, while tube bases come loose at about 150 degrees C.; and electrolytic capacitors, in general, imitate Vesuvius at temperatures somewhat below 90 degrees C.

The general method of localized heat reduction is to prevent heat from normal "stoves" from reaching temperature-sensitive components. This is accomplished by use of heat baffles, guided convection, and insulation. One example of thermal shielding, to prevent cooking of dry electrolytic capacitors by tube heat, is shown in Fig. 3. Here, a high-power pulse amplifier tube, which dissipates considerable power, is surrounded by a tubular shield. This reflects back much radiant heat and acts as a chimney to expedites convectional cooling. Note that the bottom of the cylindrical shield is open so it will "draw." Between the power rectifier, at left, and the capacitors is a vertical plane baffle which reflects back heat from the rectifier and guides local convective up both its surfaces. As these baffles function principally as reflectors, their surfaces should be bright. Without these heat baffles capacitor life was measurable in hours of operation, and not many hours at that. With the baffles in place, the operating life of the capacitors was extended to years, so that the equipment became obsolete before they failed.

Another installation using baffles to reflect heat away from a capacitor bank, along with chassis vents to keep internal temperatures within reasonable limits, is shown in Fig. 4. Socket mounting of the capacitors here insulates them against heat conducted along the chassis surface.

Temperatures of many components, such as resistors, can be lowered by use of oversized components. If a 1-watt resistor is electrically necessary and the assembly runs hot, substitution of a 2-watt resistor will sometimes be helpful. This lower temperature is not due to lower dissipation, if the resistor dissipates one watt, it will do so regardless of its nameplate rating, but a higher-rated resistor is physically larger and has a larger radiating surface, so its equilibrium temperature will tend to be lower.

Mounting of tubular elements, such as resistors, with through bolts and massive brackets will facilitate conduction of heat from the component to the chassis. Again, this will not reduce the amount of heat produced, but will conduct it away from the source more rapidly, lowering the equilibrium temperature.

Rectifiers

Selenium rectifiers in most amateur and some commercial equipment are operated somewhere between maximum recommended current and the "stink point." In addition, they are commonly stuck in an unvented corner of the chassis—creating, as far as the rectifier is concerned, a sort of autocrematorium, as in Fig. 5 lower left. Much of this trouble can be eliminated by use of adequately sized rectifiers, or even oversized rectifiers (more radiating area for the wattage to be dissipated); and by mounting them above chassis, as in Fig. 5, upper left and right. Use of a through bolt and heat conductive bracket will be found helpful in eliminating unwanted heat. A pair of small selenium rectifiers mounted in this manner is shown in Fig. 5, lower right.

Perhaps the most satisfactory mounting for the smaller selenium rectifiers is by bracketing them over a relatively large chassis hole, as in Fig. 6. Here convectional cooling is at a maximum, conduction cooling is facilitated by the center bolt and brackets, and wiring to the lugs is made easy since they project below the chassis top even though the body of the rectifier is above it.

Power Tubes

By use of suitably vented sockets, a large
power tube can be made to drive convections that will ventilate a large part of an electronic assembly. By mounting a standard socket in a vented sunk assembly, as in Fig. 7, air from under the chassis will be sucked out and upward by the convection about the power tube, provided a cool air inlet is also present under the chassis. This particular vented sunk assembly, heavily chromium plated and quite “professional looking,” is found in most plumbing shops where it is usually called a sink strainer.

Careful arrangement of components will often remove most of the problems of heat disposal without the use of complicated or costly special devices. One example of this is shown in Fig. 8, where the major heat producers, the power rectifiers (A) are surrounded by the transformers and chokes of the power supply, which are substantially heat-immune. A heat baffle (B) is placed between the audio power tubes and the nearest electrolytic capacitor, to prevent cooking it. Capacitors are protected against heat from the two adjacent 12AU7s by wide spacing (C). Convective cooling of both the chassis shown and of chassis above and below it is assisted by leaving the speaker well (D) open at both top and bottom.

Fig. 5—Selenium rectifier mountings.

Fig. 6—Recommended mounting for selenium rectifiers.

Thermal Stabilization

Localized thermal stabilization is necessary or desirable when frequency is controlled by heat-sensitive components, which includes almost all components except zero temperature coefficient crystals. One of the best methods yet developed involves the use of insulated compartments with the temperature controlled thermostatically. This is substantially a crystal oven, for which many adequate designs are known.

Additional thermal stabilization can be provided by mounting the temperature-sensitive device on or in a block of some substance with great thermal mass, such as an iron or brass block. If the temperature-control device, such as a thermostat, is mounted on the surface of this block and the thermally sensitive equipment (such as a crystal) within it, internal temperature variations can be held to a very small fraction of those at the thermostat.

By use of “thermal ballast,” plus shielded and insulated containers, plus a sensitive thermostat or series of them, the temperature at the critical point can be held constant to any accuracy desired (except 100 per cent) and stabilities of plus or minus 0.01 degree C. are rather easily attained.

Where lesser temperature stability is needed, as in most amateur and commercial equipment, thermal stabilization is commonly obtained and maintained by leaving the equipment turned on at all times. If the installation as a whole is fairly massive, rather gratifying thermal stability can be attained in this manner.
Isolation

Thermal isolation of a heat-producing component, so that its heat will not affect adjacent components and so that the heat produced by adjacent components has little effect on its equilibrium temperature, is attained by use of basal insulation and concentric lateral shields, vented to facilitate convection, as in Fig. 9. At the extreme left is the entire shield assembly. To its right is the outer “chimney,” vented to allow influx of cooler air at the bottom. Next is the tube, mounted in an elevated and insulated socket, to reduce conduction of heat to and from the main chassis. At extreme right is the tube shield, an entirely conventional component.

Tests with nested shields of this type show that, for a tube dissipating about five watts, the spacing between the tube shield and the outer chimney must be at least \( \frac{1}{4} \) inch, and full convectional cooling does not take place until the spacing is about \( \frac{1}{2} \) inch. All other factors remaining the same, tube temperature changes with this type of shielding are slightly less than one fifth the changes without the shielding. An additional concentric shield improves the thermal stability only by a factor of about 1.5, and a fourth shield causes such a small improvement that it might well be omitted.

Fans

Both localized and general cooling can be facilitated by use of fans, although the improvement that they can bring about is not always as great as is commonly believed. Fan motors, particularly the midget shaded-pole jobs that are quite popular, produce considerable heat themselves. Only if the fan removes more watts of heat than it produces will its use lead to improved cooling.

Placement of fans and proper direction of their air flow is quite important. A very small fan directed to aid convection may be a very effective cooler, but the same fan opposing convection may be less useful than no fan at all. Also, for any given installation, there is an optimum rate of air flow. Up to this point, increasing the air flow increases the cooling in almost any direct ratio. Beyond this point, doubling the air flow may only increase the cooling 20 per cent. In very general terms, subject to many exceptions, optimum cooling is to be expected when the air in a chassis enclosure is changed from five to ten times a minutes.

Small fans are best driven by shaded-pole induction motors; larger fans by capacitor start and run induction motors. Brush-type universal motors are not recommended for use around communications equipment, as very extensive shielding and isolation are needed to keep the brush noise out of receiving equipment. Where relatively large amounts of heat must be dissipated, as in high-power transmitters, it is com-
commonly desirable to mount the fan motors outside the chassis enclosure, and also out of the air stream, so that fan-motor heat is not carried through the electronic assembly. Centrifugal fans are ideal for this specific application.

In considering all heat disposal problems, both economics and good sense should limit our efforts to getting rid of harmful heat. Little or nothing is gained by running equipment at 5 degrees above ambient when all components are substantially immortal at 25 degrees above ambient. Improvement of performance and service life will result from keeping the over-all equilibrium temperature somewhat below the maximum rating for the components used, and frequency stability will be improved by minimizing changes in the equilibrium temperatures of the frequency-determining components. Further heat reduction is usually supererogatory, like measuring bricks with a micrometer, and gives little useful return for the effort expended.

General rules for heat control can be summarized as follows:

1) For minimum heating of a given assembly, keep power input at a minimum.

2) Use components and circuitry of maximum electrical efficiency. All input energy that does not appear at the output is dissipated as heat.

3) Arrange components and circuitry for minimum heat at critical points. Wherever possible, isolate heat-sensitive components from heat sources by interposing a heat-immune component. Remember that radiant heat follows the inverse square law; that heat conduction is substantially a linear phenomenon; and that heated convective air rises.

4) Arrange extra heat conductors, vents, baffles and cooling fans to compensate, insofar as possible, for remaining uncorrected thermal conditions.

5) Apply Occam’s Razor to each and every planned layout and circuit. This useful logical tool can be paraphrased into the question, “Is this the simplest arrangement that will perform the requisite function?”

6) Build and test.

7) Make necessary corrections in installation.

Acknowledgment

The writer is indebted to Mr. James P. Welsh of Cornell Aeronautical Laboratory, and to Dr. Stuart W. Grinnell of Stanford University, for helpful discussions of thermodynamic problems related to heat control and disposal; and to Mr. John Bethel of Palo Alto, Calif., for skilled photographic work.

A.R.R.L. QSL BUREAU

The function of the A.R.R.L. QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions, and Canada of those QSL cards which arrive from amateur stations in other parts of the world. Its operation is made possible by volunteer managers in each W, K and VE call area. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 3½ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

W1, K1 — G. L. DeGrenier, W1GKK, 109 Gallup St., North Adams, Mass.
W2, K2 — North Jersey DX Association, Box 55, Arlington, New Jersey.
W3, K3 — Jesse Nieberman, W3KT, P.O. Box 400, Bala Cynwyd, Pa.
W4, K4 — Thomas M. Moss, W4FJY, Box 644, Municipal Airport Branch, Atlanta, Ga.
W5, K5 — Robert Stark, W5OLG, P.O. Box 261, Grapevine, Texas.
W6, K6 — Horace H. Greer, W6TI, 414 Fairmont St., Oakland, Calif.
W7, K7 — Salem Amateur Radio Club, P.O. Box 61, Salem, Oregon.
W8, K8 — Walter E. Musgrave, W8NGW, 2145 E. 187th St., Cleveland 10, Ohio.
W6, K6 — Alva A. Smith, W6DMA, 238 East Main St., Caledonia, Minn.
W61 — L. F. Fader, VE1FQ, 123 Henry St., Halifax, N. S.
W62 — George C. Good, VE2YA, 188 Lakeview Ave., Pointe Claire, Montreal 30, Que.
W63 — Leslie A. Whitham, VE2EQ, 32 Sylvia Crescent, Hamilton, Ont.
W64 — Les Coff, VE4GC, 286 Rutland St., James, Man.
W65 — Fred Ward VE5OF, 899 Connaught Ave., Moore Jaw, Sask.
W66 — W. R. Savage, VE6EO, 833 10th St. N., North Lethbridge, Alta.
W67 — H. R. Hough, VE7HR, 1584 Freeman Rd., Victoria, B. C.
W68 — W. L. Geary, VE8SAW, Box 534, Whitehorse, Y. T.
W69 — Ernest A. A. VH1AA, P.O. Box 8, St. John’s, Newf.
K6P — E. W. Mayer, KP1KD, Box 1061, San Juan, P. R.
K70 — Audy H. Fuchikami, KH0BA, 2513 Nanaimo Dr., Honolulu, T. H.
K71 — KL7CP, 310-19th Ave., Anchorage, Alaska.
K72 — Catherine Howe, K7ZKA, Box 407, Balboa, C. Z.
An 80-meter antenna coupler like this is easy to build and tune, and assures that the transmitter can be loaded fully and that harmonic radiation is suppressed.

The neon bulb between the two capacitors serves as a tuning indicator; it is coupled to the coil through the capacitance between the coil and the upright length of wire. Phono jacks mounted 4 inches apart at the rear of the chassis are used for input and output connections. The lefthand capacitor, $C_1$, is mounted directly on the chassis, but $C_2$, at the right, is supported by small ceramic insulators.

RECENTLY at a radio club the author asked how many of the Novices present had received “QSL cards” for harmonics from the FCC. Of those present, approximately half had been cited by the FCC! All of the notices were for second harmonics of 80-meter operation. The unhappy part of the situation is that simple preventive measures would have kept the harmonics from being radiated. Before we discuss methods for preventing harmonic radiation let’s first see what a harmonic is and how it can cause trouble.

HARMONICS, Harmonics, Harmonics

When you key your transmitter on, say, 3725 kc., you want all your output power to be on that one frequency. Unfortunately, life isn’t that simple. Transmitters have the nasty habit of generating additional signals at integral multiples of the fundamental. These signals are called “harmonics.” If the fundamental is 3725 kc., there will also be a weaker signal at 7450 kc., a still weaker one at 11,175 kc., another at 14,900 kc., and so on up. As a Novice you may not know all of the amateur band frequency limits but, take our word for it, the harmonics just listed do not fall in any amateur band. It is bad enough to cause unnecessary interference to fellow amateurs, but you can be sure the commercial services take a very dim view of amateur interference to their signals. The transmitter is determined to generate harmonics, but the harmonics will generally not be radiated if we can keep them from reaching the antenna.

The first step in cleaning up a harmonic problem is to find out how bad the harmonic is. This can be determined quickly with the help of a neighboring ham by having him listen at the harmonic frequency. He should be at least a couple of miles away from you, otherwise your fundamental signal may overload his receiver. An overloaded receiver can generate harmonics and “birdies” in itself. This would, of course, lead to false conclusions by your friend.

If you find that your friend can copy a harmonic of your fundamental, you must do something to eliminate the harmonic, no matter how weak it is. Otherwise, it will be just a matter of time before you receive an official notice from the FCC.

Possibly you don’t have any amateurs living nearby who can check your signal. In that case there is another way to determine if harmonics are reaching your antenna. Build yourself a simple absorption-type wavemeter. The one described in July QST is sensitive enough for checking harmonics.

To use the wavemeter to see if harmonics are

1 McCoy, “A Novice Band Checker,” QST, July, 1958
Loading Without Harmonics

Keeping Spurious Signals From Being Radiated

BY LEWIS G. McCOY,* WIICP

getting to the antenna the instrument should be coupled to the output lead in the transmitter (or to the feed line if Twin-lead or open-wire feeders are used). Then tune the wavemeter through the harmonic frequencies. If even a trace of harmonic shows it must be suppressed.

The wavemeter will also show if your transmitter is tuned to the correct band. It is possible with many transmitters to tune them up on the wrong frequency. If you want to tune up on 3725 kc but actually end up on 7450 kc., it is just as bad if not worse than having a harmonic. That's why it is a good idea to have a wavemeter to check the tuning of your rig.

One way to reduce harmonics to a point where they no longer be a problem is to install an antenna coupler in the feedline. Fig. 1 is the circuit diagram for a coupler to be used with coax feedlines. Most transmitters these days are designed to be worked into coax lines. Unfortunately, if you go direct from the transmitter to the antenna without benefit of a coupler (or filter), it is quite easy to end up with an appreciable amount of harmonic being radiated. The coupler described here, when installed in the coax line near the rig and correctly adjusted, will provide adequate harmonic attenuation. Some transmitters have no means for adjusting the coupling or loading of the final amplifier. Another advantage in using this coupler is that it will provide such an adjustment.

Making the Coupler

The coupler shown here is mounted on a 2 X 5 X 7-inch aluminum chassis. Two phono jacks mounted on the back of the chassis are used for J₁ and J₂. The leads from the jacks are brought up to the top of the chassis through two holes in the chassis top. Rubber grommets are used in the holes to provide further insulation for the wires.

Both variable capacitors, C₁ and C₂, are mounted on top of the chassis. Standoff insulators are used for mounting C₂ because this capacitor must be insulated from the chassis. The coil L₁ is made from a length of Miniductor stock by unwinding fifteen turns from one end and a single turn from the other. When the fifteen turns are unwound, four polystyrene support bars approximately one inch long remain. The coil is mounted on the chassis by cementing the ends of the bars to the chassis with Duco cement. Let the cement dry overnight and the coil will be firmly mounted on the chassis.

An NE-21 neon bulb, mounted permanently on the coupler chassis, is used for an output indicator. A 3/4-inch diameter grommet is slipped over the glass bulb and a piece of stiff wire is wrapped around the grommet. The wire is soldered to a standard terminal tie-point mounted on the chassis between the two variable capacitors. A 2 1/2-inch length of hookup wire is soldered to the base tip of the neon bulb. This short length of wire serves as a capacitive pickup, C₃, to the coil.

The Antenna System

A sketch of a Novice installation using the coupler described here is shown in Fig. 2. The diagram also includes the dimensions of an 80-meter dipole for the Novice band.

The coupler can be installed anywhere in the station but it is usually more convenient to mount it near the transmitter. An antenna change-over relay or switch can be installed at the transmitter or in the coax line between the rig and the coupler.

In order to "get out" well the antenna should be mounted as high above ground and as clear of surrounding objects as possible. The antenna will still work if it isn't mounted high and clear but don't expect to get as good results. Some

*Technical Assistant, QST.
amateurs don't have the necessary space to put up an antenna 126 feet long. In such a case the ends of the antenna can be bent down or to one side to fit a shorter run.

The feedline can be any convenient length, and one of the advantages of coax is that it can be run along metal rain gutters, through pipes, and even under ground without upsetting the electrical characteristics of the line. However, if possible, it should be perpendicular to the antenna for the first 50 feet or so from the antenna.

Adjusting the Coupler

There is nothing complicated about adjusting the coupler, assuming the feedline and antenna are reasonably well matched, but certain precautions should be observed to obtain maximum harmonic attenuation. Turn $C_1$ to maximum capacity (plates fully meshed) and leave it set at that position. Now turn on your rig and tune it up normally, dipping the final to resonance. Next, tune $C_2$ for maximum brilliance of the neon bulb. If the bulb doesn't light move the pickup wire closer to $L_1$; if the light seems too bright move the wire away or make it shorter.

You may find that there are two settings of $C_2$ that will cause the bulb to light. One will be near maximum capacity and the other near or at minimum capacity. It is very important to use the setting of $C_2$ nearest maximum capacity (plates fully meshed) as this is correct tuning for 80 meters. A tuning indication near minimum occurs when the antenna coupler is tuned to the second harmonic and this is exactly what you do not want to do.

To increase the loading of the amplifier stage in the transmitter decrease the capacity of $C_1$. Once you have obtained the recommended plate current reading, with the amplifier tuned for a dip, the transmitter is adjusted.

Some amateurs have antenna systems using 300-ohm Twin-Lead for a feed line. The usual custom with this type of installation is to come out of the transmitter with coax to a set of balun coils and then use 300-ohm line to the antenna. Unfortunately, balun coils do not provide harmonic attenuation so such a system can get you into trouble. The coupler described here can be installed in the coax line between the transmitter and balun and will give you the protection you need.

We have discussed only the problem of 80-meter harmonics since, as pointed out earlier, they are responsible for the majority of FCC tickets to Novices. However, the same techniques outlined here can be used on the other bands. For additional information on antenna couplers and harmonics the reader should refer to The Radio Amateur's Handbook, or to the articles listed below:


This month's short lesson in logic is submitted by Louis Frenzel, Jr., WSTOM.

A "black box" has ten binding posts mounted on it. An ohmmeter measurement between any pair of terminals indicates 2 ohms resistance. Question: What is inside the black box?

Numbering the capacitors of last month's problem from 1 to 23, the answer to the problem is to disconnect No. 7 and No. 11. This leaves a block of .006 $\mu$F (Nos. 1 through 6) a single .001 (No. 7), a block of .003 $\mu$F (Nos. 8, 9, and 10), a single (No. 11) and a block of .012 $\mu$F (Nos. 12 through 23). Any capacitance from .001 to .023 $\mu$F can be made from various combinations of these in parallel.
Filtering and Shielding the Station Receiver

Measures for Reducing Stray Pickup and Radiation

BY DAVID T. GEISER,* WA2ANU, EX-W1ZEO

Worthwhile benefits result from good shielding and filtering in a ham-band receiver — for example, two not specifically mentioned by the author are better receiver utilization of the directive characteristics of beam antennas and greater immunity from noise pickup when the transmitting antenna is used for receiving. The simple measures described here can be applied in principle to practically any receiver that needs treatment.

The average amateur purchases a commercially-built receiver as part of his station. Commonly he will find that the receiver, while generally satisfactory and meeting all advertised specifications, has some undesirable features. Two faults often found in receivers are unsuitability for rapid break-in operation and the production of television interference particularly when receiving 10-, 15-, and 20-meter signals. This note tells how these troubles were eliminated from my HQ-129X and — in general — the methods by which they would be minimized in any receiver.

Difficulties with break-in receiver operation are usually caused by excess transmitter signal leaking into the receiver, making it necessary for the receiver send-receive switch to be turned on and off for each transmission. This often causes a frequency drift making the receiver lose the incoming signal temporarily if the receiver is ad-

Shielding of sensitive pick-up points in the author’s HQ-129X utilized common materials such as hardware cloth and aluminum foil. The small box at the lower left houses the a.c. line filter. Not visible is the additional internal bypassing on leads to exposed parts such as the pilot lights.
justed for greatest selectivity. Other very undesirable results of transmitter signal leaking into the receiver are overloading of the first stage, shortening the life of the tube nearest the antenna, and occasionally burning out of the first tuned circuit. Similarly, overload of the first grid will cause pulses of grid current to flow, generating transmitter harmonics in the receiver for transmission to nearby television receivers. This will occur even if the receiver send-receive switch cuts off the plate and screen voltages of the first tube, for only the cathode and control grid of the first (or other) stages are involved in this type of harmonic generation. If the transmitter signal can be kept out of the receiver, none of these troubles will occur.

Modern receivers are all potential transmitters. This is a characteristic of superheterodyne receivers, for this type includes an oscillator whose output frequency has a fixed difference with a desired incoming signal. All oscillators have some harmonic output, and if the receiver oscillator is not sufficiently shielded and filtered (like a good ham transmitter), it may radiate enough harmonic power to interfere with television receivers. Harmonic radiation is not a fault of just amateur receivers, for most old timers remember how whole sections of the 160-meter band were made unusable by fundamental and harmonic radiation from a-c-d-c broadcast receivers.

Curing one of these troubles will usually cure the other, for the filtering and shielding necessary to prevent the transmitter signal from entering the receiver will also effectively block receiver oscillator harmonics attempting to leave the receiver.

Extra advantages result from receiver filtering and shielding that is effective enough to make the receiver antenna connection the only r.f. path into or out of the receiver. Antenna line filters become effective against strong unwanted stations. The receiver is always left in receive position with improved receiver stability. A transmission-line t.r. switch has a chance to be really effective, and even an antenna duplexing bridge can be used.

Working Over the HQ-129X

Three local hams had TVI trouble with their communications receivers (all nationally-known, factory-built) and I wanted to try antenna duplexing bridge experiments. As my receiver had already been torn into for other modifications, it was selected for the full treatment. Many of the modifications incorporated will not be necessary with other receivers of even the same model, but severe test conditions were set up so that every possible type of signal leakage would occur.

The receiver was tested with a shielded resistor dummy antenna, the resistor matching the input impedance as determined by diode noise genera-

dor measurement. The transmitter was loaded into the station antenna for the initial tests. Later, when the pickup had been substantially reduced, the transmitter output was fed into an unshielded series-resonant combination of capacitor, inductor, and resistor (Q of about 11) near the receiver.

The HQ-129X had been modified earlier for use of a low-noise single-ended converter stage, so it is not possible to tell how much pickup the unshielded grid lead of the original 6K8 converter would have had. It is probable there would have been a great deal.

The greatest signal pickup was by the VR-105/OC3 voltage regulator tube used to stabilize the voltage on the oscillator plate and the r.f., converter, and i.f. amplifier screens. It was necessary to shield this tube. An almost equal source of leakage was the 6SS7 r.f. amplifier, because the metal envelope does not provide sufficient shielding against pickup. The shield covering the voltage regulator tube was extended to cover this r.f. amplifier tube. There is no reason why commercially-available individual shields would not be satisfactory if shimmed with aluminum foil or similar material.

The writer used 14-inch-mesh hardware cloth for shielding wherever convenience was not unduly impaired, but recommends the commercial shields when trade-in value is a factor.

The next prominent cause of leakage was the antenna terminal strip. This strip was removed and replaced by an SO-239 coaxial connector soldered in a copper plate which in turn was soldered to the chassis.


The Shielding Story in S-Meter Readings

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<td>S4</td>
<td>S2</td>
</tr>
<tr>
<td>Shield over bottom of chassis</td>
<td>S2</td>
<td>Inaudible</td>
</tr>
<tr>
<td>Leads to meter, pilot lamps and headphones bypassed</td>
<td>Inaudible</td>
<td></td>
</tr>
</tbody>
</table>

1 In the HQ-129X, the send-receive switch controls the r.f., mixer, and first i.f. plate supplies.
2 The Wright t.r. switch and many others.
3 Pessoden, U. S. Patent 1,170,909 and others.
Power-line filters (Sprague Liypass) were next installed in a Bud Mini-Box mounted against the chassis. In the position shown in the photograph the box readily slides through the rear cutout of the receiver cabinet.

The tuning capacitor assembly was the next leaky item. Punched holes in the rear frame were plugged with nuts, bolts, and washers. The slot in the tuning capacitor shield that formerly was used for passing the grid lead to the 6K8 converter was closed by bolting on a metal plate, and the rear bearings of both capacitors were covered with two layers of aluminum foil. The foil was fastened in place with Duco Cement, the centers of the foil layers being insulated from each other and the bearing screw by small pieces of Scotch tape, as shown in Fig. 1.

Hardware cloth was tacked with solder to the bottom lip of the chassis at one-inch intervals to form a bottom shield. The pilot light, “S” meter, and headphone leads were bypassed with 0.001-μf, ceramic capacitors where the leads entered the chassis. It was not necessary to bypass the loudspeaker leads additionally, though this might be necessary in other cases. It likewise may be desirable to bypass the “RELAY” (send-receive) terminals, but the writer has no information since these connections were not used and did not require bypassing.

Altogether, the above measures permitted the writer to be sure that the only signal path to the receiver was through the coaxial connector — where an antenna relay, t.r. box, or duplexing bridge can control the receiver input.

## New Apparatus

### Slug-Tuned Coil Forms

A number of features are incorporated in the slug-tuned ceramic coil forms (type number prefix CSA) recently introduced by Waters Manufacturing, Inc., Wayland, Mass. The winding areas are ribbed, a convenience for running leads to terminals. Insulating rings cemented on the forms at the ends of the winding space are equipped with two double soldering lugs each, so that four terminals are provided for either two separate windings or for a tapped single winding. The double-lug feature permits soldering a coil lead to one part of the lug while the connection to the external circuit is made to the other part. As shown by the photograph, two types of mounting bushings are available, one a standard-length screw type and the other a “deep-well” type which allows the slug to be retracted farther than normal, thus increasing the possible inductance-adjustment range.

In either the standard or retractive bushing types there are three form diameters — ½, 1/2, and 1½ inch — and each diameter is available in three winding lengths, ½, 1¾, and 1½ inches. There are also four types of slugs — three varieties of iron to cover the frequency range from audio to above 250 Mc., and brass. The ends of the forms are circular so that two forms can be stacked end to end (a collar is available to slip over the ends to complete the assembly) to form a transformer with separate slug tuning of both coils.
W6FHR's welded tower. The tower is 60 feet high and is broken into six 10-ft. sections. A 15-ft. rotating mast extension supports the 10- and 15-meter beams above the 20-meter array.

For years I have owned a multiband transmitter but have operated only a single-band antenna. This wasn't too confining when sunspot activity was low. But then the m.u.f. began to move up. My pole was capable of handling a 15-meter beam over the old reliable 20, so up it went. I had no other choice. Living in the city on the usual 50-ft. lot, the only room I had for expansion was up.

Soon 10 meters turned hot too, and I had to face the fact that if I wanted an additional beam on my Christmas tree I would have to start from the roots up. I had pushed the old pole as far as it would go. For a thousand reasons I couldn't abandon either 15 or 20 meters. Thus the seed was sown for a new support.

Having experimented with various antenna arrangements and finding, to paraphrase the song, "You Gotta Have Height," I set about examining ways and means of gaining a little more altitude at the same time I took on 10-meter capability. Two requirements were obvious immediately. The tower had to comply with building codes, and it had to be self-supporting with full-size three-element 10-, 15- and 20-meter beams.

As a first step, I began to explore available towers for amateur use. For one reason or another, none of these met the requirements. One or two commercial towers designed for nonamateur use were available if one were willing to part with about one kilobuck. Even so, these required too much room because of their base dimensions. Some of the other less expensive towers would not pass the Los Angeles Building Department requirements without extensive modification. These requirements aren't the toughest in the country.

Safe Construction

While not wishing to belabor the point too much, the importance of approval by local building and safety authorities cannot be over-emphasized. The job of these departments is to assure the safety of the buildings occupied by you and your neighbors. While some of the restrictions may seem severe or arbitrary, they are a result of long years of experience that have involved some pretty sad cases. The average amateur is not capable of judging the integrity of a structure.

BY LEWIS H. ABRAHAM,* W6FHR

Safe Tower for a City Lot

Welded Sections in a Self-Supporting Sixty Footer

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Upper section of the tower. The lowermost triangular plate supports the prop-pitch motor; the upper two are fitted with bearings.
A typical welded joint. The ends of the diagonal members are flattened to fit into the corners.

Only one weak member can bring a tower crashing to the ground. The author knows of several such incidents. In one, the family dog was killed. It might have been a member of the family or a neighbor instead.

An approved structure, properly maintained, usually will be safe. Building-department approval can be insurance as well as assurance. If an unapproved structure causes property damage, or injury, you have little legal status and may be considered negligent—a very vulnerable position in the eyes of a court of law. Unless an “Act of God” is clearly involved, it is pretty hard to prove that somebody hasn’t been negligent when a structure collapses.

Although I had built three towers previously, each time vowing, “Never again!” the prospects of working all bands with increased height goaded me on. Once again I forgot my old scars and let my enthusiasm prevail. Thus began the dream of Number Four. Armed with a copy of the Building and Safety Code, a well-oiled slide rule, and reams of paper, I set about the design of an edifice to rival all save Babel. This was to be my last tower—the ultimate.

From previous tests, 7 to 8 ft. seemed to be a satisfactory vertical spacing between beams. Wanting the lowest antenna at about 60 ft., this put the 10-meter beam at a height of around 75 ft. Thus the height was settled.

Constructional Details

Because of space problems, only a 4-ft. square could be allocated for the base. To use readily-available structural steel shapes would mean that the tower would have to be square in cross section. Tapering would add to the difficulty of construction, although tapering is very desirable from aesthetic considerations. Bolting the members together would mean drilling about 400 holes. This prospect almost scuttled the project before it was started. Upon consulting a local welder, it appeared that welding the members together

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1 Orr, Beam Antenna Handbook.
would offer no particular difficulties, although it would take the job out of the do-it-yourself class.

Once having decided on this method of assembly, other possibilities appeared. The tower could be made of pipe, instead of angle stock, and the cost of welding could be at least partially offset by using a triangular rather than square cross section. Tapering would present no special problem. The final design is shown in Fig. 1.

In order to facilitate transportation from the welder to the station site and to permit erection without the need for a crane, the tower was designed to break into six 10-ft. sections. The three vertical members or legs of each section terminate at both ends in joining plates or flanges. These provide a means for bolting the sections together. The flanges are drilled for joining bolts according to the chart of Fig. 1. It is important, of course, that pairs of flanges that will be bolted together when the tower is assembled be accurately matched as to bolt-hole pattern. This can be done most easily by clamping the mating pairs of flanges together and drilling the bolt holes and pipe-hole centers simultaneously through the two flanges. After the vertical pipes have been cut to the lengths of 10 ft., the flanges are welded onto the ends, keeping the surfaces of the flanges accurately at right angles to the axis of the pipe, and the pipe centered on the flange.

When the three legs of a section have been prepared, jigs of plywood sheet are drilled and bolted to the ends to hold the legs in the correct position with the proper taper. The horizontal spacing between legs in each section is 6 inches less at the top than at the bottom. Since the top jig of any section becomes the bottom jig for the next section above, proper orientation of the bolt holes is assured.

When the jigs have been bolted firmly in place, the cross bracing can be cut to fit and welded in place. Fig. 1 shows the number of cross braces required for each section. The horizontal members are added first, and then the diagonals. Fig. 2 shows a typical joint between a leg and two horizontal members. The ends of the horizontal members are not saddled to fit the pipe legs, but are cut square and the gaps are filled with weld. The diagonals are also cut square, but the ends are flattened somewhat to fit in the corner formed by the vertical and horizontal members, as shown in the detail photograph.

After assembly, each section should be given a coat of primer and one or two coats of paint. Dull grey makes a neat-looking installation.

Mast Support

Three triangular steel plates are welded into the top section of the tower. The first is at the top, the second is at the third horizontal brace from the top (3 ft. 9 inches), and the third plate is at the fifth horizontal brace (6 ft. 3 inches from the top). The bottom plate supports a prop-pitch motor, while the other two are fitted with bearings for the mast that carries the antennas. The bearings are of the plain sleeve type made of 3/4-inch o.d. × 7/8-inch wall mechanical tubing cut to a length of about 2 inches and welded to the triangular plates. A snug fit at these bearings is desirable to minimize vibration. (Standard pipe diameters are usually inside dimensions.) While ball bearings or other low-friction-type bearings are often considered, they are not very weatherproof, and since they are precision devices they are easily jammed, causing considerable difficulty. For the small amount of usage these crude bearings receive, they are quite adequate and only an occasional greasing is necessary. As a matter of fact, mine have not been greased in over a year and they are still working perfectly.

The rotating mast is made up of two sections
Fig. 3—Details of the concrete foundation. The unit is buried at such a depth that only the tops of the piers appear above the surface of the ground. The asymmetrical pattern is easier to construct than one having three equally spaced legs and may be placed closer to a building or other boundary.

of pipe. The lower section is of 2½-inch pipe and is approximately 15 ft. long. The top section is of 1½-inch pipe and is about 8 ft. long. In joining the two sections together, pieces of welding rod are used as centering spacers and then the two sections are welded together.

Foundation

In checking the design requirements for a conventional foundation, the specifications turned out to be an underground structure worthy of any Pharaoh. They called for a block of concrete 5 ft. square and 10 ft. deep. This hole would have attracted all of the swimming-pool salesmen in town. Discarding this monstrosity, the unconventional design shown in Fig. 3 was devised. This any Sunday contractor can handle. It involves some reinforcing steel, but this is small cost compared to moving about 30 tons of dirt, much of which would have to be passed up from the bottom of the hole with a bucket. This T-shaped design requires only 4 cubic yards of concrete and, buried a foot under the lawn, the foundation is completely invisible except for the three small piers on which the tower is mounted.

It is not necessary to use wood forms for the concrete, except for the piers, if the excavation is made with reasonable care. The excavation itself may serve as the form. The cross-sectional detail of Fig. 3 shows how the reinforcing rods are arranged. These reinforcing rods extend into the cubes and their ends are bent into hook shape. The rods are bonded together every 12 inches with ¼-inch tie wire. The ties wrap around the group of six rods and their ends are anchored by bending them around the upper central rod. Smaller wire should be used to bind the tie wire to the reinforcing rods where they intersect. The complete foundation, with the possible exception of the cubes, should be poured at the same time; that is, before the concrete starts to set, since dry concrete and wet concrete do not cohere.

Assembling the Tower

The bottom section of the tower weighs about 300 lbs., while the top section weighs approximately half of this. Nevertheless two men (admittedly with some experience) had no trouble in assembling the tower and mounting the antennas in a single weekend. The base section was first pushed up by hand and bolted to the foundation. A pipe gin pole with a short boom welded to the top end served as a support for a block and tackle. (See Fig. 4.) The gin pole was clamped about half way up on the base section, and the next section was hoisted into place and bolted fast. With each succeeding section, the gin pole was moved up a section on the tower and the above process repeated. The horizontal members of the tower are used for climbing and yet they are spaced wide enough at the bottom to discourage children from attempting it.

Feed and Adjustment

The antennas were cut to formula dimensions and the resonances checked reasonably close to the calculated figures. Little interaction between antennas was noticed. Gamma match is used on all three arrays. The reactance tuning capacitors of the 20- and 15-meter beams are accessible from

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Fig. 4—Method used to assemble the tower. The bottom end of the gin pole is clamped to the bracing members as shown in details A and B. The gin pole is moved up on the tower as sections are added.

all three arrays. The reactance tuning capacitors of the 20- and 15-meter beams are accessible from the top of the tower. To adjust the capacitor on the 10-meter beam, a small 1 r.p.m. motor originally designed to turn a barbecue spit was used. It worked perfectly. A single 52-ohm coax line is used to feed the antennas. Relays at the top of the tower switch the line from one to another.

To those who are interested in cost, the pipe amounted to $225. Welding required about 40 man hours. While this is not an inexpensive installation, it is cheaper than a comparable manufactured tower. Furthermore, it is exactly what I wanted and I have the assurance that it will stay up — and it's legal. In all, it was worth the effort. Besides — this is my last tower!
An All-Purpose 813 Amplifier
Flexible Unit for C.W., A.M., or S.S.B.

BY R. A. THOMASON,* W4SUD

In these days, the well-equipped amateur, be he traffic man, DXer or rag chewer, must be prepared for c.w., conventional a.m. and s.s.b. In the 813 amplifier shown in the photographs, provision has been made for convenient changing from one mode to another as well as to any of the bands from 80 through 10 meters.

The circuit is shown in Fig. 1. A turret-type grid circuit is used and the output circuit is a pi network designed to work into coax cable. The inductor is the rotary-type variable. Provision for neutralizing is included. $K_1$ is a parasitic suppressor.

For Class C c.w. or phone operation, $S_4$ is open. The 90 volts of fixed bias, furnished by a small bias supply and regulated by the VR90, is augmented by a drop of about 50 volts across the grid-leak resistor $R_5$ at a normal grid current of 15 ma. This brings the total bias to 140 volts. With $S_4$ closed, the grid leak is short-circuited and the 90 volts of fixed bias alone remains for $AB_2$ s.s.b. operation. (The author also prefers $AB_2$ for c.w. operation because it preserves the keying characteristics of the exciter better than with Class C operation.) $R_3$ should be adjusted so that the VR90 just ignites with no excitation.

Screen voltage is regulated at 750 volts by a string of five 6A2s for s.s.b. operation. When the grid drive is increased for Class C operation, the screen current increases, increasing the drop across the screen resistor $R_5$, and the screen voltage falls to 400. The regulators then lose control and the amplifier is ready for plate-screen modulation.

The screen is protected against excessive input, should the load or plate voltage be removed, by the overload relay $R_1$. The tripping point is set at 40 ma. by the varialbe shunt resistor $R_4$. One meter, $M_1$ measures cathode current, while the other meter, $M_2$, may be switched to read either grid current or screen current.

Forced-air ventilation is always advisable for a medium- or high-power amplifier if it is buttoned up tight to suppress TVI. A surplus 100 c.f.m. blower does the job more than adequately.

Construction

The amplifier is built on a 13 X 17 X 4-inch aluminum chassis fastened to a standard 12 3/4 X 19-inch rack panel. The r.f. output portion is enclosed in a 12 1/2 X 13 X 8 1/2-inch box made of aluminum angle and sheet. The VR tubes, relay, blower and meters are mounted external to the box.

The grid tank-circuit components are mounted underneath the chassis and are shielded with a 5 X 7 X 3-inch aluminum box. A standard chassis of these dimensions might be substituted. The bias and filament transformers are in a second
Fig. 1—Circuit of the all-purpose 813 amplifier. Unless otherwise designated, electrolytic capacitors not listed below should be ceramic. Resistors are in ohms.

R.F. AMPLIFIER

B1—Ventilating blower, 100 c.f.m. (surplus).
C1—250-μuf. variable (Hammarlund MC-250-M).
C2—1000-μuf. mica.
C3—Neutralizing capacitor, 10 μuf. maximum (Johnson 159-250).
C4—150-μuf. 6000-volt variable (Johnson 153-12).
C5—100-μuf. 5000-volt fixed capacitor (surplus vacuum, Amperex VC-100, or two 200-μuf. 5000-volt micas in series).
CR1—130-volt 50-ma. selenium rectifier.
J1, J5—Coaxial receptacle (SO-239).
K1—Screen overload relay, 2500 ohms, 7 ma. (Potter & Brumfield KCR5).
L1—3.5 Mc—32 turns No. 20, 1-inch diam., 2 inches long, 5-turn link (B&W 3015 or Airdux 816).
—7 Mc—18 turns No. 20, ¾-inch diam., 1½ inches long, 3-turn link (B&W 3011 or Airdux 616).
—14 Mc—10 turns No. 18, ½-inch diam., 1¼ inches long, 2-turn link (B&W 3006 or Airdux 508).
—21 Mc—7 turns No. 18, ½-inch diam., ¾ inch long, 1-turn link (B&W 3006 or Airdux 508).
—28 Mc—5 turns No. 18, ½-inch diam., ½ inch long, 1-turn link (B&W 3006 or Airdux 508).
L2—3 turns 3/16-inch copper tubing, 1-inch diam., 1¾ inches long.
L3—15-μh. variable inductor (B&W 3852).
L4—See text.
M1, M2—3½-inch d.c. milliammeter.
R1—39 ohms, 1/2-watt carbon.
R2—3300 ohms, 2 watts.
R3—15,000 ohms, 10 watts with slider.
R4—2000-ohm 4-watt variable resistor (Malory M2MPK).
RFC1, RFC2—2.5-mi. r.f. chokes (National R-50 or similar).
RFC3—Plate r.f. choke (National R-175-A).
RFC4—V.h.f. choke (National R-60).
S1—Rotary switch: 3 wafers, 3 poles, 11 positions per pole, 5 positions used (Centralab PA-0 wafers, PA-301 index).
S2—Rotary switch: single pole, 10 positions, progressively shorting, 6 positions used (Centralab PA-2042).
S3—Rotary switch: s.p.s.t. ceramic (antenna link switch from BC-375 tuning unit, or Communications Products Model 65).
S4—S.p.s.t. toggle switch.
S5—D.p.d.t. rotary switch (Centralab 1405).
T1—Filament transformer: 10 volts, 5 amp. (Thordarson 21F18).
T2—Bias transformer: 120 volts, 50 ma., 6.3 volts, 2 amp., filament winding not used; could be used for pilot light (Merit P-3045).
Bottom view of the all-purpose 813 amplifier. The grid tank-circuit components within dashed lines in Fig. 1 are enclosed in the box at lower center. Input links are wound over ground ends of grid coils. Filament and bias transformers are in the second box. The large resistor to the left of the grid box is the screen resistor. The variable resistor in the upper left-hand corner is the relay shunt R4. The selenium bias rectifier is fastened against the left-hand wall of the chassis.

box measuring 6 by 3 by 3 inches. This type of construction, together with the use of shielded wire for all power circuits, was followed to reduce TVI to a minimum. Each wire was bypassed at both ends with 0.001-mfd. ceramic disk capacitors. L4 can be adjusted to series resonate with the 600-muf. capacitor at the frequency of the most troublesome channel. A Bud low-pass filter completes the TVI treatment. As a result, the amplifier is completely free of TVI on all channels even in this fringe area.

**Adjustment**

In the pi network, the output capacitors are fixed. However, the adjustment of the network is similar to that of the more conventional arrangement using a variable portion of the output capacitance. The only difference is that the “fine” loading adjustment is done with the variable inductor.

The inductor is fitted with a Groth turns counter, making it easy to return to the proper setting for each band. Until the settings for each band have been found, C5 should be turned so that all of the output capacitance is in circuit. The inductor should be set near maximum for 80, and approximately half maximum for 40. On the higher-frequency bands, the inductor should be set so that the circuit resonates with the tank capacitor near minimum capacitance. Loading should increase as the output capacitance is decreased. A change in output capacitance will require a readjustment of C5 for resonance. When the loading is near the desired point, final adjustment can be made by altering the inductance slightly.

A 20-A or similar exciter is well suited as a driver for this amplifier on all modes. The 813 runs cool at 500 watts input on a.m. and c.w. and at 1000 watts p.e.p. on s.s.b. I believe it is a good compromise between the full legal limit and low cost.

This view shows the placement of components on the chassis. The 813 socket is mounted on spacers over a large clearance hole in the chassis. The several mica output capacitors are assembled in a stack on a threaded rod fastened to the left-hand wall of the shielding box. The neutralizing capacitor and the 80-meter plate paddles are to the right of the tank capacitor. To the right of the box are the five OA2s (the front one hidden), the screen overload relay and the VR90, the blower and meters.
With more and more antennas being fed with coax, a reliable means of measuring standing-wave ratio and power in the transmission line is a must if we are to achieve optimum antenna and loading adjustment. This is particularly true at 50 Mc. and higher, yet few of the devices that can be bought or built for these purposes are reliable for v.h.f. service. V.h.f. men who want to be sure that their equipment is working in tip-top order will be interested in the experience of W3GKP reported below.

For some time Bill had been unhappy about the state of the amateur art as regards standing-wave indicators for v.h.f. use. Most of the circuits in the Handbook and other amateur literature are not well suited for use above 30 or 54 Mc. He did not try any of the lumped-constant circuits involving reactive components or potentiometers, because of pessimism regarding the outcome.

Lumped circuits using only resistors, as in the bridge shown in Figs. 21-36, 21-33 and 21-35 in the '56, '57 and '58 editions of the Handbook respectively, can be used at 144 Mc., provided the equipment is built with more attention to v.h.f. requirements than is shown in the Handbook examples. For several years W3GKP used such a bridge, built by and on “permanent loan” from W3GZQ. In this the standard R0 is built into a coaxial plug and connected into circuit by a connector of the same type as is used for the unknown. The W3GZQ version is symmetrical electrically and mechanically, and it works much better at 144 Mc., than a 75-ohm model copied from the Handbook.

The standard supplied with it consists of a 47-ohm 1/2-watt resistor filed to 51 ohms, mounted in a PL-259A plug with the shortest possible leads. As a check W3GKP made another standard, selecting a resistor that matched the original at d.c. and mounting it in the same manner. When these are checked against each other on the bridge, a detectable but negligible reading is obtained. With the aid of laboratory equipment Bill then compared both standards with a General Radio 874-WM 50-ohm termination. With either standard a negligible reading was obtained, demonstrating the worth of the bridge as a device for adjusting antennas. But something that could be driven by the transmitter, and left in the circuit at all times, was desired. This led to an investigation of the directional coupler shown symbolically in Fig. 1.

As seen at A, a directional coupler is a 4-terminal device having the property that most of the power introduced at Arm 1 is delivered to Arm 2, except for a small sample that is delivered to Arm 4. There is no output from Arm 3, unless power is introduced at or reflected from Arms 2 or 4. Such devices can be constructed using lumped circuit elements, coaxial cable, waveguide, or combinations of these.

A coaxial version might appear as shown at B, which is intended to portray only the inner conductors. Most of the power flows down the main line to the load, Z. A small portion is coupled by m to the side line, and meter M1 gives a reading proportional to the power flowing toward the load. If the main line is terminated properly by Z, M1 will read zero; otherwise it will give a reading proportional to the power reflected by Z. If the generator is a transmitter and Z is an antenna, the ratio of the power readings at M1 and M2 is a measure of the standing-wave ratio, and the difference between the power readings is proportional to the power delivered to the antenna. It should be mentioned that this happy state of affairs results only when Arms 3 and 4 are terminated in matched impedances. This places some special requirements on the indicating devices, M1 and M2.

The ratio of power delivered to Arm 2 to that delivered to Arm 4 is termed the coupling. Due to unavoidable variations in the construction of the device, some power may be delivered to Arm 3, even when Arm 2 is properly matched. The ratio of the power to Arm 4 to that to Arm 3, when Arms 2 and 3 are matched, is termed the
directivity. Both the coupling and the directivity may be expressed in decibels. Ideally the directivity should be infinite. Reverting to 1B, the coupling, \( m \), between the main and side lines may be effected at two or more discrete points or distributed over some distance. In addition, it may be inductive, capacitive, resistive, or combinations of these.

Fig. 1-C shows a directional coupler made up of coaxial cables, coupled by capacitors, \( C \). If the distance \( L \) between coupling points is \( \frac{1}{4} \) wavelength, and the capacitors are equal, the coupler should perform as described. Fig. 1-D shows a fairly practical form, which can be constructed using standard fittings. In this sketch, A are PL259 plugs, B lengths of RG-8/U cable, C M-358 T fittings, and D modified PL-258 junctions.

The PL-258 junctions (he used Amphenol 83-1J) were modified to form a capacitive rather than a direct connection. Examination of one of these will show that its innards are retained by a spring C-ring at one end. If a hacksaw cut is made into the body opposite the gap in the ring, in the plane of the longitudinal axis and at about 45 degrees to the transverse axis, the ring will pop out intact when encountered by the saw blade. The inside can be poured out neatly. If the cut is made into the opening of the C-ring, its removal can be effected with a scriber. Parts are the C-ring, two insulating beads and a double female contact. The contact has two flanges near the center, which prevent it from falling out through the holes in the beads. W3GKP cut the contact in half between the flanges, filed the rough ends until he had a smooth flat surface extending over the entire area of the flange, and cemented the two contact pieces back together, with a bit of insulation between.

The smoothing can be done nicely by chucking the contact in a drill press and bringing it down on a flat file. The insulation used was transparent plastic 1/16 inch thick, cut from the lid of a small parts box. This was coated with GC cement, and the assembly clamped lightly in a vise to assure a uniform film thickness. After it dried, the plastic was filed down even with the metal, and the whole assembly coated with cement. It was found that this would stand having a plug inserted, but not removed, so when it is finished the T-fittings should be attached and left on.

On the first attempt W3GKP used RG-8/U cables having a tip-to-tip length of 12 3/4 inches when completed. These gave maximum directivity at 121 Mc. The next attempt to hit 144 Mc. was made with cables 10 5/8 inches long. For testing, Arm 1 was driven with a General Radio 1021 generator, the attenuator of which was adjusted to a suitable level and left fixed. The output from each of the other arms was measured with the following GR equipment: an 874 20-db. pad for matching, an 874-MR mixer, a 1216 i.f. amplifier, and 1215 oscillator. Relative output was read from the i.f., which is calibrated. The unused arms were terminated in 874-WM 50-ohm loads. Fig. 2 shows how the coupling and directivity varied with frequency.

This looked like a usable device. With a coupling of 33 db., 1 kilowatt at 144 Mc. in the main line would result in 0.1 watt in the side line, indicating that the device should be usable with amateur power levels with a simple terminating resistor. Lower coupling might be useful for low-power operation. While best directivity was obtained at or slightly below the low end, it looked good enough over the entire 144-148-Mc. range.

The computed relationship between s.w.r. and apparent directivity for an ideal coupler is shown in Fig. 3. Judging from this, a directivity of 20 db. would result in a s.w.r. error of 1.2:1. By shooting for a null it should be possible to adjust an antenna system to less than 1.5:1. The points indicated by X's in Fig. 3 show the directivity measured for various standing-wave ratios. The 2:1 point was obtained by paralleling two 874-
WM units on an 874-T fitting. Ratios of 3:1 and 4:1 were obtained by shunting this with the home-made standards. A single 874-WM was used for 1:1. For 1:2 and 1:25, an open- and short-circuited 874 10-db. pad was used. A plot of the same points, in different form, is shown in Fig. 4, along with the open- and short-circuit points, both of which read well under 1 db. The solid curve is intended to show the variation expected, and it looks as if the coupler favors something under 50 ohms.

The standard resistors used with W3GZQ’s bridge were checked, and it was found that his read about 17 db. and Bill’s about 22 db. At this point the pin in the plug came loose and broke the resistor lead, so another had to be made. Using the coupler, quite a few resistors were tried. Nominal 47-ohm resistors were consistently better than 33- or 56-ohm units. Most 47-ohm resistors read 20 db. or better. It was found that the match could be improved by surrounding the resistor with a shield connected to the ground terminal. Using this procedure, another standard was made which read 26.5 db., which is as good as the coupler. A further check was made with Arm 2 loaded with a Bird wattmeter, a reasonably good termination over the range from 30 to 500 Mc. The directivity was similar to the curve of Fig. 2.

The next step was to construct a voltmeter which would present the proper termination to the side line. The best arrangement evolved to date is shown in Fig. 5. The 500-μuf. silver-mica capacitor is the smallest physically made by Elmore. The resistor is selected for best match. Final adjustment was made with the LN34A crystal diode loaded with the meter, by dressing the 800-μuf. disk ceramic toward or away from the hot end of the rectifier. Two of these were made which, when checked on Arm 2 of the coupler, showed directivities of 28 and 23 db. Since Arm 4 is more critical than Arm 3, the 28-db. unit is used at Arm 4.

Figuring that the diode should have a constant load on it, Bill made up some constant-resistance pads for full-scale ranges of 200, 500 and 1000 microamperes, in addition to the basic 100-microampere range. These were put together in a hurry from standard resistors, and no attempt was made to get the loss just right. The coupler was then driven with the 144-Mc. transmitter, and terminated in the Bird wattmeter. The diode terminating units were attached to Arms 3 and 4.

Presumably the impedance of the main line is lowered by the coupling capacitors to the point where it works best at 40 ohms or so. This may explain the good luck with 47-ohm resistors. If true, this is an argument for looser coupling, or possibly for use of higher-impedance coax in the main line section. It would not be too difficult to experiment with hand-made coaxial sections having impedances between about 55 and 60 ohms.
The power was varied, and the forward diode was calibrated. Arms 1 and 2 were reversed to calibrate the reverse diode, the resulting curve leaving something to be desired. A step at about 20 watts was due to a change in scale on the wattmeter, and other steps showed up as a result of lack of agreement between the microammeter pads.

Subsequently a proper switch box was made, containing the 100-microampere meter and a group of pads, giving 100, 200, 500, 1000, 2000 and 5000 microamperes full scale. These present constant resistances to both diodes, and are constructed with selected resistors. Duplicate positions are provided for "forward" and "reverse." This was calibrated against the Bird wattmeter, taking care to eliminate the step at 20 watts, by reference to the manufacturer's calibration sheet for this particular meter. Fig. 6 is the result.

When the transmitter was fed through the coupler into the station antenna, there resulted currents of 330 microamperes (38 watts) forward, and 30 microamperes (1 watt) reverse, for an indicated directivity of 16 db., and an s.w.r. of 1.35:1. Using the forward-power indication, adjustments were made on the 829B amplifier, which brought the output from 38 watts up to 55, with an input of 120 watts.

The coupler has been left in the line continuously since it was completed some months ago, and Bill says that he wouldn't know how to get along without it. In rainy weather, for example, when a diode voltmeter on the transmission line gives abnormally high or low readings, the directional coupler indicates only slightly increased forward and reverse power. The net power to the line remains unchanged.

— E.P.T.
Remember the ARRL-IGY Propagation Research Project? You may not have seen very much about it lately in the pages of QST, but this doesn't mean that nothing's been going on. Far from it! PRP's hard core of some 550 amateur observers representing nearly 50 countries has been sending in semimonthly v.h.f. activity reports — many of them ever since we kicked off on January 1, 1957 — in a way that is a real credit to the ham tradition.

No matter what the propagation conditions — bad, calling for a discouraging string of negative reports, or good, meaning long lists of calls worked and heard — we have been able to count on reporting that is both regular and enthusiastic. In fact, we get the impression that some observers blame themselves somehow whenever conditions aren't all that they might be and the log is a short one! Sickness doesn't usually keep PRPers from their appointed task, either, whether it be the sort of sudden "cold" which has kept many a v.h.f. man home from work when the band was wide open, or even a stay in the hospital. Equipped with a portable ham setup by friends, K8CIC kept up his reporting while in the latter situation. One note on his log said he wasn't "too sure about some of these times as was under ether!"

The chief task of PRP observers, of course, is to supply us with reports of the ionospheric DX which they work and hear on the bands above 50 Mc. This information, after some processing, is fed to the International Geophysical Year data centers, and will be available to scientists in all the IGY countries. In addition to these worked and heard reports, we are collecting "negative" reports. These are just what the name implies — reports of the specific times when the reporter

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Another Peek at PRP

ARRL's IGY Propagation Research Project in High Gear

BY MASON P. SOUTHWORTH, W1VLH

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QST for
was active but observed nothing. Then, too, there are several stations that have been making continuous or "beacon" transmissions for the benefit of other hams. W5FHS, working with a group of hams all employed by the United Gas Corporation of Shreveport, La., went so far as to obtain permission to use company property to put a 24-hour-per-day, unattended beacon on the six-meter band. Fifty-Mc. enthusiasts owe this group a special debt for their continuing efforts to keep this signal on the air. WIREZ and W4FJ have contributed notably in scheduled 144-Mc. transmissions, and there are many others who are helping whenever they can.

Data Processing

Things haven't stood still at PRP Headquarters, either. For one thing, all that we talked about in the future tense a year ago can now be put in the present or past. Report evaluation, coding, and transcription — the first operations performed on the incoming logs — are well in hand and up to date. (At least they're up to 1½ months behind the present, which is about as close as overseas mail deliveries allow. For this reason, "now" at the PRP office is usually about 45 days ago.) During evaluation, each individual item on each report is examined for propagation type and accuracy as far as possible. The entries surviving this check (those listing ionospheric propagation plus the "nil" and beacon reports) are transcribed onto special forms. In this step, many of the data are coded, and all are arranged in a systematic form suitable for punched card presentation.

Before punching any cards, two more items of information are added to the sheets for each heard and worked report. These are the latitude and longitude coordinates of both stations. It has turned out that to keep track of the geographical locations of essentially all the v.h.f. hams in the world has been quite a project in its own right. Mrs. DeFranco, who handles the PRP coordinate file, is convinced that amateurs are nomadic mountain goats who wander from one hilltop to another! A second problem has to do with stations which can't be located in our atlas collection or on any of our charts: what's the most polite way to write to a fellow and tell him he isn't on the map? In any event, our coordinate file has provided a fine testimonial to the widespread interest in v.h.f. Not only is it bigger than we expected, but it's still growing.

Now at last we're ready to make some punched cards. This is handled by a handy-dandy little IBM machine with Mrs. Hazel Horan at the controls. Each worked, heard, negative and beacon report rates a card of its own, each one listing all the pertinent information such as date, beginning and ending times, calls and coordinates of the stations, antenna bearings, signal report, type of propagation and type of report. As you might imagine, these cards run to quite a volume, reaching as high as 30,000 per month during the sporadic-E season. All must, of course, be verified as well as punched.

After each month's cards are complete, we sort them out according to report and propagation type and put them into chronological order. This isn't quite the job it sounds, because we have a sorting machine that runs cards through at the rate of 650 each minute. Another job done at this point is to examine all the "worked" cards and pair up those that report the same contact (where both stations are PRP observers). This not only cuts down duplication in the results, but lends further confirmation to the doubly reported items.

Now the cards are ready for a trip to Boston, Mass., where the Air Force Cambridge Research Center puts them through its digital computer. The station coordinates already on the cards are used here to compute the distance between stations and sometimes the coordinates of the path midpoint. These items go into spaces reserved for them on the original cards, as well as onto a new duplicate card deck which is prepared. Another machine takes one of these card decks and automatically makes up a listing of all the information it contains. It is these listings which, at present, are being sent to the IGY world-wide data exchange centers.

Results

The question "What have you learned from all this?" is sometimes asked, and it is a little hard to answer without seeming to hedge. Actually, the IGY is primarily a period of data collection and reduction, not one of detailed study. The time for this will be the years to come ... quite a few of the years to come, judging by all the information now being gathered. So we don't feel too bad about saying that this is the way it is in...
our case. Like the IGY projects in other fields, we're concentrating on collecting and processing.

What does PRP hope to achieve eventually? In brief, our aim is to (a) document v.h.f. amateur observations in a (b) manner which lends itself to scientific study. We feel that (a) and (b) are equally important. Gathering the data is obviously necessary, and this is where the hundreds of PRP observers come in, but putting what you gather into a useful form (and one which will be used) is also vital. Therein lies the reason for the use of modern punched-card tabulating techniques with a card layout designed to permit the extraction of a maximum amount of data. We aim to make PRP data not only available, but available in a form which will insure its use. Our extremely detailed records of auroral and sporadic-E openings, for example, can readily be checked and compared with the data taken by other IGY projects. Our F2 skip m.u.f. observations can and will provide some very interesting correlations with the predicted values and those measured at the relatively speaking) handful of professional observation points.

A good deal of emphasis has been placed on transoquatorial scatter propagation. Not only did "TE" start the powers that be thinking about sponsoring an amateur program such as ours, but this mode shows promise of being one of the most interesting and controversial things in the propagation field. Prior to early 1957, everyone thought of TE as being something unique to Central and South America. After all, it was there that all of the long, north-south evening contacts had been made. Since then, however, PRP with the help of its observers has demonstrated that TE works just as well between Africa and southern Europe and Australia and Japan. The latter path has even been termed "monotonously consistent" by one observer. Comparison of data for these various parts of the world should be of great help in solving the TE riddle, especially since the only professional IGY stations studying this phenomenon are in South America. There also may be some connection between TE and the very long distance contacts such as Japan to South America. This is the impression one gets from scanning the PRP logs during such openings. Later and further study will be most interesting here, also.

The three NBS-CRPL beacon stations

Observera Still Needed

One nice thing about PRP observing is that it doesn't interfere with your operating habits. Log sheets are provided on which to report, and they act as guides to insure our getting the required information. Beyond this, you are free to follow your inclinations. If working stations is your goal, we certainly want those worked reports. If you just like to listen, we are glad to receive all the heard reports you can supply. If you seldom hear anything (which we hope isn't the case) we'd like your negative reports. In fact, even if you don't like to listen, let alone operate (why are you a ham, then?), you could run a beacon station for us!

For these reasons and others, only a very few stations have dropped out of PRP once they actually began to report. We must admit, however, that the number of reporting stations has been something of a disappointment compared with the amount of v.h.f. activity today. While there are enough fellows actively participating to do an adequate job, all right, there might well be more. A goodly number have been content to receive our monthly PRP News for free and let their more enthusiastic brethren do the reporting. This doesn't seem quite fair, so a warning has gone out that stations never heard from will be dropped from our mailing list. This in turn will make room for new — and, we hope, more active — PRPers during the final months of the IGY. There's time left, by the way, to earn one of our handsome PRP Consistent Reporting Award certificates!

How about you? If you're on v.h.f. and willing to help out PRP we'll be more than happy to send you our monthly News. Even more important, you'll be doing something for the IGY and for amateur radio. Our address is: ARRL-IGY PRP, 530 Silas Deane Highway, Wethersfield, Connecticut, U. S. A. Why not send us your name right now?

GB3ENT will be on the air on August 4, operating from the annual Show and Sports exhibition which is arranged as part of a part of the August Bank Holiday. Special QSLs will be issued.

On about the second of June a Collins 75A-3 receiver, serial number 193, was stolen from the ham shack of the MIT Radio Society in Cambridge, Mass. The receiver was badly in need of repair. Any information on this receiver should be addressed to Harold G. Fritz, Secretary, MIT Radio Society, Cambridge, Mass.
The Viking Courier is an r.f. amplifier using a pair of neutralized 811-As, and covering a continuous frequency range of 3.5 through 30 Mc. in four overlapping segments. The package, which includes power supply, measures only 15 inches wide, 11½ inches deep and 9 inches high. Its 58 lbs. however, tells you that it must be out of the low-power class. A c.w. man or sidebander can push the input to 500 watts (p.e.p. on s.s.b.). Anyone having a flea-power a.m. rig can boost his carrier output to 65 or 75 watts using the Courier as an a.m. linear.

Circuit

The grid circuit is a conventional balanced-tank arrangement using a split-stator tuning capacitor. A double-gang rotary switch (the only band switch in the unit) shorts turns at both ends of the tank coil to reach the higher frequencies. Since the two 811-As are in parallel across one half of the tank circuit, a small fixed capacitance is connected across the other half to compensate for the input capacitance of the tubes. A single coupling link coil serves for all bands.

In the pi-network output circuit, the tank (input) capacitor and rotary variable inductor are ganged to a single control. The tuning range is continuous; thus no switching. The loading (output) capacitance is supplied by a 700-µuf. variable capacitor and a bank of fixed capacitors that may be switched in parallel with the variable to total a capacitance of over 4000 µuf. This network will feed loads ranging from 18 to 600 ohms on 3.5 Mc. if the s.w.r. does not exceed 3 to 1. At 7 Mc. and higher, the range increases to cover load resistances from 20 to 2000 ohms.

It is apparent that the designers have gone to considerable care to assure parasitic-free operation. There are v.h.f. suppressors in each of the plate leads, each of the grid leads and one in the plate side of the neutralizing-capacitor lead. A resistor across the grid-circuit r.f. choke takes care of low-frequency parasitics.

Power Supply

The high-voltage supply uses a pair of 8GG-As and delivers approximately 1500 volts at 350 ma. The input choke of the single-section filter is connected between the plate-transformer center tap and ground, placing it in the negative side of the output. The filter capacitance is made up of five 80-nf. 450-volt electrolytics in series.

A low-voltage winding on the filament transformer and a selenium rectifier supply about 95 volts of fixed bias. A rotary switch selects the proper biasing system for Class B or Class C operation. The same switch also transfers the meter to show either grid current or cathode current. This is accomplished in four switch positions — two for Class B and two for Class C.

Those who have operated r.f. amplifiers not biased to plate-current cut-off are familiar with the noise that such amplifiers generate in break-in operation with plate voltage applied continuously. This noise is apt to be bothersome when a t.r. switch is used. The problem is overcome in the Courier by an arrangement that permits applying cut-off bias to the amplifier during standby periods. This is accomplished through two terminals at the rear of the transmitter.
The biasing arrangement is shown in Fig. 1. With Terminals A and B shorted, and $S_1$ (a pole of the mode-meter switch) closed, the d.c. grid return is grounded for zero-bias Class B operation. When the short is removed from Terminals A and B during stand-by periods, the full 95 volts from the bias supply is applied to the grids, cutting off plate current completely. A switch may be used to short the terminals, or it may be done with a relay tied in with the transmit-receive control system. Cutting off plate current during stand-by periods also increases tube life.

For Class C c.w. operation, A and B are shorted permanently and $S_1$ is opened. This inserts the grid leak $R_1$. Also, the voltage divider consisting of $R_1$ and $R_2$ applies 10 to 14 volts of bias which is sufficient to cut off plate current when the key is open.

As in some of the other Johnson transmitting units, terminals are provided for connecting a remote switch to control the high-voltage supply, and to operate an external antenna relay simultaneously with the plate power switch.

All power wiring is shielded and all power leads that leave the chassis, including leads to the meter and panel lamps, are fitted with v.h.f. TVI filters. The complete unit is shielded by the standard Johnson one-piece perforated metal cabinet, and the seam between the cabinet and panel is sealed with electronic weatherstripping. A small fan that comes on with the filament and bias supplies keeps the unit at comfortable temperature.

**Driver Requirements**

Class C c.w. operation requires a driver delivering about 50 watts. At some sacrifice in output, the Courier can also be operated as a Class B c.w. amplifier with a driving power of 25 to 30 watts. However, when this is done, break-in operation may not be too convenient, since it may be necessary to provide for opening Terminals A and B, Fig. 1 (for for turning off the high-voltage supply) during stand-by periods. This noise may not be a serious factor if a separate receiving antenna, or an antenna relay, rather than a t.r. switch, is used. A p.e.p. driving power of 15 to 20 watts is required for s.s.b. operation.

The instruction manual is quite complete in details of operation of the Courier with various driving units, particularly for the lower-power units in the Johnson line. There is also a good section on neutralizing triodes. — D. H. M.

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**The Hammarlund HQ-110**

Communications receivers are not all alike. One of the newer models with its full share of innovations is the Hammarlund HQ-110. Second item in the all-new Hammarlund line that began with the HQ-100, the 110 is an amateur-hand double-conversion job in the medium-price range.

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\[ \text{Fig. 1 — Essentials of the Courier biasing system discussed in the text. A and B are terminals at the rear of the unit.} \]

\[ S_1 \text{ is part of the mode-meter switch.} \]

\[ R_1 \text{ is the grid leak used in Class C c.w. operation.} \]

It has calibrated tuning ranges for 100, 80, 40, 20, 15, 10 and 6 meters.

After the first quick look, one’s reaction is likely to be “What is a ham-hands-only receiver doing with two dials?” And even after you’ve operated the 110 for a few hours, you’re likely to reach for that right-hand knob for handspread tuning. But it isn’t a tuning knob, old man —

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C "The Hammarlund HQ-100" — Recent Equipment, Jan. 1957, QST.
The Hammarlund HQ-110 is probably the first amateur-bands-only receiver to be equipped with two dials. Reasons are given in the text.

It's the function switch. Even though there are two dial windows, all the tuning is done with the knob on the left side of bandswitch.

Those two dials require a bit more discussion. The tuning capacitor is turned through a smooth-running friction-drive dial (left side of the panel) which is calibrated for the 160-, 80-, 40-, and 20-meter bands. Now, to that other window. In back of it is another dial, cable-driven from the first one. This second dial has calibrated ranges for 15, 10 and 6, plus a 0–100 logging scale. This rather neat trick results in dial readability far exceeding that obtainable with any simple single dial having 8 scales.

Each division on the 160-meter scale indicates 2 kc. On 80, 40, 10 and 15 each represents 5 kc. The 10-meter range has 20 kc per dial marking, and the 50-Mc. range 50 kc. Because the spacing of the marks is considerable, and the dial is easily read, the frequency can be read much closer than the above increments would indicate. Accurate frequency logging is made possible through the use of the built-in 100-ke. crystal calibrator and movable cross-hairs on both dials. These are manipulated by means of a "calibration set" knob in the middle of the recessed portion of the panel containing the dial openings.

Receiver controls are conveniently arranged, though they take some getting used to. Reading from upper left down around the U arrangement, they are c.w. pitch, antenna trimmer, tuning, sensitivity, manual-a.v.c. (toggle switch), bandswitch, limiter on-off (toggle switch), audio gain, function switch, and Q-multiplier selectivity and frequency controls. The S-meter is at the upper right. In the corresponding spot at the left side...
is a space for an electric clock and timer, an extra-cost accessory not included in the receiver tested. We understand that nearly all purchasers either get the clock-equipped model, or eventually order the conversion kit available to take care of buyers who were economy-minded at first and turned down the clock feature. The function switch has positions for send, receive, c.w.—s.s.b. and calibrate. The on-off switch is on the sensitivity control rather than on the audio gain, where one normally looks for it.

The HQ-110 features a die-cast aluminum panel which lends a feeling of solidity to what is in reality a very light receiver. That light weight, incidentally, is welcome for Field Day and V.I.F. Party trips to choice locations. So is the over-all power consumption of only 80 watts. And anyone who has fussed with the innumerable screws that hold some receivers inside their cabinets will take kindly to the arrangement for getting at the 110. Just two screws, both on the back, need be removed to slip the perforated housing off, for tube changes and other servicing.

Though we do not ordinarily attempt to evaluate the performance of equipment described in these pages, we know one question everyone will ask about the HQ-110, so we will attempt to answer it fairly. “How does it work on 6?”

As might be expected, the r.f. gain is lower on 50 Mc. than on other bands. The 8-meter readings are bound to be low on that account. But you can hear noise from the antenna, and side-by-side tests with converter-receiver combinations having much more gain show that just about any phone signal that can be heard on the hot combination can be heard on the 110 alone. Only your next-door neighbor will read S9 on the meter, but you'll hear the weak ones he's working, if your antenna system is as good as his.

With double conversion on all bands from 7 Mc. up, the HQ-110 is free of image troubles, and its dial mechanism allows reasonably comfortable tuning right up through the 50-Mc. band. Appreciable hum modulation shows on 6, probably the result of the hot-cathode oscillator circuit, and therefore subject to variation from one B3B5 to another. This makes the 110 something less than ideal as a weak-signal c.w. receiver, but its stability, both mechanical and electrical, is adequate for 50-Mc. operation. — E. P. T.

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**Strays**

Last month we reported that W0BP had Worked All States using radioteletype. This month we show you a picture of W0BP and some of his equipment. Top to bottom in the rack are audio panel and speaker, a high-speed tuning indicator, a Johnson Navigator modified for f.s.k., and a Collins 75A-4. Down below that are various controls, switching and patching arrangements. At the left is a model 15 page printer, while at the right is a model 28. Out of sight to the left in this same room is another rack containing S-76 and BC-779 receivers, a panadapter, power supplies, terminal units, etc. Over in the transmitter room, separated from the operating room by a glass partition, there are three separate kilowatt rigs. And one of W0BP's antennas is a version of a "vertical fan" described by him in QST way back in November, 1920. One of his antenna grounding switches is a Wireless Specialty dating back to 1914.

QST for
Results of Armed Forces Day 1958

Certificates of Merit have been mailed to two hundred and seventy-eight contestants in recognition of making perfect copy of the Secretary of Defense's International Morse Code message to radio amateurs on Armed Forces Day 1958. The message was transmitted at 25 W.p.m. by military stations on 17 May 1958. Certificate winners of the c.w. message are as follows:

Military to Amateur Contacts

Operating on military frequencies AIR, NBS, and WAR worked amateurs in the 80-, 40-, 20- and 15-meter bands, using c.w., a.t.u., s.s.b., and RTTY. The three military stations made a total of 1407 contacts. Reports from outlying military stations participating in the Novice phase of this test have not been received and are not included in the above total.

Radioteletype Writer Receiving Competition

The radioteletype receiving competition featured a message from the Secretary of Defense transmitted at sixty words per minute. A total of one hundred and forty contestants received a certificate of merit for perfect copy. RTTY winners of certificates of merit are as follows:

Military stations participating. Congratulations to all winners of the Secretary of Defense Certificates and certificates of merit are as follows:


The military departments are pleased with the continued increase in participation in these tests and appreciate the interest shown by the amateurs participating. Congratulations to all winners of the Secretary of Defense Certificates and it is hoped that next year's participants will exceed the present record.
The 1958 Novice Roundup Results
BY RONNIE GANN,* W1FGF

Confucius say: ăన (Man who do not believe '58 Novice Roundup best yet, better should join honorable ancestors than to pound brass.) I'm speaking of course, about Max Confucious, WN1QST. He owns a delicatessen here on LaSalle Road.

Anyway, Max was right. A real crazy scene was dug by all. Logs were submitted from over 85% of the participating sections with a few of the contestants raking up 10,000 points or better. In there pitching for the DXers were KG4AS, WL7CEE and WH6CJJ. It seems most of the boys favored 80 and 40 meters, although 15 was the scene of some pretty bloody battles, too!

Interest reigned high among Non-Novices this year, and apparently some got a bit overzealous. A few scooted up into the Novice band with their half-gallons and caused a bit of QRM, not to mention shattered ear drums! So to all up-and-coming Novices reading this..."We apologize, and promise to watch ourselves next year."

Tyro Topics...

"Working the NR was just about the most fun I have had. Most of the fellows were very helpful." — KN6GJD..."My greatest thrill of the contest was when a call to a CQ was received from W1AW. Thanks a million for the contest that are sponsored by the League." — KN8PC..."Sure enjoyed the contest, tax for a lot of fun." — KN5HGP..."That SS was fun, but this NR sure had that beat! Many tx to U for giving the rock-bound Novices a chance each year to show what they can do." — KN6ZB..."Communications Assistant.

Champ Greets Champ: K6SXA, last year's national high scorer, congratulates this year's top man, KN6ZBV (seated) is real happy about the whole deal...he should! Whipping out 22,995 beautiful points with 315 QSOs, and being top man in the nation, Dave certainly made the most of his Globe Chief 90, NC-300 and 3-element beam. Sac Valley adds another fine operator to its amateur ranks.

Our Turn, Now...

"Hilllip" — W1FGF..."Have received about 100 QSL cards stating I was their first Maryland QSO, and they're still coming in!" — WM3SR..."Most of the Novices I heard on in the contest were good operators." — W0JHY..."Just loads of fun. Wish I could get that Utah station's address. (C'mon WN7JBY) — K5APF..."Just keep up the good work of helping the Novices and we'll have loads of good operators." — KA1ID..."I was surprised at the number of Novices in there that could handle a fast bug." — KJUZJ..."Seems like the Novice operators get better each year." — W4OMH..."Wy nice NR as usual. Made 68 people happy with another multiplier...how comes the QSL cards?" — FO2YA..."Think we'll have a swell bunch of operators hitting the big contests before long." — K8BPX..."Boy, I really enjoyed this one!" — K8EFT.

A look at the call-areu, leaders will show a lot of hard work and nose-to-the-grindstone brasspounding by these people. A standing ovation, men.

Kn1CEC 11,514-187 Kn6ZBV 22,995-315
Wn2Dyc 17,720-215 Wn11xe 10,500-192
Kn3A1Q 10,824-240 Kn5G8S 15,848-273
Kn4OZ 20,500-345 Kn6N1D 15,984-276
Kn5Kyr 17,718-306 Kn8Klb 6,000-150

Wn6CJ 189-61
With the large number of logs submitted, only 14 participants racked up 10,000 points or better. Listed below in descending order are their calls and scores:
Kn6ZBV 22,995 Kn1CEC 11,514
Kn4OZ 20,500 Kn4U7F 11,308
Kn5Kyr 17,718 Kn3A1Q 10,824
Kn8Hnd 15,984 Wn71xe 10,500
Kn8G8 15,848 Kn5Jps 10,400
Kn6Lr 14,310 Kn1CAt 10,300
Wn2Dyc 12,720 KnjPPx 10,229
Kn3Hkb 12,200 Wn2Rfs 10,100
Kn5Pb 10,004

Nice job fellows! There were well over 250 logs submitted from Novice participants alone, not counting the non-competing stack. The continuous rise in contest operating by the Novices has been, in a word, "fantabulous," and we can well predict record-smashing participation next year. You non-Novices did us proud again this year, in giving up your time to help pull the new fellows up through the ranks. Here's how things shaped up. Calls are listed alphabetically.

W1AMy 130, W1Awn 1926, W1BDI 650, W1DGL 206 W1FGF 340, W1Hy 572, W1JFL 150, W1KCGJ 451, W1Kyg 155, W1KM 2059, W1N1J 360, W2BYE 100, W2CwV 36, W2EWZ 990, W2FEB 148, W2JLL 900.
Running 70 watts input to his homebrew rig, KN4OKZ slammed out a big 20,590 points to win laurels for the Washington Section. What a gall FB, Delta.

**SOUTHERN NEW JERSEY**

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**CENTRAL NEW JERSEY**

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Running 70 watts input to his homebrew rig, KN4OKZ slammed out a big 20,590 points to win laurels for the Virginia Section and second nationally. He’s following in his Pop’s footsteps too, for Ken’s dad is W4YKC, a well-known contest man in the realm of Hamdom.
Contest fans are aware that Sweepstakes certifications are issued on a "local" basis, i.e., to club and ARRL Section winners. Yet editorial mention is often made of new contact and scoring records, licensing area leaders, or the country’s "top ten."

In our portrayal of the phone SS in June QST, section winners were correctly identified. But in working on Minnesota leader W0EDX’s score, we overlooked a mathematical error that inflated the actual tally as not intended by either AI or our checking department. To those who wrote, to W0EDX, and to all others concerned, we extend our sincere apologies for the slip.

By way of reconstructing, then, we find Los Angeles winner K6EVR pacing the crowd with 170,520 points. Californians long have had a penchant for monopolizing the voice portion of the SS and 1957, it seems, was no exception. In fact, S/oes now have registered the top A-3 total in nine of the twelve postwar SS’s.

Meet K6EVR, top phone scorer in the 1957 Sweepstakes. Although first licensed in 1954, 19-year-old Ronald has rolled up some impressive tallies in the SS, the Novice Roundup and DX Tests, and is DXCC-210.

An all-time high of 22 amateurs posted above 100,000 points under a scoring system that has remained basically unchanged for years. Following K6EVR came Connecticut’s W1YWU with 156,366 points, while the 152,643 points of Mississippian W5DQK captured show position nationally. The fourth-ranking score of 147,861 came from East Bay’s W6PQW, all of whose 815 QSOs were made on ten meters with 00 watts input. Other six-digit men were: W7BSW 133,152, K6BWD 129,384, W2VCZ 124,830, W0EDX

(whose contact total of 854 was tops) 124,611, W6SY 121,890, W8AJW 121,764, W7CAF 121,440, W5MYI 121,005, W5VU 108,570, W90HO 106,812, W9IM 106,128, W7BJV 105,216, W6VQC 105,053, W3MSK 104,244, K2BHP 102,900, W7CBP 102,837, W1FZ 102,711, W7BLX 100,022.

The 25th ARRL Sweepstakes is set for November 8-9 and 15-16. QRV?

As ships dock at Stateside ports, foreign entries resulting from the 1958 ARRL International DX Competition continue to pour in. Besides those shown in July QST, c.w. scores ranging from 100 to above 400 thousand are claimed by CR6AI, HA8WS, JA1YX, JA2AB, KE1RH, OE3RE, OE6HY, VK2APK, VK2GW, ZL3OB, and ZP2AY. DXers reporting from 50,000 up to 100,000 points include LJ3KR, H5DII, H5BLF, OE3VP, OK1AEP, VK5MY, VK9XW, Z66JX, ZL4MT and ZS6AJO. Final standings coming up!
ELECTION NOTICE

To All Full Members of the American Radio Relay League Residing in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions:

An election is about to be held in each of the above-mentioned divisions to choose both a director and a vice-director for the 1959-1960 term. These elections constitute an important part of the machinery of self-government of ARRL. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. The election procedures are specified in the By-Laws. A copy of the Articles of Association and By-Laws will be mailed to any member upon request.

Nomination is by petition, which must reach the Headquarters by noon of September 20th. Nominating petitions are hereby solicited. Ten or more Full Members of the League residing in any one of the above-named divisions may join in nominating any eligible Full Member residing in that division as a candidate for director therefrom, or as a candidate for vice-director therefrom. No person may simultaneously be a candidate for both offices; if petitions are received naming the same candidate for both offices, his nomination will be deemed for director only and his nomination for vice-director will be void. Inasmuch as all the powers of the director are transferred to the vice-director in the event of the director’s resignation or death or inability to perform his duties, it is of as great importance to name a candidate for vice-director as it is for director. The following form for nomination is suggested:

Executive Committee
The American Radio Relay League
West Hartford, Conn.

We, the undersigned Full Members of the ARRL residing in the Division, hereby nominate (signature) as a candidate for director and we also nominate (signature) as a candidate for vice-director (signature and address).

The signers must be Full Members in good standing. The nominee must be a Full Member and the holder of an amateur license, and must have been a member of the League for a continuous term of at least four years at the time of his election. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communications, or is commercially engaged in the publication of radio literature.

Voting by ballots mailed to each Full Member will take place between October 1st and November 20th, except that if on September 20th only one eligible candidate has been nominated, he will be declared elected.


For the Board of Directors:

A. L. Rutherford
Secretary

July 1, 1958

14-MC. PHONE EXPANSION PROPOSED

In 1956 the League requested the Federal Communications Commission to amend the amateur rules to provide that holders of the Amateur Extra or Advanced Class license might use voice emission in 14,300-14,350 kc. FCC has not as yet acted on our request. Responsive to a decision of the Board of Directors, an amended petition has now been filed which would delete the license restriction and therefore presently consists of a straightforward request to make the 20-meter voice band 14,200-14,350 kc. The text follows:

Federal Communications Commission

Amendment of Sections 12.22 and 12.111 (d) of the rules and regulations

August 1958
Amendment of petition

On September 27, 1956, the American Radio Relay League, Inc., filed with the Commission a petition seeking amendment of sections 12.23 and 12.111 (d) of Part 12, Rules Governing Amateur Radio, concerning the expansion of the 14-mc., radiotelephony subband. The Commission has not as yet acted on the petition.

The petition requested the expansion of the 14-mc. radiotelephony subband so that it would become 14,300-14,350 kc., and presented arguments in support thereof.

The petition also included the request that the use of the proposed new radiotelephony segment 14,300-14,350 kc. be limited to holders of the Advanced or Amateur Extra Class grades of license.

As directed by its Board of Directors, the League now amends its petition by withdrawing the proposal for a restriction to certain classes of amateur license. The amended petition, therefore, seeks only the expansion of the 14-mc. radiotelephony subband so that it will read 14,300-14,350 kc.

THE AMERICAN RADIO RELAY LEAGUE, INC.
BY PAUL M. SEGAL
Its general counsel

A. L. BUDLONG
General Manager
May 21, 1958

V.H.F. C.W. SEGMENTS PROPOSED

Responsive to a decision of the Board of Directors, the League has filed with FCC a petition for amendment of the amateur rules to provide exclusive c.w. segments of 100 kc. at the low ends of the 50- and 144-mc. bands. In accord with ARRL's request for preferential attention, the Commission promptly issued a notice of proposed rule making to accomplish the changes, with a date of August 29 by which comment may be filed. The text of both the League's request and the Commission's notice follows:

FEDERAL COMMUNICATIONS COMMISSION

Amendment of paragraphs 12.111 (h) and 12.111 (i) of the rules and regulations; limitation to A-1 emission of the lower 100 kilocycles in the 50- and 144-mc. amateur frequency bands

Petition for rule making

Pursuant to § 4 (d) of the Administrative Procedure Act and § 1.702 of the Commission's Rules and Regulations, the American Radio Relay League, Inc., requests that paragraphs 12.111 (h) and (i) of the Commission's Rules and Regulations be amended to provide for only A-1 emission in the lower 100 kilocycles of each the 50- and 144-mc. amateur bands.

This request is filed pursuant to decisions of the Board of Directors of the League at its meeting in May, 1958. As the Commission is aware, the ARRL Board of Directors is composed of sixteen amateurs nominated and elected by some 70,000 licensed amateurs to represent them in the formulation of League policy.

1. The contributions of the amateur radio service to knowledge of propagation characteristics in the v.h.f. portion of the spectrum are a matter of record. The most recent examples are the two-way 144-mc. communication between California and Hawaii in July, 1957, and innumerable instances of intercontinental two-way communication in the 50-mc. band during the past year. Additionally, nearly 1,000 amateurs are enrolled in an intensive project, as part of the International Geophysical Year program, to gather further data on propagation phenomena.

2. The principal raw material for such studies, and therefore for contributions to the art, comes from long-distance amateur contacts. It is well established that, with regard for watt, A-1 emission is a far more effective medium for marginal work over great distances than A-3 emission. It is also well known that a weak, distant c.w. signal is characterized by voice signals from local amateur stations. It is more to the credit of the amateurs who, under the handicap of local voice interference, have accomplished the distance records on c.w. so far obtained.

The League believes that such experimental long-distance attempts at communication should be provided every opportunity for success, and therefore proposes the establishment of exclusive c.w. segments of 100 kc. each at the low end of the 50- and the 144-mc. amateur bands.

3. The principal raw material for such studies is known to be useful without local A-3 interference.

4. The League's proposal does not derive from the usual considerations applying to suballocation between types of emission on the lower-frequency amateur bands. It stems from a need to provide experimentally-inclined amateurs the proper tools with which to accomplish successfully the studies they are undertaking, particularly in connection with the IGY. If anything, the exclusive c.w. segments proposed should benefit voice operators as well, for they will provide space where foreign voice stations may be received without local A-3 interference.

5. The League requests that preferential attention be given its petition and hopes that immediate and favorable action will be forthcoming from the Commission in order that, if adopted, the new rules will become effective for as much as possible of the balance of the International Geophysical Year which ends December 31, 1958.

THE AMERICAN RADIO RELAY LEAGUE, INC.
BY PAUL M. SEGAL
Its general counsel

A. L. BUDLONG
General Manager
May 21, 1958

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D.C.

In the Matter of

Amendments of Section 12.111 of the Commission's Rules. Amateur Radio Service, to provide that only A-1 emission may be used in the lower 100 kilocycles of the 50 and 144 Mc amateur bands.

Docket No. 12845

Leading Mexican amateurs and officials of the Liga Mexicana de Radio Experimentadores at their 26th national convention at Mexico City in May. Lt. Colonel Mariano Yusitis C., XE1BX, administrative manager; Juan Lobo y Lobo, XE1A-XF1A, well-known DXer; Ing. Manuel Medina, XE1N, who this year retired after many distinguished years as society president; General (retired) Alberto Najera, XE1H, newly elected president of LAMRE.

QST for
Notice of Proposed Rule Making

1. Notice is hereby given of proposed rule making in the above entitled matter.

2. The Commission has received a petition filed by the American Radio Relay League, Inc., to amend Sections 12.111(h) and 12.111(i) of the Amateur Radio Service Rules to provide that (a) A1 emission may be used in the lower 100 kc of the 50 to 54 and 141 to 148 Mc amateur bands, (b) in the case of the 50-mc. band, there is technical justification for selection of the low end for the exclusive c.w. segment. For example, in F-2 layer work, as is now going on widely as the result of the current solar activity peak, and (although not quite to the same extent), in sporadic-E propagation, the lower the frequency the better the chance of making distant contacts, in the case of the 50-mc. band, the location of a proposed c.w. segment is not subject to the same technical justification, and our selection of the low end is purely a matter of consistency with other amateur band suballocations.

3. The Rules now provide for the use of A1, A2, A3, and A4 emissions and narrow band frequency or phase modulation for radiotelephony in the pertinent portion of the 50 to 54 Mc. band. In the 144 to 148 Mc. band the Rules now provide for the use of A8, A1, A2, A3, and A4 emission and special emission for frequency modulation.

4. In support of the request petitioner states that the contributions of amateurs to the general knowledge of v.h.f. propagation characteristics are a matter of record; that nearly 1,000 amateurs are enrolled in an intensive project as part of the International Geophysical Year program to gather further data on propagation phenomena; that long-distance amateur contacts contribute to such knowledge and that A1 emission is a more effective medium for long-distance communication than is A3; and that such long-distance communication attempts should be given every opportunity for success. Petitioner further states: The League's proposal ... stems from a need to provide experimentally-inclined amateurs the proper tools with which to accomplish successfully the studies they are undertaking, particularly in connection with the IGY. Petitioner, in justification of its selection of the lower 100 kc of the involved bands for exclusive use of A1 emission, states: In the case of the 50-mc. band, there is technical justification for selection of the low end for the exclusive c.w. segment. For example, in F-2 layer work, as is now going on widely as the result of the current solar activity peak, and (although not quite to the same extent), in sporadic-E propagation, the lower the frequency the better the chance of making distant contacts. In the case of the 144-mc. band, the location of a proposed c.w. segment is not subject to the same technical justification, and our selection of the low end is purely a matter of consistency with other amateur band suballocations.

5. The sought amendments would result in the removal of A1 emission of only two and one-half percent of each of the amateur bands in question and would therefore not appear to materially affect the present usage of these bands. Furthermore, the proposal is generally consistent with the availability, from a historical standpoint, of all bands for A1 emission and only some bands for other types of emission.

6. Accordingly, the Commission proposes to amend Sections 12.111(h) and 12.111(i) as set forth in the Appendix hereto.

7. Authority for the amendments herein proposed is contained in Section 12.111(h) and 303 of the Communications Act of 1934, as amended.

8. Any interested person who is of the opinion that the proposed amendments should not be adopted or should not be adopted in the form set forth herein, and any person desiring to support this proposal may file with the Commission an original and 14 copies of any comments or briefs in support thereof within 30 days from the date of issuance of the Notice of Proposed Rule Making, or prior thereto. In addition, any person desiring to support this proposal may file in support thereof within 30 days from the date of issuance of the Notice of Proposed Rule Making, or prior thereto. In addition, any person desiring to support this proposal may file a written statement or brief setting forth his comments. Replies to such comments may be filed within 10 days from the last date for filing original comments. No additional comments may be filed unless (1) specifically requested by the Commission, or (2) good cause for the filing of such additional comments is established. The Commission will consider all such comments prior to taking final action in this matter, and if comments are submitted warranting oral argument, notice of the time and place of such oral argument will be given.

9. In accordance with the provisions of Section 1.54 of the Commission's Rules, an original and 13 copies of all statements, briefs, or comments filed shall be furnished the Commission.

FEDERAL COMMUNICATIONS COMMISSION

MARY JANE MORRIS
Secretary

Released: June 13, 1958

APPENDIX

It is proposed to amend Section 12.111 as follows:

1. Amend Section 12.111(h) to read as follows:
   (b) 50.0 to 54.0 Mc. using type A1 emission. 50.1 to 54.0 Mc. using types A2, A3, and A4 emissions and narrow band frequency or phase modulation for radiotelephony, 5140 to 51.0 Mc. using type A9 emission, and on frequency 525.5 to 54.0 Mc. type A4 emission and special emission for frequency modulation (radiotelephone transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation technique).

2. Amend Section 12.111(i) to read as follows:
   (d) 144.0 to 148.0 Mc. using type A1 emission, 141.1 to 148.0 Mc. using types A8, A2, A3, and A4 emissions and special emission for frequency modulation (radiotelephone transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation technique).

LOUISVILLE EXAMS

FCC has, effective August 1, added Louisville, Kentucky, to those cities where its traveling engineers conduct examinations four times yearly. The next examinations in Louisville will be some time in August and November, details available from the Chicago district office (826 U. S. Courthouse). Henceforth, the Conditional Class examination will not be available to applicants residing within 75 miles of that city.

RADIOASTRONOMY

In 1956 FCC solicited comments from interested parties on a petition from radioastronomy groups to restrict radio operation in certain bands in order to prevent possible interference to scientific efforts to receive signals from outer space. Frequencies in our 50- and 5650-Mc. bands were among those throughout the spectrum where such protection was sought. The League's comment at that time (p. 54, November 1956 QST) was to the effect that no rules changes were required, and any interference problem could be handled as an individual matter on a cooperative basis.

FCC has now issued a further notice of proposed rule making which provides in effect that, with a few exceptions, future applicants for radio facilities within a designated area around the proposed national radioastronomy observatory at Green Bank, W. Va., will have to clear such applications through radioastronomy authorities. One of the exceptions is the amateur service. FCC says, "Because of the variable frequencies on which they operate, their intermittent use and their low power, amateur stations have also been excluded . . . (from the proposed requirements)."

21-KMC. FILING

Responsive to an FCC proposal, and in accord with instructions of the Board, the League has filed a brief statement with the Commission indicating concurrence with the idea of shifting our 21,000-Mc. band so that it would be 22,000-23,000 Mc.

Congratulations to VE1BZ, newly appointed Lieutenant Governor of Prince Edward Island.

August 1958
Late National Convention News

Program details for the 10th ARRL National Convention in Washington, D.C., August 15-17, 1958, are nearing completion at press time and we publish below the names of chairman, masters of ceremonies, speakers and subjects at the various technical and operating sessions and meal functions. See page 68 of July QST for a general outline of the overall program.

Military Luncheon — Saturday — Master of Ceremonies will be George W. Bailey, W2KHI, past president of ARRL, and secretary of IRE. Military pays tribute to amateur radio. Awards will be made by Army Signal Corps, Air Force and Navy to amateurs who have made outstanding contributions to the military. Awards will also be made at this luncheon for the three.best exhibits. In attendance will be a galaxy of brass and you will see more stars than you can from a spaceship.

DX Luncheon — Sunday — Vic Clark, W4KFC, of the DX committee announces a get-together of the DX gang with Leonard Cleveland, W4CGB, as luncheon chairman. Guest speakers Bob White, W1WPO, DXCC Awards, ARRL; Bill Leonard, W2SKE, and Don Chesser, W4KVK.

ARRL Luncheon — Sunday — Master of ceremonies Paul A. Smith, W4ZSA, office of the Secretary of Defense, will introduce your League officials. Here's your opportunity to get acquainted with the boys from Headquarters.

Buffet Dinner Dance — ARRL Atlantic Division Director, Gil Crossley, W3VA, will serve as master of ceremonies, and ARRL President Goodwin L. Dostand, W0TSN, will extend a brief welcome at this, the first social function of the convention. This is a Friday get-together for cocktails and ARRL President Goodwin L. Dostand, W0TSN, wiU
to extend a brief welcome at this, the first social function of the convention. This is a Friday get-together for cocktails and

RTTY Dinner — After the party Saturday, the RTTY boys have their own private dinner and then break up for the free entertainment for all. Frank White, W3PYW, will introduce RTTY guests.

Single Sideband Banquet — One of the biggest attractions is the s.s.b. get-together Saturday night. You don't have to be a sidebander to attend. Ladies invited. Those attending this get-together will be able to enjoy dancing in Washington's largest ballroom — 11-piece orchestra — the chance to get together to meet everybody — bring the XYL — stage or drag.

TCI Session — Nate Coffey, W30BR, chairman. "TVI — The Place and Future" by Philip Rand; "Cooperation for International Geophysical Year, 1957-1958" by Harry Wilson, EI2W; "WINMIL/1 Contest Operation" by Robert P. Rafaune, W1RUD.

V. H. P. Forum — An open forum Saturday evening with Edward P. Tilton, W1HIDQ, V. H. P., Editor, QST, as moderator. There will be discussion of v.h.f. topics by prominent v.h.f. men. A v.h.f. award as well as awards for best designed amateur v.h.f. gear.

Mobile Session — Jim Roberts, W3YAR, IBM, chairman. "Mobile Emergency", a mobile unit display, will be described by Clinton R. Spencer, jr., W3QQQ, Phil-Mont Mobile Radio Club; "Mobile Amateur Radio" by Joseph Stahle, W4Y8G, Bassett Industries; "Mobile Communications" by Gay Milius, W4NJF, Cmdr., USN. Andy Anderson, W3NL, editor of Auto-Call, will also address the session.


RACES Session — Cecil Harmon, W3PG, chairman. Walt C. Lockhart, jr., W3PWB, co-chairman. "The Place of the AREC in RACES" by George Hart, WINMJ ARRL National Emergency Coordinator; "RACES Communications For Region II" by Austin Sparks, communication officer, Civil Defense Region II; "RACES: Antennas and Their Use" by John Barolet, antenna engineer USN; "New York State RACES Communication VHF Teletype" by Vincent Kenny, W2BGO, N. Y. State Civil Defense. Other speakers from FCC headquarters.

Y.L.R.L. Session — Elizabeth Zandonini, W3CQD, chairman, Irene Ackers, W3RXJ, co-chairman, "Y.L. Activities" by Eleanor Wilson, W4QON, Y.L. Editor QST. "Y.L.R.L. and You" by Claire Bardon, W4TUT; "Y.L.R.L. Contests" by Kay Anderson, W4BLR, of Y.L.R.L.'s of Richmond. Betty Frederick, W3PV7, past president of Y.L.R.L. will also address the session.
Hams Across the Sea

BY ARTHUR S. LUKACH,* W2DPP

For years I was an armchair traveler. With a copy of the National Geographic Magazine and a map of the world in front of me I would soar away on a flying carpet to the four corners of the earth and relive some of the scenes seen in its magic pages. More recently I started to collect international plane timetables and became intrigued by the short time required to reach far-away places. Gradually the pressure increased until one night I spread a map on the table, turned to the XYL, and said, “Let’s take a trip.”

At this point I would like to make a frank statement — as much as I enjoy traveling, I like ham radio more. The thought of not being able to operate the rig for a period of five or six weeks had a dampening effect on my otherwise exuberant spirit. Then up spoke the XYL and said, “I suppose you’ll spend all your time visiting your DX friends.” That chance remark is the reason for this article.

Time compresses quickly when you leave Idlewild Airport in New York bound for Vienna. I had hardly unpacked at the famous old Sacher Hotel when the phone rang and a voice said, “Hello, Arthur, this is OE11FT.” Incidentally, you have no idea what a wonderful feeling it is to hear someone call you by your first name in a strange city.

We made an appointment for the following day at which time I had the pleasure of visiting Franz, inspected his station and talked shop. Fortunately the weekly meeting of the Vienna Radio Club took place the following evening. Their quarters consist of two rooms located on the ground floor of a neat appearing building. The front room facing the street had a plate glass show-window on the inside of which were posted

*25 Fifth Ave., New York 16, N. Y.
a number of rare QSL cards. A full-time secretary, OE3WB, is the oldest member in the club and a licensed ham since 1926.

What with my poor German and the fact that a number of those present spoke English fairly well, we were able to converse without too much difficulty. When OE1ER, who owns a very modern electrical supply store, heard that a W2 ham was at the club, he insisted that I visit him the following day. His station was very complete and up-to-date. Subsequently I called on OE1PC who is a teacher at one of the local high schools. From there I had no difficulty in contacting the States. It is interesting to note that all of the amateurs I visited lived in apartment houses. Central heating is a rarity and most of the rooms had their own stoves — either coal or oil.

The following observations apply not only to OE hams but also to those visited in the countries described below. All of them were troubled with BCI and some TVI. I say some TVI because receivers were either of the army surplus type — a number of them of German manufacture — which had been converted to the amateur frequencies or of the home-made variety. I saw no receivers, I was, of course, asked what I used. When I said a Collins 75A-4, I was looked at with great awe and I had the feeling that they thought I was a millionaire on a holiday! I had been advised that if I did nothing else, I must contact Hans Wieder, OE2HW. Dutifully, I dialed his number from my hotel room. As the dial tone stopped, a voice said, "Welcome to Austria. This is OE2HW." Since I had not said a word, I assume this was his standard salutation. He said he would call for me in half an hour and escort me to his apartment.

One of the interesting things about ham radio is the fact that you never have the slightest idea what your contact looks like. Hans was 62, white hair, tall and full of enthusiasm. In fact, his enthusiasm for amateur radio had overflowed into his family, and both his daughter, Inge, and his son-in-law, Karl, were also hams. Retired now, he has two other hobbies, mountain climbing and photography. He was truly one of the OE oldtimers, licensed since 1927.

The following night, the XYL and I were invited to attend a meeting of the Salzburg Amateur Radio group, which was held in the beer stube of a small hotel. When I asked why they happened to choose this particular room, the answer was, "One of our members owns the hotel." A wonderful spirit seemed to pervade the group, which was exemplified by an incident that took place while I was there. I noticed that a collection was being taken, and when I asked the purpose, I was told that a Yugoslavian ham had informed one of the members over the air that his daughter had been stricken with polio and he had no funds to pay for her medical treatment.

From Salzburg to Munich, in Germany, the route led through the heart of the Bavarian Alps — a thrilling panorama of snow-covered peaks and broad green valleys. Munich, the capital of Bavaria, is a large and bustling metropolis which still shows some signs of Allied bombing. It is also the headquarters of the very active DARC, the Deutsche Amateur Radio Club, which claims almost 9,000 members. I was fortunate in being able to meet DL3JE, their very able vice-president, who is also head of the Air Traffic Control School at the Munich Airport and DL3TJ, an instructor in the same institution. After visiting the latter at his apartment and making a number of contacts to the States, we embarked on an extensive sightseeing tour. Our first stop was at the famous Siemens & Halske Electric Museum. This concern would correspond roughly to our General Electric Company. The next morning I was shown through the school at the airport and then spent an hour in the traffic control tower. It is interesting to note that English is the universal language used on the Continent in all contacts between ground and planes. The following day we drove out into the suburbs to visit a famous abbey noted for the wonderful beer that is brewed by the brothers. I need hardly add their reputation was well deserved.

When it was time to depart, DL3TJ and 3JE were at the airport to say goodbye. They pinned
a DARC badge on my lapel and waved a fond farewell as the plane taxied to the runway.

The advantage of traveling by air in Europe is that different countries are only hours apart. From Munich to London the time was four hours. I had heard so much about the Radio Society of Great Britain and particularly Arthur Milne, G2ML, that it was pleasant to contact him by phone. He suggested that I meet him in front of a well-known church a few doors removed from their headquarters. When I asked how I would recognize him he said, "It should not be too difficult — I am 6 feet 2 inches in height."

The RSGB rooms occupy the entire top floor of an office building at 23 Little Russell Street in the Bloomsbury section of London, close to the British Museum. There I had the pleasure of meeting GGCL, their secretary, and G2AHL, his able deputy. We went to the roof for a wonderful view of the city, and thereafter talked about ham radio in our respective countries. Their organization has close to 10,000 members, and their patron is none other than H.R.H. the Duke of Edinburgh. I glanced through a number of copies of their very excellent monthly magazine and before I left joined RSGB as a regular member.

From London I headed north to the land of windmills, canals, tulips, and bicycles. I had become very friendly with PA0RL over the air, and he was the first person I looked up after my arrival. From him I learned that there were about 115 active amateurs in Amsterdam, most of whom were members of RCA — the Radio Club of Amsterdam. As far as I could learn, only a very few were on s.s.b., the balance working n.b.f.m., a.m. and c.w. Although there is only one television channel in operation, the matter of TVI continued to plague the group.

I visited PA0JD, one of the first licensed hams in Amsterdam. While there I contacted PA0YJ and PA0QK. After I had given the former my call, he came back with "Hello, W2DAY PAY PAY, you are the first W2 I have ever worked without QRM, hi!" On one day PA0JD, myself and the two XYLs took a trip to Volendam and the Isle of Marken where the men still wear the women's colorful costumes are all identical.

Over the years I have had many contacts in Denmark, and I looked forward with great anticipation to my visit in Copenhagen. I also wanted to find out whether it was really true that in this country the women smoked cigars! I found out soon enough. At a restaurant on my very first night, the adjacent table was occupied by a middle-aged couple. When they finished their coffee, the lady opened her bag, took out a large cigar, her husband lit it for her and she puffed away contentedly.

There are approximately 1,700 amateurs in Denmark, of which about 800 live in Copenhagen or the general vicinity. Not all of this group is active at the present time. I had the pleasure of visiting OZIII, the QSL manager for Denmark. He lived in an apartment with his wife, sister and mother, the latter a delightful elderly lady of 72. After coffee had been served and remembering what I had seen the previous night, I offered her a cigar. She accepted it, smelled the tobacco, lit it, puffed for a few minutes and said, "Sehr gut." Then her daughter and I followed. I asked OZIII how many cigars his mother smoked. "Too many" was his reply — "10 or 12 a day!"

In talking to amateurs in the various cities, I found that they were keenly interested in radio developments in our country and asked innumerable questions about our latest receivers and transmitters. In Germany, the DARC even went so far as to translate and mimeograph some of the more important articles from the pages of QST. But as they remarked, often 12 months elapsed before they were received by the local chapters. With a very few exceptions, none of the hams I spoke to subscribed to QST and I soon discovered the reason. The wages received in Europe are a very small fraction of those obtained in the United States, and the subscription price of $5.00 loomed as a large sum. When I told them that in the future I would see that they received all of my old copies, the looks of appreciation were so heart-warming that I decided upon my return to make a plea to all the readers of QST to do the same thing. The cost of mailing from this country is very low — I have already sent 10 copies in unsealed envelopes marked "Printed Matter" and in no case has the postage exceeded 10c. I was told repeatedly since ours is a technical magazine, old copies are just as welcome as the latest issues. Let us all resolve to put some of our good DX friends on our mailing list and strengthen still further the wonderful bonds we now enjoy with those across the sea.

I cannot begin to describe the grand feeling in being able to meet face-to-face for the first time persons who heretofore were simply a distinctive voice or the sender of the coded word. The easy introduction, the use of first names and our great common interest, all created the atmosphere of old friendships of many years' standing. Ours is indeed a unique and wonderful hobby and I came away with the thought that perhaps in our own small way, we amateurs were making a very worthwhile contribution to international understanding and good will — both of which are so vitally important in the troubled world of today.

This is DL3TJ, of the Deutscher Amateur Radio Club.

August 1958
**NOVICES**

Presque Isle, Maine

Editor, QST:

In the June issue of QST K2VBL turns thumbs down on Novices and classes them as a nuisance. I for one would like to be marked as regarding this as a very short attitude. I will agree that the 15-meter band is too wide, that the QRM on novice bands is terrible and that Novices (and Generals) get out of hand and band at times, but please don't forget that we all had to learn sometime. I will defy the man who says he can learn all from the book without experience.

I was studying diligently for my General ticket in my spare time and recently decided to pick up a Novice ticket and then to learn on the Novice bands. Because the average Novice is unable to receive International Morse at the normal speeds found on the General bands, it is evident that these habits must have been acquired by listening on the various phone bands.

It is not for us to propose restrictions or to criticize, but rather to offer a helping hand and by example assist these newcomers to become the type of operator that will bring credit to the amateur fraternity—the type of operator that we all wish we could become.

Robert C. Ohin, W7ALU

808 E. 7th Street
Brooklyn 30, New York

Editor, QST:

I don't see what all these Generals are griping about. I will admit that there is quite a bit of un-understandable bang on the air due to inexperienced Novices and that the Novice test is so simple that most any dink fool can pass it but there are many Generals that are just as much at fault when it comes to causing QRM. If these Generals would just show some courtesy and knowledge of operating procedure, about half of this junk on the air would be cleared up...

— Kim Bariskin, KN6MGS

Box 202
Matador, Texas

Editor, QST:

Just a good word in favor of the Novice. Some of these so-called nuisances will one day be electronics engineers. All they need is some place to stir up their interest, and what better place is there than in amateur radio as a Novice? Sure, the Novice will make some mistakes, but haven't we all at one time or another?

— O. W. Kilingsworth, W5ZUQ

351 Ocean Avenue
New London, Conn.

Editor, QST:

One has to start somewhere in the game of ham radio and I say that the Novice license is the best first rung on the ladder to General and above. I'm an ex-Novice myself and I am absolutely certain that I could never have passed the General test without the practical experience gained as a WN. K2VBL mentions the harmonics, chirps, and break-break. Just how does he know for certain that the Novice is specifically responsible for the bad malapertier on the bands? He cites no proof whatsoever. Besides, an ex-WN/KN has to learn from someone... could be an oldtimer, General or Extra Class? Who knows...

— Tracy Levy, Jr., K1GZO

R.F.D. #1
Stony Point, N. C.

Editor, QST:

Since when should a 10-year-old boy be prevented from getting an amateur license because of age? I have heard many adults using the terms break-break-break-break. Some of the Generals on the air are more child-like than a lot of 10 year olds I know. The way for the General to stop these terms is for them to help these new amateurs instead of criticizing and writing QST with these foolish criticisms...

As for the "Video Rangers," they will drop out when their licenses run out. If these "Video Rangers" were shown the correct operating tactics we would have a greater percent of hams sticking with amateur radio. Instead of...
Editor, QST:

Whatever hobby, profession, sport, or club you find,
if you do not bring in new blood and expand the group
it will wither up and eventually die. Amateur radio is
the same way. This is the purpose of the Novice class
license—to train people to be good General class hams.
In the matter of youthfulness, let me say that we know
several hams under 21 who can send and receive faster
than many of the oldsters. . . .

— Bob Wilcox, W7FTK

Editor, QST:

Although I don’t think the Novice should be done
away with, I believe some changes should be made to
discharge the “Video Rangers.” Here are a couple of them:
(1) raise the code speed from 8 to say 10 w.p.m. to encourage
listening around the bands, which in turn should give the
prospective Novice an inkling of how to operate and pro-
mote the idea that there are other letters in the alphabet
besides CQ CQ CQ de KN7XXX, etc. (2) I believe the
written exam should be stiffer so as to teach Mr. Prospective
Novice how to keep his 6L6 from radiating on every band
except his own.

— Joe Hester, KN5QJO

Editor, QST:

Box 55
Carlinville, Illinois

Perhaps there are more Novices who believe that they
are licensed as DXers and a Technician class
license and say that the Technician is a mistake, when the
only difference is several w.p.m. in speed? Is it likely that
the Novice license was granted for people to get their code speed up by ragchewing and not so they could
develop keys that are stuck sending CQ DX. Perhaps you
should publish your answer, as I am sure that there are
many more Generals like myself who are entertaining this
notion as I am.

— G. Huff, K5AUB

Editor, QST:

Is it possible for a person to make the marked
distinction between a General and a Technician class
license and say that the Technician is a mistake, when the
only difference is several w.p.m. in speed? Is it likely that
the Novice with his few-kilocycle band gives such tortuous
treatment to the General with his band-sweeping r.f.o.
Calling the Novice tortuous, has K2VBL ever considered
the hold General licensee who with his mighty multi-
hundred-watt transmitter slams down on the Novice band,
drowning out our mere 75-watt maximum? The Novice and
Technician have, in my opinion, inundated many of the young
persons in our club, causes and dances, etc.
I feel that I have learned very much from ham radio. All
that and enjoyment, too. But, about the Novice, that’s just
a starting point. Many of todays beat operators and contest
winners once held WN/KN tickets.
I’ll allow the fact that many Novices are poor operators.
But, many Generals (maybe even you and I) are also poor
operators.

— Bill Axelrod, K3DDW

THE HBR-14, AGAIN

Editor, QST:

RFD 1, Box 78-2
Atwater, California

There are thousands of hams in this country and probably
most of them have something they would like to say or
(Continued on page 148)
INEXPENSIVE AND RUGGED MECHANICAL CONSTRUCTION FOR CUBICAL QUAD ANTENNAS

This constructional details shown in Fig. 1 provide for the most simple, rugged and inexpensive cubical quad design that we have found. The method uses standard parts, completely eliminates welding and makes less difficult the job of attaching element supports to the boom.

The construction requires no welding or special machine work and cost is kept to a minimum. Method of construction may be applied to either single-band or multiband quads.

Readily available “KEE” clamps of the type used in making pipe frameworks were obtained at a cost of $1.72 each. These clamps have four 1\(\frac{1}{4}\)-inch diameter openings spaced 90 degrees apart and another 1\(\frac{1}{2}\)-inch opening through the other axis, thus providing mounting holes for the antenna supports as well as a socket into which the boom may be slipped. Aluminum tubing, 1\(\frac{1}{2}\) inches in diameter, was used for the boom and 8-inch lengths of this same material were used in assembling the bamboo supports. Each section of pipe is firmly locked in place by tightening up on the Allenhead screw already included for that purpose.

Plastic resin is used to pack the space in between the bamboo rods and the short aluminum supports. After the resin had set sufficiently to withstand drilling, each arm of the assembly was drilled (through the aluminum, the resin and the bamboo) to accommodate a bolt which adds mechanical strength to the junction.

Electrical details of the antenna are standard and require no additional description at this time. However, the fact that the installation has withstood 80-miles-per-hour winds is of interest. Although ours is a single-band affair (14 Mc.), it is obvious that supports for additional antennas could be easily mounted merely by slipping some more “KEE” clamps along the boom.

— Frank Kehoe, VE3VU

SPLICING 300-OHM LINE: AN ADDITIONAL HINT

I have had excellent results splicing 300-ohm transmission line by extending the system described by W9BPS on page 55 of QST for January, 1958. The method used here assures a strong, weatherproof joint and makes use of some ordinary kitchen-type wax paper and an electric flat iron. The XYL may immediately say “No dice,” but you may guarantee her that the surface of the iron will not be damaged. The steps to be followed in making the joint are as follows:

1) Proceed through B (Fig. 4) of W9BPS’s instructions.
2) Strip wire from scrap pieces of 300-ohm Twin-Lead, leaving only the insulation.
3) Cut insulation into 2- or 3-inch lengths.
4) Place one piece of insulation on each side of the spliced area and cover with a fold of wax paper (double thickness) as shown in A of the accompanying sketch, Fig. 2.
5) Apply heat — medium setting of the flat-iron will do — to the wax paper until the insulation becomes molten.
6) Remove heat, allow insulation to cool and set, discard wax paper, and trim joint as illustrated in B of Fig. 2.

— Denzil O. Cooper, W0TXP

Fig. 2—(A) Sketch showing how W0TXP prepares a spliced 300-ohm line before applying heat with a flatiron. (B) The sturdy, weatherproof joint after excess insulation has been trimmed away.

QST for
REOMETELY-CONTROLLED
COAXIAL SWITCEH

Anyone who has to jump in to manipulate coaxial connectors each time the band of operation is changed may have given thought to the installation of a remotely controlled coaxial switch. These same operators may be interested in the homemade affair illustrated in the accompanying photograph. Fig. 3. It is simply a B & W type 550A coaxial switch coupled to a Ledex solenoid-activated slave switch.

Fig. 3—The cover has been removed in thia view of the remotely controlled coaxial switch. The coaxial switch is mounted on the right wall of the U-shaped structure and the electrically operated solenoid is bolted to the inside bottom surface. A terminal block for control wires is at the left.

The Ledex is a 12-position pulse-operated solenoid operated from 115 volts a.c. It comes mounted on a base complete with line cord, selenium-rectifier power supply and a 12-position rotary control switch. The master or control switch may be remotely located with respect to the solenoid and is connected to the latter through a five-wire cable. The slave switch automatically follows the control switch regardless of which way it is rotated.

The 12-position switch has a 30-degree index while the B & W switch has five positions (plus one for the input cable) with 60-degree indexing. By coupling the two switches together and moving the master control switch two positions at a time, the B & W coaxial unit will switch five different antennas or, at the sixth step, completely disconnect all antennas.

The stop on the B & W switch must be removed because this switch may be required to rotate through a full 360 degrees depending on which way the remote control switch is turned. The solenoid shaft may be coupled to the switch more readily if the rear wafer, which is not needed, is removed so that the rear shaft guide may be moved forward toward the front of the assembly. A standard 5/8-inch solid shaft coupler may be used to gang the two switches.

If the unit is to be mounted outside near the antennas, it is advisable to use a weatherproof housing around the solenoid switch. Of course, with the assembly located adjacent to the antennas, it is necessary to use only one coaxial feedline between the shack and the antenna farm. Short lengths of coax may be run between the coaxial switch and the individual antennas.

— Russell Weltner, W5QVO

FIXED-STATION OPERATION
WITH A MOBILE ANTeNNA

We recently moved into a new home and although the main equipment was set up and ready to go, I lacked time to work on a permanent antenna installation.casting about for a temporary radiator, I spotted the family bus adorned with a 40-meter mobile antenna. A high-Q loading coil is used with the antenna, and reports with my 12-watt mobile rig had been pretty good. So why not hook the fixed-station transmitter to the mobile antenna?

A 25-foot length of coaxial cable was run from the shack to the car in the driveway. The mobile rig was, of course, disconnected from the antenna and a straight adapter connector (PL-258) used to couple between the coax cables running from the fixed-station rig and to the whip.

The home station runs about 70 watts for voice-modulated operation and reports are nearly as good with the mobile antenna as with the regular antenna used at the previous location. Obviously, there is some operating inconvenience caused by connecting and disconnecting the coax each time you want to operate fixed-station, but the idea does provide a suitable answer for temporary operation and it may solve the problem when a landlord absolutely forbids even No. 37 wire strung around the premises. Naturally, one should avoid slamming the car door on the coaxial extension.

One final word of caution: Don’t drive off before disconnecting the coax! It is reportedly very hard on a transmitter to be dragged down the street at the end of a 25-foot length of cable!

— Richard F. Van Winkle, W6TKA

ANOTHER METHOD OF INSTALUNG "PROXOS"

The "Proxos" proximity relay switch described in QST for March, 1957, appears to have a great merit as a neat and clean way to turn on automatically the oscillator or v.f.o. of almost any transmitter. Perhaps, though, it would be convenient to replace the "feeler" wire with a small metal plate, the plate being located near the knob (or paddle) of the key. When the fingers are moved to the knob, "Proxos" would switch on the oscillator, while the key would control the buffer in the usual manner. When the fingers are moved away from the knob, the oscillator would switch off.

It is estimated the oscillator would normally start about ½ second before the first transmitted character and hang on about ½ second after the last, but, of course, this would depend entirely on how fast the fingers were moved in the region around the sensitive plate.

— W. A. Monahan, jr., W6GTR
SNAP-ON CABLE CLAMPS

Ordinary snap rings such as used with punched loose-leaf note paper make ideal clamps for securing coaxial line and multiwire conductors. They may also be used as a substitute for lacing cord or other binding in the construction of a multiwire cable. Cables or wires held by the clamps may be easily moved or serviced merely by opening the rings, performing the necessary operation, reinserting the conductor/conductors and snapping the rings closed. Small screw eyes may be used to fasten the rings to wooden surfaces.

The snap rings are available in a variety of sizes and can be obtained quite inexpensively from stationery supply stores.

— William A. Cline, W2DMU

RG-8/U IN THE GAMMA-MATCH CAPACITOR

Amateurs who contemplate installation of a gamma match may be interested in construction which uses RG-8/U coaxial cable as the inner or variable element for the gamma capacitor. The mechanical details are not difficult to duplicate and the assembly may be easily adjusted and waterproofed.

Details of the capacitor are shown in Fig. 4. The fixed section of the capacitor is an appropriate length of aluminum tubing having an inside diameter that will fit snugly over RG-8/U after the latter has been wrapped with good quality tape and then coated with plastic spray. Dimension A controls the length of the gamma rod, and the capacitance is determined by dimension B; the capacitance will increase as B is made longer.

One inch of the outer jacket must be removed from the input end of the coaxial element (Section C) in order that a copper band for feedline termination may be soldered in place. Be careful not to damage the shield braid when the insulation is being removed because the copper feedline terminal must be soldered to the exposed shield. After the coaxial section has been prepared, and then inserted in the aluminum tubing, adjust at D for a spacing that will prevent shorting between the shield braid and the aluminum tubing.

The inner conductor of the coaxial feedline is terminated at the copper terminal provided and the shield for the line is attached to the boom. The coax line should be taped or clamped to the boom to relieve strain at the termination points. Coarse adjustment of the capacitance is made by varying the length of dimension B. Start with more than enough coax encased in the tubing and then clip off short pieces as adjustments and measurements proceed. Fine adjustment may be made by loosening the clamp at the outer end of the gamma bar and then sliding the bar back and forth over the coaxial element.

After the assembly has been adjusted for proper performance, it may be waterproofed by plugging the open end of the gamma bar with an ordinary cork and then coating the entire unit with plastic spray.

— Wm. J. Engle, jr., W3KKO

"UMBRELLA FOR TWO;" NOVEL GROUND-PLANE ANTENNA FOR 144 MC.

I had wanted to build a cheap-and-easy ground-plane antenna ever since the two-meter craze hit the Beaver Valley Gang. However, it took some activity on the part of local canines to get me started. After they had torn the XYL's umbrella to shreds, they left me with the prettiest set of ready-made two-meter radians you ever saw!

Paint was scraped from the inside ends of the ribs and these thoroughly cleaned areas were bonded together (soldered) with a length of flexible shield braid. A hole to accommodate the vertical section of the antenna was drilled in the top of the umbrella assembly. A 20-inch length of brazing rod fed with coaxial cable was used as the radiator.

One of the nice features is that I can still open and close the umbrella for convenient installation and transit. Furthermore, you don't have to be a drinking man to get the materials!

— Rollyn W. McMahan, W3ECQ

TIME SIGNALS ON THE GONSET SUPER 6

Some operators may not be aware that the Gonset Super 6 converter may be used for receiving time signals transmitted by WWV and CHU (Ottawa, Ontario, Canada).

The 7.335-kc. signal from CHU may be received by adjusting the converter for 40-meter operation and then tuning just above the high end of the band. Transmissions at 11.07 and 15 Mc. from CHU and WWV, may be picked up with the converter switched to 20 meters.

The 14- and 15-Mc. signals are easy to find if you keep your eyes on the 10-meter dial scale while tuning. CHU's signal will appear with the pointer set at 20.3, and the 15-Mc. signal from WWV will show up at 20.7.

— Dr. Julian E. Greenbaum, W1LIG

Fig. 4—Sketch showing the details of W3KKO's gamma matching section. The gamma capacitor is made from a length of aluminum tubing and a section of RG-8/U coaxial cable. Although the inner conductor of the coaxial cable is not used, it need not be removed.
CONDUCTED BY ROD NEWKIRK,* W9BRD

Whew:
Warm, eh? Or are you a KL7? This is a good month to pass up polemics and grind out something innocuous for the file. It's time for our photofiscal triennial, anyway, the presentation of snapshot statistics calculated to allay such queries as "Where did I see that picture of VK7BD?"

So, picking up where we last left off (August 1955 QST) we add three more years to your DX family album directory:

1955
July: OZ2KR, I1ER, CTICO, OESAIH, YK1AA, 3V8AS, E9AJD.
August: SM2YP, VP3QJ, K0QSH, CR7DRX, C0ZCR.
September: F3BR, CR9AH, J1AIF, V83A, Aland OH1s RK RX SS ST, SV group, HB1IT & Co.
October: 4X4PV, SU17C, LX1AO, F2KAIH, V8SC.
November: O4AG, HR group, HB9 group, V.2SW, EA9BR.
December: PX1EX crew, SU1AS, DL3JH, PABIA, HZ1AB.

1956
January: JA6AO, MP44AL, KE6LI, HP1ER, 4X4BL, HA5BB & friends.
February: HB5K & 3Aas, VP1KE, F0DHD, KX8AF, O5Q5I, March: K04 group, OK1CX, IS1EHH, VR26X, DU1FC, YN1A.
April: VP1AZ, HB1MO, O81AI, Major YO1K, JAIY, OQ5SH, YK6ZB, PI Field Day, Z69JL, June: F3BR, OD9SH, JA1Y.
July: AP2RH, H18FR, KB0QG, OY7M, X28KN.
August: HCW, L65DC, SPSKAB, CTINT.
September: VQ5GC, JA1s AGU AEA, ZR6AS, FM7WN, E15G & staff.
October: F0MB, KASNY, ZD8A, VP4DX, ZE5MP, DL3JL, 487MR, Aland OH1s RK RX SS ST, ZR2s T & R, H01ARE.
November: V818V, ZL2GX, HB1CZ/vn, ZP9AY, FL3SB, SP36L, ZD4 hamfest, V86 clubbers.
December: SI8KV/L, LP7AY, WL7UBS, KG5s AG AX.

1957
January: HB1CM/HE, 3A2BH with HE8DXD, HK3AB, AP2E, U3ASEG, VR2A4, ET2US.
February: PY2CK with W1FH, EX-VR3D & Pacific friends, SI85K with Os 3M1, R2Ls 41U, CQ5G, SV50R, March: U3KAA, ZD8AE, YO5RD, CR49H with W2APF.
April: M1B, MD3s ADZ AMO DNQ, SPSZ, CR7BRS, V865F, CN8X1.
May: BV1US, UA1AB, H8SKE, H851M, E361M, June: JA8KBD, Y0B3M, ZD47's DXCC #1, 182Y, ZW8AC, Warsaw CCR meet.
July: XZ2AD, O152AA (O152D), KW6A, DL0AJT, F8RAS.
August: CR7s DQ L, P7ZUGY, UP2A4, OATI, RAEM, SMI1TG, SM1.
September: HK2J, I81A, IS6L, E15V, ZL1CZ, EB72, October: OH1s IK KQ on Alands, V85A5HT/SU, IS9EX, HB8EJ, SP5HIH, HK7LX, November: HZ1AB.
December: 4X4CJ, TF5KG, W6AM, O4AG, ZX3TH.

1958
January: LX1DC, F8RAS, DUG1V, CC2RS, EAGAF, VR2BC, SP1DC, February: HB1CZ/vn, U3A3D, OQ5HP, HZ2AM, W4LYv's DXCC #2, OH1s RX ST & Co., on Alands, JT1A4, W6AM, March: PR7ZE, ZE1JU, F084AP, VQ5GC, AX4DK, SU1IC, U05A, April: PX1YR, L1ZSS, V072J, U3A3J, O44FM, K58 1ST 625 SV groups, OY1R, May: FL8AC, VP35S, W6GPP's DXCC #2, W1BB, L2Z3CB, June: TF2WCC, V8SEAT, PY1CK1 (PY7SO), U1AIDG.

Zooks! how time flies. Another fast pictorial DXCC for your "How's" picture gallery and here are the guys, gals and groups responsible:

W1s BB BD1 FI H161 HCP NS QON QPN T8 VG WPO W1R Y3M ZDP, W2s BQ BV8 GKP WPM MUM O1P, K2s BKU BSM IXD K1HZ LH2 OAH TCD, W3s HQ18 GLE VKD, W4s CHQ HYW KFC LHT SET TBF ZMC, W5s ALA H4Y RS, W6s AM ITI KG KQY MUR YY ZEN 2Z, K6s DV TK, W7s A8S DJU PHI, W8s DAW DLZ HCW N8K OHV, W8s AEU EX DXF A1QK RTH WHM, W9s QG1 UQY VFM YFE, AP2RHI, CN9NNM, CR9AH, Dth IC1 7SV, HE8DXD, H01T, K0C6A, LXA1L, OK1s JX MB, SVW0, UC2AF; Milwaukee Radio Amateurs' Club, West Gulf DX Club: William Rice and S. S. Lawrence.

A special salutation to W1s ICP VG WPO, W3s GHS VKD, W6YY, K6DV, W7PHO, W6DZL and W9WHM, each responsible for three or more productions. Applause, too, for the dozens of loyal contributors whose proffered pix didn't quite make the team.

Factors in the selection of "How's" photos include reproduction quality, fame of station or operator, DX and ham atmosphere, general topicality, and make-up balance. Their appearance is an important part of our all-out effort to maximize enjoyment of amateur radio through heightening your DXperience. Got some likely prospects for publication? Send 'em along!

What:
Our simmering summer DX world awaits the marketing of nomatick watercooled headsets and truly nonskid knobs. Meanwhile the season's soaring temperatures and sagging prop conditions continue to drive DROMs to the mountains and the shore. Luckily, however, enough persistent perspirers do remain at their dials to keep your "How's" Bandwagon rolling at a smart clip through thick and thin. Pull up some shade, a julep and a breeze, and help us winnow the mail. . . .
The operating positions of 9G1BQ, DL3TG and VQ4KPB, left to right, are interesting arrangements thoroughly worked by North Americans. The 9G1BQ console houses c.w., a.m. and s.s.b. gear for several bands, 14 Mc, preferred, including SX-24 and Eddystone receivers. DL3TG’s layout (photo courtesy W7DJU) is an excellent example of European home-brew precision and utility. VQ4KPB’s outfit hits 10 through 40 meters with a 30-watt final modulated by 807s, the receiver an AR-88.
suncess that KNs 4RID 5LMJ 5LZ0 8GHG and others have had that a good antenna is half the battle. The other half? A solution to quit calling CQs and listen once in a while. Tony, on behalf of all of us, thanks everyone for putting up with the many DX stations who patiently patronize 15 meter beginners, K6GKU, echolive.

10 phone features finding DX openings and present pickiest are slim. KCBR, KZ9FE, W4YOB (123/14 on 28-Me. phone), W5KLB, K9KIZ, W5ZJG, K6CMV, K9s USG and K9CR keep the ball rolling with GNYV, GOSCN, GP1AM, CR6s AI CA (430), CR6DJ (420), F4MTY, H6GTM, K5TLY (420), K4WSUW, K9s CHU SB YG UG, K6GKY, K9IFK, QA1HGY some 20 miles from Lima on Spot-watch, PZ1AE, T2ELA, V7s GATN 6kW, VPs ZLB 3HAC 5CB 6KM 9IIH, VQ2AV, V8AR 1000, ZDQ 3ZNEW 7HM TRO, X AVIPU, Xs IA6A 1AWQ 10N 1PSM 61W, TIL7JBA, K5BMI, LZZ2KS, Fernando de Noronha's PY7SC (9) 0, SP9RF, V8EBP, VPs V8G 7NC, YS8W, YU1HKL and some side KAIK; (15) 23. Eleven years of concentrated 7-megacycling produced 107 countries confirmed at W3MQY, Bob's main route to 1W2GCG to confirm his AG's CAD and DBV. An additional 40-meter Novice slot, mailing VK3MY (104) 9-11, KN7CAD also hugged JA1BXS, and K9DJ learns that more JAs are beginning to chase Nove Novices of real junket just below the 7500-kc. mark. KIMOF hears KZ5RD and VP7BO pursuned on 7-Me. phone, S.W. C. V. Edwards still appears in British Guiana, VPs ZTA G7V JEG 3EHC 3HAG 41G 3VY 45MM 4TF 6II8 6KM. CTHIC, OA1GR, plus Statesiders K9KDJ WALK, Ws 897 KLT EF P, WOOQI and others on phone. Eighty? Only K6EGX with VP2SI.

Where:

Europe — Rhode DX scholars at SV0WV accept QSL inquiries only pertaining to contacts dating after November, 1957. WIBPY confirms their address as USCG Courier, WAGR-110, AP223, New York, N.Y. Special arrangements or international DM bureau is mentioned by WGDGC's DX Bulletin: Box 37, Strasbourg 1, D.D.R. But, so far as we know, the results are the same. In the States, W5ZJG and DBV give conditions now — and stick with that everlovin' GMT, eh? W5ZJG offers an additional 40-meter Novice slot, mailing VK3MY (104) 9-11, KN7CAD also hugged JA1BXS, and K9DJ learns that more JAs are beginning to chase Nove Novices of real junket just below the 7500-kc. mark. KIMOF hears KZ5RD and VP7BO pursuned on 7-Me. phone, S.W. C. V. Edwards still appears in British Guiana, VPs ZTA G7V JEG 3EHC 3HAG 41G 3VY 45MM 4TF 6II8 6KM. CTHIC, OA1GR, plus Statesiders K9KDJ WALK, Ws 897 KLT EF P, WOOQI and others on phone. Eighty? Only K6EGX with VP2SI.

America — OQ51G will be off the air for about a year air force AMC will be off the air for about a year while the boys take a break for a bit. Some 700 QSOs in three short days. K6GKU supplied valuable assistance at home base and routed most QSLs through bureaus. K6BAZ racks this month and then is off to sea again, this time to India.

The lure of high adventure led K6BAZ to a position with the Scripps Institute of Oceanography at the age of 18. After preliminary engagements in Alaskan waters Doug headed for the South Pacific aboard Spencer F. Baird in October of last year, accompanied by a Viking I, Sx-99 and a cache of spare parts. Exciting months that followed saw stops at Fakarava, Tahiti, Rapa (shoreline at center), Chile, Peru and Easter Island. As C6AOG on Easter, K6BAZ piled up some 700 QSOs in three short days. K6GKU supplied valuable assistance at home base and routed most QSLs through bureaus. K6BAZ racks this month and then is off to sea again, this time to India.
Amateurs of the Ukraine, in mid-1955, took the lead in dissolving a four-year Russian embargo on outside-the-Curtain QSOs. Two representative operators in the region are UB5TV (left) and OM Tura of club-collective station UBSKDK. UB5TV’s Dnepropetrovsk station—exciter, final amplifier and HRO, left to right—is widely worked on several bands.

*Photos via W7DJU and W6YY*
Asia — Ex-Y13AA describes the restive Middle East and laments: " Tried for almost a year to get back on the air in Iraq but was informed that no more licenses will be issued there is little hope that the country's next leader will longer handle international dealings with amateur radio."

Meanwhile, amateur-look K969AD continues activity on 20, 40 and 80 meters and may try 160 meters in the near future. ... XW8AJ reports that the 14,000-kc. DX band is "open for business" and the 14,020-kc. signal is "passable". XW8AJ states that he has heard DX signals from points as far away as the West Indies and reports that he is looking forward to the possibility of working DX stations from his location. XW8AJ notes that he is currently using a 300-watt transmitter and a 2000-watt receiver for his work on the 14,000-kc. band.

Balkans — VQ8AIK reports that he has worked a number of DX stations from his location in the Balkans and is looking forward to further DX activity in the near future. VQ8AIK notes that he is currently using a 200-watt transmitter and a 200-watt receiver for his work on the 14,000-kc. band.

Europe — Ex-K731A reports that he has worked a number of DX stations from his location in Europe and is looking forward to further DX activity in the near future. Ex-K731A notes that he is currently using a 200-watt transmitter and a 200-watt receiver for his work on the 14,000-kc. band.

Middle East — W3QK reports that he has worked a number of DX stations from his location in the Middle East and is looking forward to further DX activity in the near future. W3QK notes that he is currently using a 200-watt transmitter and a 200-watt receiver for his work on the 14,000-kc. band.

North America — Ex-K587A reports that he has worked a number of DX stations from his location in North America and is looking forward to further DX activity in the near future. Ex-K587A notes that he is currently using a 200-watt transmitter and a 200-watt receiver for his work on the 14,000-kc. band.

Oceania — Ex-K698D reports that he has worked a number of DX stations from his location in Oceania and is looking forward to further DX activity in the near future. Ex-K698D notes that he is currently using a 200-watt transmitter and a 200-watt receiver for his work on the 14,000-kc. band.

CQ DX Contest

The CQ DX Contest was held in August 1958. The contest was open to all amateur radio operators and included two main categories: the DXCC category and the QSO category. The DXCC category was aimed at operators who were trying to work all 150 Countries or Areas of the World, while the QSO category was aimed at operators who were trying to establish contact with as many DX stations as possible.

The contest was a great success, with many operators logging contacts with DX stations from all over the world. The winners of the contest were awarded certificates and prizes for their efforts.

August 1958
YL Certificates and How to Obtain Them

Interest of both YLs and OMs in awards and certificates issued by YL clubs and nets continues to grow. In an article which appeared in July, 1957, QST, Phil Simmons, W1ZDP, listed 60 certificates and awards issued by various clubs and groups which are available to all amateurs. The information which follows here is concerned with certificates available to YLs and OMs which are issued by YL clubs only.

Space limitations preclude giving complete rules for each certificate, but sufficient information is given to help you trace details on the particular ones which may appeal to you.

YLRL Awards

The best known YL awards are those issued by the Young Ladies Radio League — namely, YL-WAS, YL-WAC, and the YL Century Certificate. A few months ago the YLRL augmented the popular third with the addition of the DX-YL award. Complete rules for the YLCC, YL-WAS, and YL-WAC awards may be found in the YL column for September 1957, with the detailed rules for the DX-YL award announced for the first time in the May 1958 column.

YL Century Certificate — The YLRL requires proof of contact with 100 licensed YL operators anywhere in the world. All contacts must be made from the same QTH or within a 25 mile radius. Endorsements are issued for confirmed contacts with each additional 25 YLs. Award custodian is Katherine Johnson, W9GME, Box 660, Pawtucket, R. I.

DX-YL Award — Issued to YLs only. A YL who contacts 25 other licensed women operators outside of her own country on or after April 1, 1958, is eligible. A copy of the log of contacts should be sent to Kay Anderson, VV4BLR, 5210 Raleigh Road, Richmond 23, Va. QSLs not necessary. Stickers issued for each 10 additional contacts.

Unless specifically stated otherwise, the YLRL awards (excepting the DX-YL award) and all of the certificates that follow are issued to all amateurs, YL and OM.

Club Certificates

East:

RTYL Certificate (Rhode Island YL Club) — Contact any ten YLs in Rhode Island. Send confirming QSLs to Ruth Sherman, VV1WED, 128 Massasoit Drive, Warwick, R. I.

Penn-Jersey YL Club Certificate — Issued to U. S. hams for contacts with 10 club members. Foreign stations must work only 5 members. Send list of stations worked with name, date, time, and band to Carolyn Currens, VV3GTC, P. O. Box 523, Norristown, Pennsylvania.

Georgia Peach YL Certificate — Contact 10 members of the Georgia Peaches YLRC. Send proof of contact to Peggy Butterfield, K4KRM, 2203 Terry Mill Rd., Atlanta, Ga.

Floridora YL Certificate — Contact 10 club members (not during net time). QSLs should be sent to Shirley Hill, W4WPD, P.O. Box 11185, Produce Station, Tampa, Fl.

Mid-West;

LARK Certificate (Ladies Amateur Radio Klub of Chicago) — Contact 10 LARKs (resident, non-resident, or honorary members). Send list of contacts, dates made, and frequencies used to Gladys Jones, W6MC, 1232 Hampton Ave., Western Springs, Ill.

HAWK Certificate is issued by the new Hoosier Amateur Radio Klub of Indiana to any amateur who works 10 members. Cross-band operation or contacts made during nets not valid. Send QSLs to Adah Elliott, W9RTT, 721 Centennial St., Seymour, Ind.

TYLRUUN Certificate — The Texas YL Round-Up Net offers its YL-OM certificate to any YL or OM who confirms contacts with 25 full members of the net. Contacts made during regular net meetings will not count. QSLs should be sent to Helen Douglas, W5LGY, 1501 Monroe St., Commerce, Texas. Stickers given for additional 25 contacts.

OM YL-OM IOM Certificate — Offered by the Texas YL Round-Up Net to YLs only. YLs must contact 100 different licensed males operators. QSLs not necessary — send a list of the 100 contacts, verified in writing by three licensed amateurs, to Lyn Ohbun, W5RYX, 7614 Maxwell Ave., Dallas 17, Texas.

GAYLARK Certificate — A brand new certificate offered interested in amateur awards, Susi Liebig, DJ2YL, of Braunschweig, Germany, has a for a starter collection DXCC, WAC, DUF, WASM, S6S, and a certificate from Paraguay. In the last ARRL DX contest, Susi worked more than 300 W and VE stations. She has been operating since 1955, primarily DXing on 10, 15, and 20.
by the Gulf Area YLARK club. Send log data of contact with six GAYLARKs to Phyllis Riblet, V5CXM, 8902 Ilona Lane, Houston 25, Texas. Contacts with members valid after 1-28-58. Include 10j5 for handling.

West:

Ladies Certificate — The Camellia Capital Chirps YL Club of Sacramento, Calif., offers this certificate of membership to any lady who has worked YLs in ZS, ZE, CR, VQ, and OQ lands since July 1, 1952. Amateurs outside the mentioned countries need only 10 QSLs for confirmation. Stickers are issued for additional 50 contacts. Send QSLs to Mrs. Marjory Snyman, ZS1RM, P. O. Box 80, Strand, Cape Province, Union of South Africa.

Others:

WAYL (Worked All YL) — The South African Woman's Radio Club offers this certificate to any amateur who has worked YLs in ZS, ZE, CR, VQ, and OQ lands since July 1, 1952. Amateurs outside the mentioned countries need only 10 QSLs for confirmation. Stickers are issued for additional 50 contacts. Send QSLs to Mrs. Marjory Snyman, ZS1RM, P. O. Box 80, Strand, Cape Province, Union of South Africa.

National Convention Coming Up

August 15, 16, and 17 are the fast approaching big dates for the ARRL Tenth National Convention in Washington, D. C. There is still time to make plans to attend the affair, if you hurry. Pre-registration prices terminate Aug. 1.

Chairman of the YL Program, John DeBardeleben, W3CN, and his committee of Washington Area YLRC members have planned a program which they feel should well please all of the YLs and XYLs who attend. Events for the ladies include special breakfasts, luncheons, teas, and dinner-dances, a wide choice of sightseeing tours (one to the White House), bridge parties, two fashion shows, one American and one Chinese, and a non-radio hobby exhibit.

The President of the new Hoosier ARK, Adah Elliott, W9RTH, welcomes YLs to club membership. An affiliate of the Indiana Radio Club Council and the YLRL, the HAWKs meet three times annually with dues at $2.50 for Indiana YLs and $2.00 for out-of-staters. Formerly W0RTH, Adah has been on c.w. since 1941. She's EC for Seymour, Indiana.

The general registration fee for ladies is $7.50 ($5.00 before Aug. 1). Checks should be made payable to the ARRL, 225 Main St., Newington, Conn. Fees for tours, special breakfasts, luncheons, etc., may be paid upon registering in person at the hotel.

CU there!
**KEEPING UP WITH THE GIRLS**

Three more YLs were added to the DXCC roster in May, according to W1WPO of Hqtrs. Chuta, W1RLQ, Dora, K4CYF, and Dena, W5DRI, made the grade. New officers of the South African Woman's Radio Club are Pres. and Editor ZS6YL: V.P. ZS6AIL: Secy. ZS6GH: Ass't. Editor ZS6KK: Contests and Awards ZS1RM. Some So. African YLs heard regularly on 16X bands are ZS1HZ, ZS5s AD, BP, FN, GJ, and ZS6VI, Vote, a new YL who is sightless. Fifty-five YLs registered at the Oregon Amateur Radio Convention held in Salem, Oregon, on May 3 and 4. Forty-one at the YL luncheon heard YLRL President, Beth Taylor, W7NJS, give a history of the club and an account of present and proposed activities.

Wanda, K6ENK, takes over editor duties of YLRL Harmonies from Betty, W9STR. Helen, W1ROY, lacks only New Mexico and Idaho for WAS on 6 meters. There are about 60 YLs in 5L land, according to a check by DJ1TE, Christe, Martha Edwards, ex W6QYL, is now OD5CH in Lebanon. While studying nursing in Illinois, Jeanne, WSUWV/9, keeps skeds with her mother Wave, W5FPT, in Michigan. The only active YL in Poland is SP5YL. Sophie, age 23, is studying engineering in Warsaw and has been active on 15 and 20 meters since May 1957. ZS6KK, Marie, won both the phone and e.w. trophies in the South African Radio League Contest. The Camellia Capital Chirps are preparing a cookbook of recipes submitted by YLs the world over.

CE4EV, Harriet, is returning to the States after four years "temporary residence" in Chile. KZ1UQ, Evelyn, is active in the N.Y.S. CD Radiological Information Net. We regret to report the passing of Manila Beebe, W7IGM. Manila was licensed in 1916 and had many friends around the world.

K6POG relates that K6PGO, K6PGP, and K6POG are all YLs and that both K6PGO and K6POG are "Mary."

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**25 Years Ago this month**

August, 1933


- Operating Information: Ten-Meter Band Hotl, Amateur Radio at a Century of Progress (World's Fair), More on the new QSL Bureau system, descriptions of various amateur stations, IARU News, the Communications Department pages and Station Activities. Calls Heard, incidentally, showed that a number of the signals being heard on 28 Mc. were actually harmonics from 14-Mc. stations.

- New regulations were announced, with most changes effective Oct. 1. Phone privileges were extended, and pure d.c. required on 14 Mc. and below. Amateurs mobile authorized on aircraft only, on 56 and 400 Mc. only. Class A, B and C licenses introduced, license term to be three years.

- Also of interest are the number of advertisers of 25 years ago that are still with us. Among them; reading from page 1 of the 1933 issue: Hammarlund, National, Candor, Port Arthur College, Walter Ashe and Collins Radio.

QST for
Elsewhere in this issue will be found the full text of the ARRL petition to FCC for 100-ke. segments at the low end of the 50- and 144-Mc. bands for c.w. emission only. Also reproduced in its entirety is the FCC Notice of Proposed Rule Making, Docket 12485, which starts the legal machinery moving toward the establishment of these exclusive c.w. subbands.

As might be expected, opposition to this proposal has developed in some quarters, and we wonder if those who object to the idea of the c.w. segments understand fully the reasons for the ARRL request. If you are one of the objectors, please refer to “Happenings of the Month” in this issue, and read the ARRL notice carefully. From these it should be obvious that this is no rehash of the old phone-c.w. argument. Narrow slices of our two most-used v.h.f. bands were not tossed aside in order to provide more territory for c.w. men. Though it is understandable that some operators might feel that the subbands should be granted, even at the expense of v.h.f. phone, it is well known that c.w. has a tremendous advantage over phone in weak-signal work.

Why should we be so concerned with weak-signal communication? Every operator of our v.h.f. bands should understand that he is using spectrum space that is subject to heavy pressure from other services. The day may come when we can make a good case for retention of our v.h.f. bands only if we can show that we have made the best possible use of them. The record of amateur radio in this respect is one in which we can all take pride. It shows that nearly all forms of long-distance propagation in the v.h.f. range were discovered and first exploited by amateurs. The worth of amateur radio data for scientific studies is widely recognized, but we cannot sit back and rest on our laurels forever. Our record in the future should be equally good. It can be, for there is much left for us to do.

*V.H.F. Editor, QST.

August 1958
future propagation studies. The ARRL IGY Propagation Research Project is currently providing a great reservoir of amateur communication data for this purpose, but we can do our best work only if we are able to exploit weak-signal possibilities to the fullest extent. This means consistent and widespread use of c.w. during marginal conditions.

Anyone who has attempted DX work on 50 Mc. recently knows that band occupancy has reached a point where the low edge (the most useful spot in the band for observing the beginning and ending times of openings, and their geographical distribution) is nearly always jammed with strong phone signals. How many more West Coast 50-Mc. men could have worked into Europe last winter, had not the signals of EI2W, CT1CO, and the LAs and SMs and other Europeans not been smeared byWs crowding the low edge of the band on phone? How much oftener could Easterners have worked into Hawaii, had it not been for the mass of phone QRH on the signals of KH6NS and KH6UK? Might not some other American areas have worked into Japan, Australia or New Zealand, except that Ws were so busy working each other on voice, mostly in the first 100 kc.?

If we were concerned merely with open-band conditions, the problem would not be so serious, for the percentage of time that our bands are open for DX is certainly small. Effective use of the c.w. segments need not wait for either 6 or 2 to be open. One of the most intriguing possibilities of our v.h.f. bands lies in the utilization of the various forms of scatter. These are available at any time or season. Tropospheric scatter is good for distances of 300 to 500 miles at any time, on both 6 and 2, if optimum c.w. techniques are employed. Ionospheric scatter is a practical matter for well-equipped 50-Mc. stations, and it works around the clock and calendar, over distances of 600 to 1200 miles. Meteor scatter is a c.w. operator's game, on either 50 or 144 Mc., but more so on the higher frequency. Moonbounce, if we are ever to get to it, is a c.w. proposition.

In all forms of band openings c.w. gets through first, and works longer, than voice. The fellow who gives up on either $P_2$ or sporadic-$E$ skip when phone ceases to be readable misses the best part of the fun. The v.h.f. man who struggles in an attempt to copy the garbled voice of a distant station during an aura is cutting himself off from the best that this weird form of communication has to offer. Yet all these marginal forms of communication can be done effectively on c.w. only on channels that are free of phone QRH.

We should have had such channels throughout the history of v.h.f. endeavor. It is of extreme importance that we have them now. There must be far more work in the world above 50 Mc. than chowing the rag and collecting QSL cards. We should lose no opportunity to build up the record of amateur accomplishment in our v.h.f. bands, as we may someday need it sorely in our continuing battle to maintain our rights to segments of the spectrum above 50 Mc. If narrow slices of both bands for the exclusive use of c.w. will help the cause along, they are a small price, indeed, to pay.

### 2-METER STANDINGS

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QST for
Members of the Spartanburg (S. C.) Amateur Radio Club, with some of the 6-meter portable stations built recently as a club project. Equipment was used effectively in connection with the Peach Blossom Golf Tournament. Self-contained and operated from small dry batteries, they could be deployed anywhere on the course to supply a constant flow of information far more effectively than the 75-meter mobiles formerly used.

Front row, 1 to r: K4HDX, K4LM, K4NO, K4MYR, W4ANTO. Back row: K4GQZ, K4BEW, Don Deckin, and K4LEI.

Here and There

Here's a really weird one that happened May 25. W6LFM, San Antonio, Texas, tells us that W5KRI and K5HVC worked JA1US at 1900 and heard JA1OW on 50 Me., from just before a few minutes after midnight! Signals were weak, with rapid fading that is characteristic of transpontual scatter. Their beams were aimed west, whereas the direct path of Japan would be northwest. The character of the signals suggests the TE mode, and inasmuch as Japanese stations have had considerable success with what might be called transpontual backscatter, it would appear that something of this sort was responsible. JA's W5-JA contacts. This is typical of the kind of observations that make amateur radio data so valuable for propagation studies. One thing we can be sure of: just about anything can happen on 50 Me., and if you are consistently active, and wide awake in the middle of the night, you can happen to it.

On 144 Me., the big news in June was a tremendous tropospheric opening early in the month. W9GAB, Beloit, Wis., calls it the best for north-south work in his experience, bringing in Arkansas, Mississippi, Louisiana, Texas, Tennessee and West Virginia. W9BAX, Columbus, Ohio, reports Kansas, Minnesota, and Nebraska worked June 3. It swung to the East June 4 and 5. W1RUF, Brigham, Mass., heard stations as far west as Wisconsin June 6. W5MI, Indiana, Iowa, picked up Maryland and West Virginia. K4AXJ was operating from a 3,000-foot elevation near Elkins, W. Va., for this one, the night of June 3, and he gave out many first contacts with his state. Among them was W8BNI, Pleasant Hill, Mo.

W30KP, Spencerville, Md., heard his first WSs before 1900 EST. W9GHH, Kenosha, Wis., was heard on s.s.b., at 07, shortly after. W9WOK, Barrington, Ill., was heard at 2300, and he gave us out the best reports ever heard. He was worked on e.w. at 04, W3BAMJ was raised at 0130, for a new state for both, followed by K6EIMJ, Cedar Rapids, Iowa, at 0142. The next hour was spent in digging for new ones, and in sending QSTs regarding stations and frequencies. W9RUF, St. Cloud, Minnesota, Mo., was heard at 0325 on voice at 2300. In the midst of a CQ he faded down too weak to read, and the next two hours were spent in frantic attempts to get him on e.w. Finally W9RUF heard W2CXY on c.w. in this time, and then changed over. Working W2CXY, W4QD and W30KP, in that order, Bill finally putting anyone who will tune in in. We hear K1ACD, Orange, Conn., giving his W9GAB into the select circle of 2-meter men having 9 call areas worked.

The life of a sidetone enthusiast on the v.h.f. bands is far easier to manage. W8SAG, Spencer, Iowa, was heard on voice at 2300. In the midst of a CQ he faded down too weak to read, and the next two hours were spent in frantic attempts to get him on v.h.f. Finally W9RUF heard W2CXY on c.w. in this time, and then changed over. Working W2CXY, W4AO and W30KP, in that order, Bill finally putting anyone who will tune in in. We hear K1ACD, Orange, Conn., giving his W9GAB into the select circle of 2-meter men having 9 call areas worked.

Almost lost in the noise connected with the best opening on 144 Me., this year was also the occasion of the first of the major daylight meteor showers, the June Perseids. Only results reported to date are successful sketches kept by W9GAB, Beloit, Wis., with W7-3RE, Biloxi, Miss., K4HVC, Chester, Va., and W1MMN, Orange, Vt. These put W9GAB into the select circle of 2-meter men having 9 call areas worked.

W2CXY, W4AO and W3GKP, in that order, Bill finally putting anyone who will tune in in. We hear K1ACD, Orange, Conn., giving his a work-

August Events

August is a big month for the v.h.f. fraternity. First, there's the National Convention in Washington, D. C., Aug. 15-17. The National Capital V.H.F. Society, as part of the Foundation of Amateur Radio Clubs, Inc., has charge of the v.h.f. program. Rick Emerson, W3OJU, promises that v.h.f. men will find plenty to interest them. See you there!

About the time you read this, v.h.f. men all over the Middle West will be taking off for Turkey Run State Park,
Cogent Quotes. Every so often in the flow of operating reports and letters across the desk, comments pop up that seem significant even beyond the correspondence considered by itself. This month we propose to share a few of these comments with our readers to consider each and make of it what you may.

"Let's have a personal program for monitoring one's own signal. Most follows surely wouldn't put out rotten signals if they knew how they sounded." — Stan, W4ADB.

F. E. HANDY, W1BDI, Communications Mgr.

"Most fellows surely wouldn't put out rotten signals."

GEORGE HART, WINJM, Natl. Emerg. Coordinator

"This locates carriers you can work, often DX, if you use a little c.w. W8KBL also says. "You stand a better chance of making code proficiency when you actually use it in your operating."

ROBERT L. WHITE, W1WPO, DXCC Award Winner

"Gaining code proficiency when you actually use it in your operating." — W8KBL in Ham-Grab. When they run out of contests, they will have a contest for those who have been in 25 or more contests.

"Listen much, transmit on the air no more than necessary."

"I tuned one ham Qding 23 times with his call but twice. Such operating wastes time; those disgusted pass on to someone else."

"I like the RFI card better than any other piece of wall paper I have."

"I want one ham Qding 23 times with his call but twice. Such operating wastes time; those disgusted pass on to someone else."

"Everyone knows ham radio as slang for the radio experimenter and operator. Let us look to the future, be proud of our name, and strive through our radio efforts to make it known the world over."

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FCC ordered (May 22, 1958) that the Technician Class amateur operator license of Harvey J. Benedix, Jr., Oakland, California, be suspended for a period of three months, it appearing that the licensee on various occasions between July 31, '57 when his Novice Class license KN6ELS expired and Nov. 14, '57 when he was granted a Technician Class amateur license, operated an unlicensed radio station in the 3.5-4 Mc. band using A-3 emission and the self-assigned call W9ELS/6, violating Sec. 301 and 318 of the Communications Act, it further appearing (1) that after receiving a Technician Class license KN6ELS, he operated on various occasions using A-3 on the 3.5-4 Mc. band contrary to the license terms, violating Sec. 12.23 and 12.28 of FCC rules and (2) that he failed to keep a complete and proper log, violating Sec. 12.136 and (3) that he operated at a fixed location other than that authorized in his station license, a violation of Sec. 12.64 and 12.98, FCC rules.

FCC ordered (May 22, '58) that the Technician Class amateur operator license of Gary H. Jones be suspended for a period of three months, it appearing that the licensee on various occasions between June 9, '57 to July 17, '57 operated an unlicensed radio station in the 3.5-4 and 7-7.3 Mc. bands using A-3 emission contrary to the terms of his license, a violation of Sec. 301 and 318 of the Communications Act, it further appearing (1) that after obtaining a Technician Class license W6QDJ he on various occasions operated A-3 in the 3.5 and 7 Mc. bands contrary to his license terms in violation of Sec. 12.23 and 12.28 FCC rules and (2) that he operated his amateur station at a fixed location different from that authorized in the station license, violating Sec. 12.64 and 12.93 FCC rules.

FCC ordered (May 16, '58) that the Technician Class amateur operator license of John L. McPherson, Jackson, Miss., be suspended until Oct. 22, 1951 (3½ years) his amateur operator license (of K6OXC) to be turned in to the FCC, it appearing (1) that FCC issued to B. L. Pedersen, San Fernando, Calif. a Novice Class operator-station license KN6UXC and Technician Class license K6OXC and it further appearing (1) that these licenses were issued by FCC on the basis of information and statements in the application and certifications which were false and (2) that B. L. Pedersen did not execute and file with FCC the applications, nor take the code examination Sept. 13, '56 as certified and (3) that John L. McPherson did on Sept. 13, '56 and other occasions, participate in arrangements wherein by fraudulent means, in violation of Sec. 12.102, the above-mentioned licenses were issued.

FCC ordered (May 22, '58) that the Technician Class amateur operator license of Harold W. Casto, Mountain View, Cal., be suspended for a period of three months, his license returnable to FCC for the period of the suspension, it appearing that the licensee during the period July 7 to July 18, '57 operated an unlicensed radio station, using A-3 in the 3.5 and 7 Mc. bands and the self-assigned call sign K6CQA, a violation of Sec. 301 and 318 of the Communications Act and it further appearing (1) that after obtaining Technician Class license W6QCU he operated his station using A-3 in the 3.5 and 7 Mc. bands contrary to this
ODST Sundays, 7140 kc. Stations are called in order, any opens 15 seconds of "mark" are sent by the NCS with re-3H20 kc. 7 p.m. EDST each Wednesday. Before the net traffic exchanges are directed by NCS W0BP. Bulletins of other than that authorized in his station license, violatin Sec. 12.23 and 12.28 FCC rules and (2) Sec. 12.61 and 12.93.

listing: W1BTV, VV1FYF, K28IL, K4SJH, W5DWB, Canada, Cuba, and U, S. possessions who report to their awarded to the followlng amateurs slnce last month's KOIDV...

W2BVE., W8WGU, K4KBT. .

K6MCA : W0IA (Apr.) W7APF f Apr.).. K4DSN" K40NQ

K2B1L W4WQT K6GK W1EMG ... W4QDY WOTOT,. ......

W1YRC K9GDQ W0KQD. ......

W2CPI   . . K4 EL(î. K5FPA W0GAR

W0BLI K2PHF W0IA W6GYH. W0BDR WflOHJ, W0LCX W0LGG W9DO W4PL.   .

W0CPI   . . KOGDF, W9NZZ W0SCA

 Vy7BA

Late Reports:

EMERGENCY FREQUENCIES (Kc.)

3550 3875 7100 7250 14,050 14,225 21,050 21,400 28,100 29,640 50,550 145,350

21,050

NATIONAL CALLING AND EMERGENCY FREQUENCIES (Kc.)

3550 3875 7100 7250 14,050 14,225 21,050 21,400 28,100 29,640 50,550 145,350

Training Aids Notes

Our Training Aids section announces the availability of a new film Coded F-35 and titled "Get the Idea." This movie is another product of the Phil-Mont Mobile Radio Club, whose other production, "Every Single Minute," is also available to ARRL affiliated clubs.

"Get the Idea" presents some good basic conceptions on phone operating procedure, both commercial and amateur. We're certain affiliated club groups viewing this motion picture will find it very enjoyable and beneficial. It has sound, is black and white and runs approximately 17 minutes.
Now that we’re getting plenty of material for this column (thanks, fellows!), we can start looking it over and getting a little choosy about what we use and when we use it. That’s what happens, you know. When you get prosperous, you get particular.

The working informal policy we have used is to give highest priority to reports of amateur participation in actual communications emergencies. When the emergency is widespread and amateur participation extensive, and illustrative material is available, we often are able to submit an up-front feature article on it. Reports on drills and special non-emergency activities come second, but when you include a usable picture it “ups” the priority to the extent that we may use the picture with a suitable caption. Other material, such as new ideas for organization, progress reports, reports of meetings or gatherings, take a third priority rating as a general rule.

In all material, we have to insist on using editorial perspective in line with the space we have available. This space problem is a critical one. Some issues of QST have more space available than others, so occasionally we have to cut something out, or add something, depending on whether we have more or less space. We deplore interference from the type-setting process, but this is a very practical problem and we have to deal with it. You might think that it is easy to draw the line between emergencies and non-emergencies, but this is not the case. It is sometimes very hard to determine whether an activity can be classified as emergency or not, and becomes harder every day as more and varied material is received. In recent and subsequent issues you will come across some typical examples. In one issue we had an emergency in which a boy was stung by a bee at a fair in which amateurs were participating. And if what they did could have been accomplished just as well (or better) by commercial means (even if it does cost some money), then it just wasn’t really a communications emergency. That doesn’t mean you shouldn’t report it, only that it will take a lower priority in this column than those activities that qualify as communications emergencies.

Now that we are getting considerable material, we are going to get a little tougher about this distinction. We may open up another category: the non-communications emergency. That is, the emergency in which amateurs participated by communicating, but in which their services weren’t really required by the situation. If material you submit is reviewed and we feel it has to be rejected because it is not an emergency, we’ll just assume that their services were not required. This should get us into a lot of interesting arguments, because we cannot engage in extensive inquiring correspondence on this subject. We hope it will make it clear, one way or the other, and that you’ll check your reports to see that the five one-word interrogatives above are answered.

The University of Connecticut Emergency Net had a good workout on April 21 when it was called upon to assist in a forest fire near the Mansfield Hollow Conservation Dam Basin. Two-meter portables were used to maintain communications with Storm, 144 miles north, W7b HUP and W7U handled the two portables on the scene. Several other operators, with their stations, stood by to help if needed.

On May 3, AREC and RACES members in the Belleville, Ill., area, responded to a tornado alert. Mobiles were manned by W9s TTT IUOR QDM RQR NXY BA and K9QYR, Radio Officer W9RA activated the Communications Center, assisted by Alternate Officer W9JAY RSZ, K9h MNZ MLH MNR. Out-of-town contact was effected by W9BN and W9END when the twister struck Collinsville. Although damage was slight, there was need for emergency communications facilities. The communications center, serving Belleville, East St. Louis and St. Clair County operated under the call of K9NNM, W9BA, EC St. Clair Co., Ill.

A severe wind and rain storm along the South Shore of Nova Scotia on Apr. 2 disrupted communications facilities and brought the AREC into action. VE1ABJ and VE1L handled train dispatch orders between Bridgewater and Middleton. Fifty-four messages were handled between Middleton and Lunenburg for Canadian National Telegraph and six to other points, through a hookup that included VRlK KE MA and VN. VE1DW handled Yarmouth traffic while VE1ADE looked after Halifax traffic. The operation was continuous from 1245 AST until 2130 AST at which time commercial communications were restored.

V8G1, EC Western Nova Scotia.

After a very heavy rainfall on May 9, Noneconnah Creek in Memphis overflowed, disrupting communications. The Red Cross requested aid from the amateurs, and in a matter of minutes mobiles W4BAQ, K6CATA and W4WTJ were on the scene. VE4B, and often seems unfair. From a detached standpoint, a communications emergency would seem to be one in which normal (commercial) means of communication are not available or are overloaded, and in which amateurs provide communications facilities on a temporary basis until normal service can be restored or until the emergency is over, whichever is sooner. Two things are requisite: an emergency situation and a lack of communications. If either is lacking, it is not a communication emergency and does not deserve to be treated as such.

Such a policy may seem unfair when a group is alerted for a pending emergency and loses time and sleep in monitoring and preparing, only to have no communications emergency develop, while another group is called into action until a communications emergency exists, then does a sloppy, makeshift, haphazard job of communications. The latter group has performed in a communications emergency, the former has not — but which group deserves the greatest credit?

As often as not, the information submitted is incomplete, inaccurate and incomprehensible. We don’t require applicants to be journalists, but we do need all the facts: when, where, what, how and who? We’re not interested in details of the emergency situation, except to know what it was; what we want to know about is what the amateurs did. And if what they did could have been accomplished just as well (or better) by commercial means (even if it does cost some money), then it just wasn’t really a communications emergency. That doesn’t mean you shouldn’t report it, only that it will take a lower priority in this column than those activities that qualify as communications emergencies.

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Army headquarters at that point. Via amateur radio, contact was also maintained between Milwaukee, Chippewa Falls (Wis.), and Davenport (Iowa), also through W9FYS.

On June 4, K6VYG heard K6YVB calling “CQ Emergency” on 6 meters. On answering the call, K6VYG was told that there was a car accident on the Hollywood Freeway, and a lady was badly injured. Even while this information was being passed along, K0ZKG called the police and told them where to go. — K6VYG.

The St. Paul, Minn., Mobile Radio Club was able to offer some valuable assistance during the extensive tornado activity in Wisconsin on June 5th and 6th. While K3GVX operated Red Cross headquarters station W2DRT in St. Paul, W2A PDK E7Y CLUB and K1EKF operated mobiles in the disaster area, maintaining contact with W2DRT, W9FYS in River Falls, Wis. Much traffic was passed, both of an emergency and personal nature. EC W9PBN gives us the following additional list of amateurs who took part: W7s IPN, EXC THY, ARU HUA, GCM.

On June 7, K5EOI and K5GHK assisted in obtaining a special antitoxin needed to save the life of an Air Force technical sergeant bitten by a coral snake. Information that the serum was needed came from W5JHS, and long amateurs from Texas to Florida were calling their hospitals in an effort to obtain it. The needed medicine was finally landed in New Orleans and flown by Navy jet to Kansas City, Mo., in time to save the sergeant’s life.

Members of the Midwest V.H.F. Association (St. Louis area) were alerted for a number of tornadoes in April and May, but no communication resulted. Nevertheless, the turnout for these alerts was always good; these alerts show its ugly funnel around St. Louis. Operations, in- cluding most of the alerting, is all conducted on six meters. Such alerts (the real thing, not drills) were called on April 5 (29 participating), May 3 (29 participating), May 4 and May 31.

On March 18 W9IRM, while driving to work, noticed a large dump truck on fire. He called K9BFS on the six meter net, who noticed the fire department by landline. Once the firemen arrived at the fire scene, K9BFS provided communication between them and the chief in Mounds, for a very impressive demonstration of amateur radio emergency facilities.

On April 10, 200 explorer scouts and senior girl scouts participated in the largest scout-c.d. drill ever conducted in the state of Illinois. The problem was a simulated atomic explosion in Waukegan, and scouts were dispatched on six meters for a number of tornadoes in April and May. On answering the call, K6YVB was told that there was a car accident on the Hollywood Freeway, and a lady was badly injured. Even while this information was being passed along, K0ZKG called the police and told them where to go. — K6VYG.

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but this did not prevent extension of courtesy to outside stations who broke in or to visiting mobiles not familiar with the procedure. The important aspect of this type of operation is the relative fluidity of the net, which left even outside stations to make their transmissions short and to the point. We wish more amateur nets sounded like this.

We received 25 April SEC reports, representing 6689 AREC members. This is an increase of three reports and about 500 AREC members over April of last year. What's more, five of the SECs reporting for April were from sections not previously reported in 1958: Western N. Y., N. C., E. Pa., Vt. and B. C. Other sections reporting for April: Md.-Del.-D.C., Conn., NYC-L.I., Ga., Santa Barbara, Tenn., E. Bay. Mont., Colo., Nev., N. M., Ala., San Joaquin Valley, E. Fla., Wla., N. Texas, S. Texas, Santa Clara Valley, Mich., Maritime.

RACES News

The May, 1958, issue of “The Monitor,” a monthly paper published out of Dallas, Texas by W5RYP and W5ZYA, contains an interesting item on the Dallas RACES plan. This plan is comprehensive but still in proposal stages, but it is interesting and encouraging to know that the Dallas gang and some other Texas cities are starting the ball rolling even though there is as yet no coordinating state plan in existence. We wish the Dallas gang success in getting the plan approved to give greater stature to the state of Texas in the RACES program.

So far, RACES is one thing Texas is not biggest in.

Among the agencies asked to participate in the filming of the United Religious Emphasis Day In Philadelphia on April 20 was the Philadelphia Civil Defense Council, which was asked to provide mobile radio communications for the moving camera crews of the United States Army Pictorial Service. A RACES mobile was assigned to the director of the movie and other mobiles were dispatched as needed to points needing coverage. Although not a RACES drill as such, the activity was good practice and represented a real situation rather than a paper drill. The first mobile checked in at 0900 and the last checked out at 1815. Frequencies on the Phil-Mont Mobile Radio Club plan were used on ten meters, and that of the Mobile Sixers Radio Club on six meters. About ten RACES mobiles took part.

On May 1, W6DCW was designated to organize communications coverage for a C.D. drill involving the evacuation of school children from Jefferson County, Colo., to Glenwood Springs, 150 miles away, and return the next day. The main problem was to keep the children in contact with their parents. W6DCW set up control on forty meter phone and three mobiles accompanied the convoy to Glenwood Springs. Several fixed stations at each end and along the route also assisted in maintaining contact between the control station and the convoy mobiles. About 10 amateurs participated. Everyone proclaimed the operation a great success.

The Peoria (III.) Civil Defense Director called KOYDY, net manager of the 12 County Support Area Net at 1855 on May 5, asking that he alert as many stations as possible to the presence of school children from Jefferson County, Colo., to Glenwood Springs, 150 miles away, and return the next day. The main problem was to keep the children in contact with their parents. KOYDY set up control on forty meter phone and three mobiles accompanied the convoy to Glenwood Springs. Several fixed stations at each end and along the route also assisted in maintaining contact between the control station and the convoy mobiles. About 10 amateurs participated. Everyone proclaimed the operation a great success.

NATIONAL RTTY CALLING AND WORKING FREQUENCIES

3620 kc. 7140 kc.

These frequencies are employed throughout the United States by amateurs using radioteleotype.
more, after asking for an escort. The following other net
members participated in the emergency: W9HIA ZLO
JCD KZP and KG8X.

Another emergency handled by the Mission Trail Net
had to do with several missing buses, two trains and a
number of private cars, all stalled by a rock slide on High-
way 25 near the community of Pueblo, Colorado. The
information came through W6XEU, W6QGU assisted in
locating the train and relayed for several hours. As a
result of this effort, the Highway Patrol rescued the
highway on both sides of the slide and got all buses and
private cars to safety. Other amateurs working in this emer-
gency were W7SF KZP TW EP8 USA, K66 SXJ Jim YWB
LCF KLO, W7s CML TQE, K7AGE/m.

TRAFFIC TOPICS

Experiencing some difficulty in obtaining new traffic
"blood" for our nets by conventional means, we have em-
ployed to use a more literal and scientific approach. In the
dark recesses of certain nameless laboratory, Dr. H. R.
McRey, W1QTC, has been researching on a project designed
to bring more traffic converters into the amateur ranks. The
detail of the secret, shrouded in mystery, but we can
tell you that by both fair means and foul (the latter) he
has acquired a supply of blood from some of the
more active traffic men and has already developed a serum.
When injected into known pigs, the effect is encouraging:
their paws twitch as though trying to operate keys, the
eyes go blank (i.e., radiogram blank), and they squeak in
a manner highly reminiscent of a 75-meter phone net.
The effect wears off after a certain length of time, after
which re-injection is necessary for continuation. The good
doctor is on the lookout for means for human volunteers.
The amateur ranks, but all approached so far have turned
lively at the thought of such a fate.

Eventually, we are confident that the experiments will
prove to be successful, and the serum, which we call "traffic
juice," will be available for distribution to the field, free
of charge. We hope to have supplies of it, along with the
means for administering it surreptitiously, available
for our agents at meetings of DX, RTTY, s.s.b. and
VLF. Some groups at conventions and campsites. Mean-while,
W1QTC will work on a new method of oral consumption
such as in speech or hoots, to assure widespread assimila-
tion by amateurs nationwide.

August 1 is the date that all nets in our present registry
are placed behind the "discontinued" tab. They are then restored to the active part of the file only as they are re-
registered. Get a copy of CD-85 so you can be assured of a
place in the first QST net listing (November QST) and in
the annual net directory issued about the first of Decem-
ber. However, this year we want to give fair warning that social
and rag chew nets with no other purpose will not be regis-
tered.

Net reports. The Early Bird Transcontinental Net reports
31 sessions and 710 messages handled. Transcontinental
Traffic Net conducted 52 sessions and handled 1,466 mes-
sages, averaging 22 stations per session, and 1,466 check-ins; three
emergency sessions were held. The North Texas Oklahoma
Traffic Net had 31 sessions, handled 361 messages in 834
check-ins.

National Traffic System. Seems as though we operators
who work in The System ought to set the example for other
traffic men. Recently we have noticed many NTS operators,
most of whom certainly know better, using procedure not
recommended by ARRL, or leaving out things which are
recommended by the League. Minor things, mostly, and
usually a result of habit rather than ignorance — such as
leaving out or otherwise neglecting the "check" of a mes-
sage, omitting the AA separation between the parts of the
address or the AR at the end of the message on c.w., or
using the word "SIG" before the signature. Many mes-
sages come through in non-standard form, mostly as a result
of incorrect MARS reporting, and remain in that form because
no one takes the trouble of changing it to amateur form
along the way. Remember, it is wrong to change the con-
tent of a message, but desirable to correct its form. These
things have all been covered in this section of QST in
the past. Naturally, you have a right to agree or disagree and
Here's W8STOL, manager of the NTS Tenth Regional Net,
at his next and business-like operating position in Man-
hattan, Kans. "Do" in addition to being TEN Manager, is
NCS on QKN (Kans. C.W. Net) and Central Area Net.
He's OGS, of course, and has been an amateur since 1926.
Ex-calls include W9BYY and W9AU.

use the procedure you think best; but you are perpetrating
a disservice both to yourself and The System if you ignore
the facets of logic on which most of our procedure is based.
Trouble is simply that so many traffic men are stubborn
individualists and they'll bend the rules on anything that
the procedure they are used to. We don't suppose we'll ever change
this, but we do hope that our newer traffic men (those
familiar with "traffic juice") will study up on procedure as
recommended by the League and use this rather than
innocent incorrect procedure acting, as practiced by
some of the old timers.

May reports:

| Net         | Sessions | Traffic Net | Average Represen-
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<tbody>
<tr>
<td>EAN</td>
<td>35</td>
<td>1216</td>
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<tr>
<td>CAN</td>
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<td>31</td>
<td>1285</td>
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<td>471</td>
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<td>54</td>
<td>1566</td>
<td>7.3</td>
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<td>1073</td>
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<td>15132</td>
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<tr>
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<td></td>
<td>90.9</td>
<td>100.0</td>
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</table>

1 Regional net representation based on one session per
day. Others are based on two or more sessions.
2 Section nets reporting: WVN (W. Va.); QMN (Minn.),
QKN & QKS (Kans.); AENP Morning, AENP & AENB
(Ala.); CWX (Neb.); CN & CPN (Conn.); FMTN, Gator
& FN (Fla.); ASYN Noon, ASYN evening & MNS
(Minn.); WSN (Wash.); KSP & EYN (Ky.); S. Dak.
& S. Dak.; Iowa 75; TLCN (Iowa); MDD (Md.,Del.,
etc.); GSPN (N. H.); ILN (Ill.); SCN (S. C.); SCN
(Calif.).

TCC functions reported, not counted as net sessions.
The Rocky Mountain Net is shortly to become the
Twelfth Regional Net of NTS; this was decided upon during
a recent personal visit to the region. The new regional net,
most of which will be tracked down in the present Ninth NTS
Region, will consist, tentatively, of the states of New Mex-
ico, Colorado, Utah, Arizona and Wyoming. We hope by
July 1 to get an agent in each state to assist the region in
becoming a solid part of NTS in full status. This means that it must have a

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full complement of section representatives, net control stations, and area net liaisons. NTS is expanding; it’s up to you fellows in the Southern Rockies to get behind this movement and show that spare ability is not necessarily proportional to sparse population.

The TCC roster: Central Area (W6BDR, Dir.) — W9CXY, W7Cs LCG BDR SGA LGG, Pacific Area (W6BPT, Dir.) — W5DBW, W7Rs EOT ADB PLY BPT VTX HC UTV, R6s DXW EYW HLR BES GID, W7GMG, W7Rs Q6D WMK.

ELECTION NOTICE

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

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

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

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

Communications Manager, ARRL, 38 La Salle Road, West Hartford, Conn.

We, the undersigned full members of the

... ARRL Section of the

... Division, hereby nominate.

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

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates. You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

— F. E. Handy, Communications Manager

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.

Santa Barbara — Robert A. Henske, K6CVR May 9, 1958

Eastern Massachusetts — Frank L. Baker, jr., W1ALP June 15, 1958


Northern Texas — L. L. Harbin, W55NG Aug. 10, 1958
WIAW OPERATING NOTE
The WIAW summer schedule, as shown on page 80 of last month's QST, is still in effect. See that issue for full information on when and where to look for the ARRL Headquarters station.

CODE PROFICIENCY PROGRAM
Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from WIAW will be made on August 20 at 2130 Eastern Daylight Saving Time. Identical texts will be sent simultaneously by automatic transmitters on 3555, 7060, 14,000, 21,010, 28,000, 50,000 and 115,000 kc. The next qualifying run from W6QW only will be transmitted on August 6 at 2100 PST on 3555 and 7060 kc.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions are made from WIAW each evening at 2130 EST. An approximately 10 minutes' practice is given at each speed. Reference to texts used on several of the transmissions are given below. These make it possible to check your copy. For practice purposes, the order of words in each line of QST text sometimes is reversed. To improve your speed, hook up your own key and audio oscillator and attempt to send in step with WIAW.

Date: Subject of Practice Text from June QST
Aug. 4: Let's Go Microwave, p. 11
Aug. 12: The Versatile S.W.R. Indicator, p. 15
Aug. 14: A Transistored Grid-Dip Meter, p. 31
Aug. 21: A Weather-Resistant Quad, p. 12
Aug. 23: Board Meeting Highlights, p. 64A
Aug. 29: So You Know Your Field Day Rules, p. 68

DXCC NOTES
Announcement is hereby made of the addition to the ARRL Countries List of Chatham Islands. These islands are located in the South Pacific Ocean approximately 420 miles east of New Zealand. Addition is made by virtue of point 2 as explained in the May 1955 QST, page 63. DXCC credit will be given starting October 1, 1958 for creditable confirmations dated or on after November 15, 1945. This is to permit foreign amateurs to start receiving credits at the same time as those in the U.S. Confirmations received prior to October 1, 1958 for this country will be returned without credit.

DX CENTURY CLUB AWARDS

<table>
<thead>
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<th>HONOR ROLL</th>
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<tbody>
<tr>
<td>W6AM. 279 W6AW. 262 W6GZ. 278</td>
</tr>
<tr>
<td>W6FJ. 272 W6HJ. 272 W6RH. 270</td>
</tr>
<tr>
<td>W6CQ. 275 W6ZQ. 271 W6VR. 260</td>
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<tr>
<td>W7IVK. 272 W7WY. 268 W7GA. 265</td>
</tr>
<tr>
<td>W8RX. 278 W8BH. 275 W8ME. 275</td>
</tr>
<tr>
<td>W8SY. 273 W9ME. 265 W9ADP. 267</td>
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</tbody>
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Radiotelephone

| W8AM. 279 W6AW. 262 W6GZ. 278 |
| W6FJ. 272 W6HJ. 272 W6RH. 270 |
| W6CQ. 275 W6ZQ. 271 W6VR. 260 |
| W7IVK. 272 W7WY. 268 W7GA. 265 |
| W8RX. 278 W8BH. 275 W8ME. 275 |
| W8SY. 273 W9ME. 265 W9ADP. 267 |

From May 1, 1958 to June 1, 1958 DXCC certificates and endorsements based on postwar contacts with 300 or more countries have been issued by the ARRL Communications Department to the amateurs listed below.

NEW MEMBERS

| W6CY. 250 W6RL. 258 W7RF. 268 W8AB. 271 W8GA. 268 |
| W6YL. 179 W6DK. 107 W6KQ. 107 W6CD. 107 W6OS. 107 |
| W7AR. 145 W7AT. 146 W7BH. 146 W7CQ. 146 W7FO. 146 |
| W7KN. 221 W7KQ. 106 W7PB. 106 W7RM. 106 W7UC. 106 |
| W8NW. 118 W8MK. 106 W8NJ. 106 W8EJ. 106 W8DX. 106 |
| W8NB. 118 W8DC. 106 W8EA. 106 W8FJ. 106 W8CQ. 106 |
| W7OJ. 111 W7TH. 106 W7UM. 106 W7HR. 106 W7XK. 106 |
| W7TV. 111 W7AK. 106 W7XQ. 106 W7ZK. 106 W7ZL. 106 |
| W6TR. 110 W6YJ. 106 W6KQ. 106 W6GR. 106 W6KQ. 106 |
| W8QY. 109 W8PB. 104 W8KD. 104 W8FO. 104 W8VZ. 104 |
| W7QL. 109 W7SA. 104 W7RO. 104 W7AO. 104 W7AO. 104 |
| W8QV. 106 W8DQ. 104 W8NM. 104 W8QV. 104 |
| W6LY. 105 W6BQ. 105 W6BQ. 105 W6BQ. 105 |

Radiotelephone

| W6EG. 120 W6HY. 105 W6BQ. 102 |
| W6IB. 110 W6RQ. 102 W6BQ. 102 |
| W6ID. 122 W6BK. 103 W6BQ. 101 |
| W6WH. 110 W6PB. 104 W6BQ. 100 |
| W6YQ. 110 W6SA. 104 W6BQ. 100 |
| W6FQ. 106 W6UJ. 104 W5NW. 100 |
| W6LY. 105 W6BQ. 105 W6BQ. 105 |

ENDORSEMENTS

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| W7A. 214 W7Q. 195 W7Q. 195 |
| W7B. 214 W7Q. 195 W7Q. 195 |
| W7C. 214 W7Q. 195 W7Q. 195 |
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Radiotelephone

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| W6L. 112 W6PA. 112 W6BQ. 112 |
| W6M. 112 W6PA. 112 W6BQ. 112 |
| W6N. 112 W6PA. 112 W6BQ. 112 |

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**ATLANTIC DIVISION**

**EASTERN PENNSYLVANIA—SCM.** Richard R. Meilman, W3IJQ—SEC; W3USW—V.P.; W3TVG—Treas.; K3ZAD, W3TVG, PAM. Net meets Mon., through Fri., on 3860 kc. at 2000 EST.

**PENNSYLVANIA—SCM.** John W. Todd, W3BU—V.P.; W3WGM—Treas. Net meets Wed., Fri., and Sun., on 3940 kc. at 1400 EST.

**SOUTHERN PENNSYLVANIA—SCM.** Fred A. Engle, W3HJ—Sec.; W3CB—Treas. Net meets Mon., Wed., and Fri., on 3940 kc. at 1800 EST.


**SOUTHERN NEW JERSEY—SCM.** Herbert C. Kisco, W3UCG—Sec.; W3DAB—Treas. Net meets Mon., Wed., and Fri., on 3940 kc. at 1930 EST.

**SOUTHERN NEW ENGLAND—SCM.** Charles T. Hansen, W3USK—Sec.; W3EM—Treas. Net meets Mon., Wed., and Fri., on 3940 kc. at 1930 EST.

**NEW YORK—SCM.** Charles P. Ziesing, W2HQP—Sec.; W2DQ—Treas. Net meets Mon., Wed., and Fri., on 3940 kc. at 1930 EST.
THE HORSEPOWER RACE

In the past several years a change has developed in the manner in which various manufacturers specify the power ratings of their amateur transmitters. The old method, which is largely outdated, specified the DC Power input to the final amplifier. The new trend, caused primarily by the growing movement towards SSB operation, seems to lean toward rating equipment in peak envelope power, commonly referred to as P.E.P. Some manufacturers specify P.E.P. input, while others specify P.E.P. output. At any rate, this change produces a certain degree of confusion in the amateur's mind when he begins to compare the relative merits of various commercially built amateur transmitters or linear amplifiers.

To illustrate various forms this confusion may take, let us consider two examples. One transmitter, which on meter peaks indicates 625 to 650 watts, is rated by the manufacturer at 1000 watts P.E.P. input. The second rig indicates 1000 watts input on the meter, and is rated by its manufacturer at 2000 watts P.E.P. input. As illustrated by this example, one manufacturer considers P.E.P. to be approximately 1.5 times as great as D.C. input, while the other uses a factor of 2 to 1. Obviously, this difference in yard sticks can make it difficult for the amateur to determine how loudly a transmitter will talk.

Basically, it should be readily apparent to each of us that the most important consideration, when discussing power, is how much output we get before generating excessive distortion. For example, an amplifier with 1000 watts DC input, which is 50% efficient, gives us 500 watts to the antenna; while a rig which is 66 2/3% efficient can produce the same signal output with only 750 watts DC input. It would seem, therefore, that the premium should be on efficiency, rather than on meter input, much of which is burned up in the form of plate dissipation.

Moreover, it seems to us, that since 1000 watts is the maximum indicated power input the amateur can utilize, any talk in excess of this figure, regardless of how the input power is stated, has little or no meaning.

In line with the thinking outlined above, we at Hallicrafters have chosen not to add to the confusion by rating our new HT-33A linear amplifier in P.E.P. input. We do state that this final runs conservatively at the maximum legal limit of 1000 watts DC input. Moreover, and this is the important point, the HT-33A can deliver more output to the antenna, no matter how it is measured, than any other commercially manufactured amateur linear amplifier now on the market. In addition, it does this with third and fifth order distortion products down in excess of 30 db. It is the feeling at Hallicrafters that this is the type of information today's amateur demands.

— Tom Stuart W0REP

ADVERTISEMENT
Anyone starting out in amateur radio will find these publications a necessary part of his reading and studying for the coveted amateur radio operator's ticket. Written in clear, concise language, they help point the way for the beginner. Tried and proven by thousands upon thousands of amateurs, these ARRL publications are truly the "Gateway to Amateur Radio."

$1.50
POSTPAID

The American Radio Relay League, Inc.—West Hartford, Connecticut
VIKING “6N2 VFO”
Here’s good news for VHF operators: the Vîking “6N2 VFO”—exceptionally stable, compact, and packed with outstanding new features! Designed to replace 8 to 9 mc. crystals in frequency multiplying 6 and 2 meter transmitters, including types using overtone oscillators, the Viking “6N2 VFO” provides rock-solid output for operation on any frequency in the 6 and 2 meter bands. Unit is temperature-compensated and voltage-regulated for minimum drift and high stability. “6N2 VFO” is housed in an attractive, extra heavy, shock-proof aluminum cabinet. Plexiglas dial is calibrated from 144 to 148 mc., 50 to 51.5 mc., 51.5 to 53 mc., and 53 to 54 mc. for maximum bandspread. Dial is edge-lighted for high visibility—10 to 1 vernier tuning gives you positive frequency control. The Viking “6N2 VFO” is available completely wired and tested or as an easy-to-assemble kit, complete with tubes and calibrated dial.

Cat. No. 240-133-1 Kit. Amateur Net $34.95
240-133-2 Wired and tested. Amateur Net $54.95

VIKING “6N2” TRANSMITTER
This compact VHF transmitter punches your signal out with 150 watts CW and 100 watts phone input. Instant band-switching 6 and 2 meters. Completely shielded and TVI suppressed, the “6N2” may be used with the Viking “Ranger,” Viking I, Viking II, or similar power supply/modulator combinations. Operates by crystal control or external VFO with 8-9 output. With tubes, less crystals, less crystals, key, and microphone.

Cat. No. 240-201-1 Kit. Amateur Net $129.50
Cat. No. 240-201-2 Wired. Amateur Net $169.50

E. F. Johnson Company
2822 Second Avenue Southwest • Waseca, Minnesota
VIKING "RANGER" TRANSMITTER/EXCITER
Superbly engineered... delivers solid audio punch! This popular 75 watt CW or 65 watt phone transmitter also serves as an RF/audio exciter for high power equipment. Built-in VFO or crystal control—instant bandswitching 160 through 10 meters. 6L6 final amplifier—wide range pi-network output. Timed sequence keying. TVI suppressed. With tubes, less crystals.
Cat. No. 240-161-1... Kit... Amateur Net $229.50
Cat. No. 240-161-2... Wired and tested... Amateur Net $329.50

VIKING "VALIANT" TRANSMITTER
Here's effective power, wide flexibility, and many unique operating features combined in a compact desk-top transmitter! 275 watts input CW and SSB (P.E.P. with auxiliary SSB exciter) and 200 watts phone. Instant bandswitching 160 through 10 meters—built-in VFO or crystal control. Final amplifier utilizes three 6L6 tubes in parallel—wide range pi-network output. Silver-plated final amplifier inductor—built-in low pass audio filter—low level audio clipping. With tubes, less crystals.
Cat. No. 240-104-1... Kit... Amateur Net $349.50
Cat. No. 240-104-2... Wired and tested... Amateur Net $439.50

VIKING "PACEMAKER" TRANSMITTER/EXCITER
An outstanding power bargain when used as a transmitter or exciter! 90 watts SSB P.E.P. and CW input... 35 watts AM. Unique circuitry uses only 1 mixer for improved spurious signal rejection greater than 50 db. Balanced range audio. Highly stable built-in VFO gives complete coverage of bands without crystal switching or re-tuning. Instant bandswitching 80, 40, 20, 15 and 10 meters. VOX and anti-trip circuits. Wide range pi-network output. Effectively TVI suppressed. With tubes and crystals.
Cat. No. 240-301-2... Wired... Amateur Net $495.00

Full 2000 watts SSB*—1000 watts CW and AM!

VIKING "KILOWATT" AMPLIFIER
Here's the finest power amplifier ever designed for the amateur service! A sparkling concept of contemporary transmitter design and engineering craftsmanship, the Viking "Kilowatt" is the only amplifier that gives your signal the authority of maximum legal power in all modes. Class C final amplifier operation provides plate circuit efficiencies in excess of 70% with unequaled broadcast-type high level amplitude modulation. Two 4400A tetrodes in parallel, bridge neutralized—wide range pi-network. Pedestal contains the complete unit. Excitation requirements: 30 watts RF and 10 watts audio for AM; 2-3 watts peak for SSB. With tubes.
Cat. No. 240-1000... Wired and tested... Amateur Net $1595.00

Matching accessory desk top, back and three drawer pedestal.
Cat. No. 251-101-1... FOB Corry, Pa. $122.00

*The F.C.C. permits a maximum of one kilowatt average power input for the amateur service. In SSB operation under normal conditions this results in peak envelope power inputs of 2000 watts or more depending upon individual voice characteristics.
VIKING "NAVIGATOR" TRANSMITTER/EXCITER
More than a novice transmitter—also serves as a flexible VFO-Exciter delivering enough RF power to excite most high powered amplifiers on CW and AM! 40 watts CW input—6l46 final amplifier tube—wide range pi-network output. Built-in VFO or crystal control—bandswitching 160 through 10 meters. Timed sequence keying. TVI suppressed and filtered. Complete with tubes, less crystals.
Cat. No. 240-126-1. Kit............. Amateur Net $149.50
Cat. No. 240-126-2. Wired and tested...... Amateur Net $199.50

VIKING "ADVENTURER" TRANSMITTER
Perfect for the novice or experienced amateur! 50 watts CW input—instant bandswitching 80 through 10 meters. Crystal or external VFO control. Rugged 807 final amplifier tube—wide range pi-network output. Clean, crisp keying. TVI suppressed. Complete with tubes, less crystals.
Cat. No. 240-181-1. Kit............. Amateur Net $54.95

SPEECH AMPLIFIER/SCREEN MODULATOR
Designed to provide phone operation for the "Adventurer". High gain—use with crystal or dynamic microphones. With tubes.
Cat. No. 250-40. Kit............. Amateur Net $12.25

-you can't beat a Viking!

Dollar-for-dollar and feature-for-feature... Viking amateur transmitters are your best buy!
The Viking amateur equipment line offers you a complete choice of power ratings, types of emission and operating features in a wide range of prices. Compare Viking quality and performance—you'll soon see why Viking transmitters are "first choice" among the nation's amateurs.

VIKING "FIVE HUNDRED" TRANSMITTER
Rated 600 watts CW input... 500 watts phone and SSB (P.E.P. with auxiliary SSB exciter)—instant bandswitching 80 through 10 meters! Compact RF unit designed for desk-top operation—power supply/modulator unit may be placed in any convenient location. All exciter stages ganged to VFO tuning. High gain push-to-talk audio system. Operates by crystal control or highly stable, built-in VFO. Class C 4-40QA final amplifier provides plate circuit efficiencies in excess of 70% with unequalled broadcast-type high level amplitude modulation. Wide range pi-network output circuit with silver-plated final tank coil will load virtually any antenna system. Low level audio clipping—effectively TVI suppressed and filtered. Complete with tubes, less crystals.
Cat. No. Amateur Net
240-500-1. Kit.................. $749.50
240-500-2. Wired.................. $949.50

VIKING "COURIER" AMPLIFIER
This power-packed Class B linear amplifier is rated 500 watts P.E.P. input with aux. SSB exciter—300 watts CW and 200 watts AM! Continuous coverage 3.5 to 30 mcs. May be driven by the Viking "Ranger", "Pacemaker" or other unit of comparable output. Drive requirements: 5 to 35 watts. Employs two 811A triodes in parallel—wide range pi-network output. Fully TVI suppressed. Complete with tubes.
Cat. No. Amateur Net
240-352-1. Kit............... $244.50
240-352-2. Wired............ $289.50

VIKING "THUNDERBOLT" AMPLIFIER
Rated at 2000 watts P.E.P.* input SSB; 1000 watts CW; 800 watts AM linear! Continuous coverage 3.5 to 30 mcs.—instant bandswitching. May be driven by the Viking "Ranger", "Pacemaker" or other unit of comparable output. Drive requirements: approx. 10 watts Class AB2 linear, 20 watts Class C continuous wave. Employs two 4-400A tetrodes in parallel, bridge neutralized—wide range pi-network output. With tubes.
Cat. No. Amateur Net
240-353-1. Kit........ $524.50
240-353-2. Wired........ $589.50

E.F. Johnson Company
2815 SECOND AVENUE S. W. • WASECA, MINNESOTA
All of these licensed radio amateurs make important contributions to the Heath line of fine ham kits. In a sense, they are your personal representatives within the company, because their design ideas and performance preferences reflect not only their own "on-the-air" experiences, but those of the amateur fraternity with which they are in constant contact.

With this kind of representation in Benton Harbor, you can continue to rely on high-performance Heathkit amateur radio equipment designed by hams, for hams!

**HEATH hams work to bring you**

**HEATHKIT 50-WATT CW TRANSMITTER KIT**

MODEL DX-20

$35.95

If high efficiency at low cost in a CW transmitter interests you, you should be using a DX-20! It employs a single 6DQ5A tube in the final Amplifier stage for plate power input of 50 watts. The oscillator stage is a 6CL6, and the rectifier is a 5U4GB. Single-knob band-switching is featured to cover 80, 40, 20, 15, 11 and 10 meters, and a pi network output circuit matches antenna impedances between 50 and 1000 ohms to reduce harmonic output. Designed for the novice as well as the advanced class CW operator. The transmitter is actually fun to build, even for a beginner, with complete step-by-step instructions and pictorial diagrams. All the parts are top-quality and well rated for their application. "Potted" transformers, copper-plated chassis, and ceramic switch insulation are typical. Mechanical and electrical construction is such that TVI problems are minimized. If you desire a good clean CW signal, this is the transmitter for you!

Shpg. Wt. 19 lbs.

ROGER MACE (W8MWZ)
SENIOR HAM ENGINEER
HEATH COMPANY
HEATHKIT “APACHE” HAM TRANSMITTER KIT

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

**MODEL** TX-1  **$229.50**  Shipped motor freight unless otherwise specified. $50.00 deposit required on C.O.D. orders.

Fresh out of the Heath Company laboratories, the brand-new “Apache” model TX-1 Ham Transmitter features modern styling and is designed as a handsome companion to the also-new Heathkit “Mohawk” receiver. The “Apache” is a high quality transmitter operating with 150 watt phone input and 180 watt CW input. In addition to CW and phone operation, the “Apache” features built-in switch selectable circuitry providing for single-sideband transmission through the use of a plug-in external single-sideband adapter. These Heathkit adapters will be available in the near future. A compact, stable and completely redesigned VFO provides low drift frequency control necessary for single-sideband transmission. An easy-to-read slide rule type illuminated rotating VFO dial with vernier tuning provides ample bandspread and precise frequency setting. Simple band-switching control allows flip-of-the-wrist selection of the amateur bands on 80, 40, 20, 15 and 10 meters (11 M with crystal control). The “Apache” features adjustable low level speech clipping and a low distortion modulator stage employing two of the new 6CA7/EL-34 tubes in push-pull class AB operation. Time sequence keying is provided for “chirpless” break-in CW operation.

The final amplifier is completely enclosed in a perforated aluminum shielding for greater TVI protection and transmitter stability. Cabinet comes completely preassembled with top hatch for convenient access without taking chassis out of cabinet. Die-cast aluminum knobs and front panel escutcheons add to the attractive styling of the transmitter. Pi network output coupling matches antenna impedances between 50 and 72 ohms. Incorporates all the refinements necessary with many “plus” features for effective and dependable communications. Shpg. Wt. 115 lbs.

HEATHKIT “MOHAWK” HAM RECEIVER KIT

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

**MODEL** RX-1  **$274.50**  Shipped motor freight unless otherwise specified. $50.00 deposit required on C.O.D. orders.

Outstanding results can be expected with the new “Mohawk” receiver which is designed to combine all the necessary functions required in a high quality communications receiver. A perfect companion for the Heathkit “Apache” transmitter, the “Mohawk” features the same wide-band slide rule type vernier tuning and covers all of the amateur bands from 160 through 10 meters by seven bands with an extra band calibrated to cover 6 and 2 meters using a converter. External receiver powereds accommodations are available for these converters which will be available in Heathkits soon. The “Mohawk” is specially designed for single-sideband reception with crystal controlled oscillators for upper and lower sideband selection. A completely preassembled, wired and aligned front end assures ease of assembly. All critical wiring is done for you insuring top performance. This 15-tube receiver features double conversion with IF's at 1682 kc and 50 kc. Five selectivity positions from 5 kc to 500 CPS. A bridged T-notch filter is employed for maximum heterodyne rejection. Complete accuracy is obtained with the use of a built-in 100 kc crystal calibrator and the set features 10 db signal-to-noise ratio at less than 1 microvolt input. S-meter and many other fine features built-in for top-notch signal reception. Shpg. Wt. 90 lbs.
HEATHKIT PHONE & CW TRANSMITTER KIT

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

HEATHKIT DX-100 PHONE & CW TRANSMITTER KIT

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

more fine ham gear from the pioneer

HEATHKIT GRID DIP METER KIT

A Grid Dip Meter is basically an RF Oscillator used to determine the frequency of other Oscillators, or tuned circuits. Numerous other applications such as pre-tuning, neutralization, locating parasitics, correcting TVI, adjusting antennas, designing new coils, etc. Features continuous frequency coverage from 2 MC to 250 MC, with a complete set of prewound coils, and a 500 ua panel meter. Has sensitivity control and a phone jack for listening to the "Zero-Beat" It will also double as an absorption-type wave meter. Shpg. Wt. 4 lbs.

Low frequency coil kit: Two extra plug-in coils extend frequency coverage down to 350 KC. Shpg. Wt. 1 lb. No. 34I-A $3.00

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

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

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

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

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

...in do-it-yourself electronics!
HEATHKIT VARIABLE FREQUENCY OSCILLATOR KIT

Enjoy the convenience and flexibility of VFO operation by obtaining this fine variable frequency oscillator. It covers 160-80-40-20-15-11 and 10 meters with three basic oscillator frequencies. Better than 10 volt average RF output on fundamentals. Requires 250 volts DC at 15 to 20 ma, and 6.3 VAC at 0.45 a, available on most transmitters. It features voltage regulation for frequency stability, and has illuminated frequency dial. VFO operation allows you to move out from under interference and select the portion of the band you want to use without having to be tied down to only 2 or 3 frequencies through the use of crystals. "Zero in" on the other fellows signal and return his QO on his own frequency! Shpg. Wt. 7 lbs. MODEL VF-1 $19.50

HEATHKIT REFLECTED POWER METER KIT

A necessity in every well equipped ham shack, the model AM-2 lets you check the match of the antenna transmission system, by measuring the forward and reflected power or standing wave ratio. Handles up to one kilowatt of energy on all bands from 160 to 2 meters, and may be left in the antenna system feed line at all times. Input and output impedances for 50 or 75 ohm lines. No external power required for operation. Meter indicates forward and reflected power, and standing wave ratio from 1:1 to 6:1. Shpg. Wt. 3 lbs. MODEL AM-2 $15.95

HEATHKIT BALUN COIL KIT

This convenient transmitter accessory has the capability of matching unbalanced coax lines, used on most modern transmitters, to balanced lines of either 75 or 300 ohms impedance. Design of the bifilar wound Balun Coils will enable transmitters with unbalanced output to operate into balanced transmission line, such as used with dipoles, folded dipoles or any balanced antenna system. Can be used with transmitters and Receivers without adjustment over the frequency range of 80 through 10 meters. Will handle power inputs up to 200 watts. Shpg. Wt. 4 lbs. MODEL B-1 $9.95

HEATH COMPANY
BENTON HARBOR 9, MICH. a subsidiary of Daystrom, Inc.

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address
city & state

QUAN. ITEM MODEL NO. PRICE

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

☐ Rush Free 1958 catalog.

$... enclosed. Parcel post, include postage—express orders are sent shipping charges collect. All prices quoted are Net P.O.B., Benton Harbor, Mich., and apply to Continental U.S. and Possessions only. All prices and specifications subject to change without notice.
Electronic engineering and research have made possible totally new techniques in miniaturization—the art of getting the most into the least amount of space. Mallory has helped pioneer this field.

With miniaturization comes the necessity of getting maximum reliability into compact assemblies—not only for dependable performance, but because these compact assemblies don't always lend themselves to easy maintenance.

Instruments—that new receiver—a personal BC portable—or civil defense gear—may be an example of how miniaturization can deliver more performance in less space.

Whether you buy or build equipment—for work or for play—you can count on the contributions Mallory has made to the state of the art. Tiny Mallory TT, TAP, TAW and TNT capacitors—miniature Mallory-developed Mercury Batteries—special transistor-taper controls—and many other developments assure maximum dependability for a weekend of rag chews, relaxation or emergency communications.

See your Mallory Distributor for all your component needs.
Field Engineering with a Future!

Ed Doherr's imagination and quick action probably saved the life of the Air Force pilot in the story at right.

Today, as a Raytheon executive, Ed (W1EEE) still keeps in touch with the activities of Raytheon field engineers in remote parts of the world with the help of a potent kw heard almost nightly on the low end of twenty.

Field engineering experience has helped many Raytheon engineers to become executives. As activities are expanded, field engineers have the opportunity to qualify for new key positions.

Requirements: field experience plus an EE degree or the equivalent in practical experience with air or ground radar, missiles, microwave or sonar. Benefits: attractive salary, relocation assistance, insurance, educational programs, etc.

The story of the coat hanger that saved a jet pilot

It happened during an H-bomb test near Eniwetok.

Air Force planes had to be at exact altitudes and distances before shot time. A special radar system permitted personnel of the command ship to identify each aircraft and check its position on the radar scopes.

The shot went off as planned, but when the shock wave hit the ship, it knocked out the special radar antenna high on the mast.

The Raytheon Field Engineer* on board went into action. He quickly fashioned an emergency antenna from a metal coat hanger, climbed the mast, and taped the antenna in place.

With the system working again, it was discovered that one pilot was flying in the reverse direction—out to sea. An Air Force officer reported that the prompt restoration of the special radar undoubtedly made it possible to save this pilot and his plane.

Raytheon Field Engineers work with the Armed Forces to keep electronic equipment in top operating condition. Their skills are another reason why Raytheon has earned its reputation for “Excellence in Electronics”.

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HAM EQUIPMENT
.... GET
Henry's DEAL

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HQ110 • 20 monthly payment $11.30.
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Designed all the way with the amateur
in mind. Smart, modern receiver packed
with all the features an amateur wants.
Clock timer $10.00 extra.

HENRY HAS THESE HAMMARLUND ITEMS
IN STOCK FOR IMMEDIATE SHIPMENT
HQ160 RECEIVER ............... $379.00
HQ100 RECEIVER .................. 169.00
MATCHING SPEAKER ............. 14.95
CLOCK TIMER .................. 10.00

Complete stock of all transmitters, receive-
ers, antennas, rotators, towers, parts, accessories, equipment. Henry has
ALL the new equipment first.

Nets: ILN, 3515 ke., Mon. through Sat. at 7 p.m. The
Hamfesteis Radio Club station (Chicago) has now been
assigned the call W9AA. Cy Reed, past-president, had
requested that this be done and the club accepted it
in his honor. The ILN wants more down-state stations
to check into the net. What say, gang? K9LFU's XYL is
sweating out her Technician Class exam and in the mean-
time planning free curtains for the Club's shack. K9F JX
gets a new piano when her General Class ticket
arrives. K9GAU is sporting a new dual band quad. DRN
is on 2 meters, 2 meters. HON has a new mode for
K9JRJ is now General Class getting ready for DX-clas-
ing. RA has been appointed RO for the combined Belle-
ville, East St. Louis and St. Clair County ARC.
Communications Center. SW1A is now K9MMW, TZN reports
that because of a torn hand ligament his traffic total is
eddied up to 30. New Nomists heard in the Chicago area
are K9NE, MDF, MDF, MDL, MDM and MKA. A new
DXCC members is ICF with 100 QSLs on 10-meter phone. MAA reports that the ILN on its sessions handled
518 messages, and GSW states the North Central Phone
Net total was 590, CZB became the proud holder of a
collar on May 6. The SWANI Club has restored its
popular transmitter hunts. By the time this report is
printed the Springfield and Sangamon County RACES
program will be in full force with 6-meter Communi-
cators. The May 5 Practice Alert saw many RACES
organizations operating en masse and from all reports the
results were gratifying. There were too many letters re-
curred by your SCM to make a listing of their operations.
The Joliet Ham Club has a new $600-watt transmitter
and a cost of only $2.95. New appointments are: K9NH as
9CM. K9KII, and K9DGQ as ORSs. ILVQ
spoke at the May 23 Hamfesteis (Chicago) meeting. The
League's Board approved the application of the St. Louis
Amateur Radio Club, Inc., and also the Ottawa Radio
Club, Inc., as duly affiliated societies. The downstate
gang was active with the tornado that struck near Belle-
ville on May 3. ESD received his WAZ by receiving
JTIA's QSL, Mr. and Mrs. Carl Mosley (of the hear
that bears his name) were guests of the Hamfesteis Radio
Club during the regular May meeting. UQT is back on
the air with a lot of power and says that the signal reports
are great. NHI and NGG are celebrating their 35th year
of hamming. Congratulations, fellows. K9IZG soon will
be leaving for the land of the WAS. K9JL, K9CMZ and
K9GUB are the new officers of the Chicago Amateur
Radio League, Inc. K9NJLD, NCS of the Reg-
onal Ncuse Nc., is in need of members in the northern
part of the State, and also is asking each member to get
two new members to help enlarge the net roster. KQL and
1YP have gone mobile on 6 meters with home-brew
transmitters. Transfser: (May) W9DO 112, W9GGQ 2
ERJ 389, W9MAK 341, FAW 253, PCQ 151, CWS 69,
NN 4, PHN 3, PDQ 1. (Apr.) K9GSR 374. K9GJS 29,
K9GUS 1, W9CEF 1 (Mar.) K9GJS 32.

SCM: Seth Lee Harker. BNTA: SEC: CMT. RAMS: B8K
K9JY, SWD and UXK. RAMS: DGA. JOZ and KT,
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NOW, HENRY DARES TO GIVE YOU THE ABOVE GUARANTEE...Try any receiver or transmitter for 10 days. If you are not perfectly satisfied, return it and all you pay are shipping costs.

**Collins**

**KWM-1 Mobile Transceiver**


- **KWM-1 Net Price**: $820.00
- **75A-4 Net Price, complete with Gear Reduction Tuning Knob, 3.1 kc Mechanical Filter, and tubes**: $695.00
- **KWS-1 Net Price**: $2,095.00

Complete stock of all transmitters, receivers, antennas, rotators, towers, parts, accessories, equipment. Henry has ALL the new equipment first.

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“I am now using the Gotham V80 vertical antenna with only 55 watts, and I am getting fantastic reports from all over the world”. VP1SD

**ALL-BAND VERTICAL ANTENNAS**

GOTHAM’s sensational new vertical antennas give unsurpassed multi-band performance. Each antenna can be assembled in less than two minutes, and requires no special tools or electronic equipment. In the V160, resonance in the 160, 80, 75, and 40 meter bands is secured through use of the proper portion of the loading coil. Yet, when the coil is eliminated or bypassed, the V160 will operate on 20, 15, 10 and 6 meters! The same idea applies to our V80 and V40 multi-band verticals. No guy wires needed; rugged, occupies little space, proven and tested.

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

**QUALITY MATERIAL**

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

**ALL-BAND OPERATION**

Switch from one band to another. Operate anywhere from 6 to 160 meters. Work the DX on whatever band is open.

**EASY ASSEMBLY**

Less than two minutes is all you need to put your vertical together. No special tools or electronic equipment required. Full instructions given.

**SIMPLE INSTALLATION**

Goes almost anywhere. On the ground, on the roof, or outside your window.

**AMAZING PERFORMANCE**

Hundreds of reports of exceptional DX operation on both low and high power. You will work wonders with a Gotham vertical.

**PROVEN DESIGN**

Over a thousand Gotham verticals are on the air—working the world and proving the superiority of Gotham design.

**AND THE PRICE IS RIGHT!**

“I worked LU3ZS on Half Moon Island in Antarctica on Dec. 26 at 21150 Kc. I was using my Gotham V80 vertical antenna and only 55 watts.” KN5GLI

**HOW TO ORDER.** Send check or money order directly to Gotham or visit your local distributor. Immediate shipment by Railway Express, charges collect. Foreign orders accepted.

**WORK THE WORLD**

GOTHAM 1805 PURDY AVENUE MIAMI BEACH 39, FLA.
10% PRICE SLASH!

YOU COULD WORK WONDERS IF YOU HAD A GOTHAM BEAM!

Study these specifications — compare them — and you too will agree, along with thousands of hams, that GOTHAM beams are of the best!

TYPE OF BEAM. All GOTHAM beams are of the full half-wave plunger's delight type; i.e., all metal and grounded at the center. No wood, tuning stubs, baluns, coils, or any other devices are used.

MORE DX CONTACTS

THOUSANDS IN DAILY USE

GAIN. GOTHAM beams give the maximum gain obtainable. Our 2 element beams give a power gain of four (equivalent to 6 db.); our 3-element beams give a power gain of seven (8.1 db.); and our 4-element beams give a power gain of nine (9.6 db.)

CONSISTENT PERFORMANCE

YOU WILL WORK THE WORLD

STANDARD AND DELUXE BEAMS. Standard beams in the 6, 10 and 15 meter bands use 1/2" and 3/4" tubing elements; the deluxe models for these bands use 3/4" and 1". In 20 meter beams, the standard has a single boom, while the deluxe uses twin booms.

TRIBANDER BEAMS

2 METER BEAMS

6-10  TWO BANDER ................................................. $29.95
10-15 TWO BANDER ................................................. 49.95

10 METER BEAMS

6-10  TWO BANDER ................................................. $29.95
10-15 TWO BANDER ................................................. 34.95
10-20 TWO BANDER ................................................. 36.95
15-20 TWO BANDER ................................................. 38.95

15 METER BEAMS

6-10  TWO BANDER ................................................. $29.95
10-15 TWO BANDER ................................................. 34.95
10-20 TWO BANDER ................................................. 36.95
15-20 TWO BANDER ................................................. 38.95

T RIBANDER BEAMS

6-10-15 TRIBANDER .................................................. $39.95
10-15-20 TRIBANDER ................................................ 49.95

NEU! RUGGEDIZED HI-GAIN 6, 10, 15 METER BEAMS

Each has a TWIN boom, extra heavy beam mount castings, extra hardware and everything needed. Guaranteed high gain, simple installation and all-weather resistant. For 52, 72 or 300 ohm transmission line. Specify which transmission line you will use.

TWO BANDER BEAMS

10-15 TWO BANDER ................................................. $38.95
10-20 TWO BANDER ................................................. 34.95
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20 METER BEAMS

6-10  TWO BANDER ................................................. $29.95
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Each Two Banders has twin 12' booms, and full-size half-wave elements. 1/2" and 3/4" aluminum alloy tubing, all castings and fittings are supplied. Assembly is easy.

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**100 FOOT VERTICAL ANTENNA (OR BEAM MAST) IN YOUR CAR TRUNK!**

Just the thing for vacation or field day portable — but rugged enough for year round dependable service in the worst weather!

Heavy duty Signal Corps AB-85 Mast Sections, at a fraction of their original cost. Each 3 feet long, 1 1/2" diameter, with 7/8" thick wall. Made of highest tension light-weight aluminum alloy. Only 34 ounces. Bonded olive drab finish. Precision telescoping joints 6 inches long give sturdy rigidity. Four heavy integrated fittings for positive contact.

A cinch to run up, a section at a time — and just as easy to take down! 40 section, 100 foot vertical radiators are giving excellent service in commercial installations. (For a rugged high Q vertical, use an insulated base and "Glas-Line" or nylon guys, or wire guys broken with egg strain insulators.) 18 sections, guyed every 15 feet, have been holding a heavy 75-Meter transceiver using a ground-plane antenna 75 MPH winds for more than a year!

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- Flat guy rings 4 for 88c
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- Roller bearing guy rings.
- For easy rotation of mast and beam... $2.97
  - Thimbles for guys...
  - 4 for 29c
- Glas-Line, per 100 feet...
  - $2.89
- Heavy 7x17 high tensile strength 1/8" wall. wire. Per 100 feet $2.63

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Come on in, or order by mail for fast service ($3 minimum, please)

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Special heavy automatic model, $8 per VHF array, up to 15-20 mini and loaded beams, AR-22—$31.17

(4 wire cable—$3.25 per 100)

**Guy wire clamps**

- 6 for 98c
- Egg strain insulators
- 7 for 98c
- Rotary screw earth anchors (Deadman)

Universal mounting base. For flat, sloping or slope to peak. $1.45 per insulator for base. Heavy ceramic, glazed, 5/8" high. (Or, use a Coke bottle)

**Ohio**

120 SOUTH DAKOTA—SCM. Les Price, WEFPL—The following was sent in by SCT: The Prairie Dog Duc operated its emergency truck at Centerville during the 75-Meter Jubilee with the 185 Cub. Operators were K9GDF, K9JQW, K9OIJ, K9MF, K9AK and K9OAI. Several Texas contacts on 50 Me. The WVRA station now using a ground-plane antenna, K9GDF is busy with traffic. Nine daily skeds keep K9GDF busy with traffic. K9MJ is back on. K9LQ is the new net control on the 75-Meter Phone Net. K90Z is a new net control on the 75-Meter Phone Net. K9NOL is a new Novice in Jamestown. K9PN and K9FPO (OM and XYL) are new pals in Devils Lake. Traffic: (May) W9CNY 124, K9GDF 744, ELT 302, W9DYG 60, STA 16, K9HT 31, AEQ 29, W9FXA 21, VHF 11, K9LI 10, RTP 9, 10, VCH 9, K9CL 8, WMRP 9, 7, K9OQ 5, WM9WQ 6, K9GSC 4, CEP 3, W9QIL 2, SIZ 2, (Apr.) K9AEQ 65.

**DAKOTA DIVISION**

**NORTH DAKOTA—**Acting SCM. Arnold L. Oehler, W9CWE—H.V.F. and PHC did a good job at the radio controls for RACES participation in Operation Alert 1958. K9PMA has moved to Bismarck for the summer. K9ICZ is going into the Army in July, using his 75-Meter transceiver as a ground-plane antenna. K9ICZ is a new net control on the 75-Meter Phone Net. K9NOL is a new Novice in Jamestown, K9PN and K9FPO (OM and XYL) are new pals in Devils Lake. Traffic: (May) W9CNY 124, K9GDF 744, ELT 302, W9DYG 60, STA 16, K9HT 31, AEQ 29, W9FXA 21, VHF 11, K9LI 10, RTP 9, 10, VCH 9, K9CL 8, WMRP 9, 7, K9OQ 5, WM9WQ 6, K9GSC 4, CEP 3, W9QIL 2, SIZ 2, (Apr.) K9AEQ 65.

**SOUTH DAKOTA—**SCM. Les Price, WEFPL—The following was sent in by SCT: The Prairie Dog Duc operated its emergency truck at Centerville during the 75-Meter Jubilee with the 185 Cub. Operators were K9GDF, K9JQW, K9OIJ, K9MF, K9AK and K9OAI. Several Texas contacts on 50 Me. The WVRA station now using a ground-plane antenna, K9GDF is busy with traffic. Nine daily skeds keep K9GDF busy with traffic. K9MJ is back on. K9LQ is the new net control on the 75-Meter Phone Net. K9NOL is a new Novice in Jamestown. K9PN and K9FPO (OM and XYL) are new pals in Devils Lake. Traffic: (May) W9CNY 124, K9GDF 744, ELT 302, W9DYG 60, STA 16, K9HT 31, AEQ 29, W9FXA 21, VHF 11, K9LI 10, RTP 9, 10, VCH 9, K9CL 8, WMRP 9, 7, K9OQ 5, WM9WQ 6, K9GSC 4, CEP 3, W9QIL 2, SIZ 2, (Apr.) K9AEQ 65.
Want to turn your present receiver into the sharpest, slickest, SSB/CW, AM/MCW job, one which can hold its own with the very best of them? Just plug this new HC-10 Converter into the 450 to 500 KC IF output tube socket, and connect your speaker! It has T-slot filter, vernier passband tuning, noise limiter/squelch, linear product detector, stable BFO, adjustable decay AVC, IF amplifier, internal power supply, etc., to add every modern feature to your receiver. Uses 10 tubes.

TRY ONE, and you'll be convinced! It's well worth the $149 investment. Especially when you can get it for only $27.56 down, and 12 monthly payment of $11, which includes all carrying cost.

Even less, if you trade in and down payment is more than $25 and the low carrying cost!

With control clock, $10 more. Matching speaker — $14.95.

The STAR PERFORMER that has everything. Covers frequency range of 540 KCS to 31 MCS. Dual conversion with calibrated Ham bandspread. Built in notch filter. Q Multiplier. Crystal calibrator. This receiver, reflecting Hammarlund's finest engineering design and production skills, can be yours today for only $36 down and $27 a month. Matching speaker—$14.95.

FOR QUICKEST DELIVERY — send me your order right now! A deposit of only $5 will start fast action. If you have a trade-in, tell me about it so I can give you the very highest allowance. Mention the approximate terms you would like, and give employment and credit references. Prompt, safe shipment to most anywhere in the world, or, you can "Come and get it!" and take it safely home with you.

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103
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The total power in output watts is not exceeded.

That two simultaneous voltages may be used, if center tapped output windings are provided.

Type No. | D.C. Volts | D.C. Ma.| Max. | Watts | Net Price
---------|------------|--------|------|-------|----------
TY-68S   | 250        | 65     | 16%  |       | $8.34    |
TY-69S   | 300        | 100    | 30%  |       | $11.40   |
TY-70S   | 325        | 150    | 48%  |       | $11.40   |
TY-71S   | 375        | 200    | 75%  |       | $12.30   |
TY-74S   | 600        | 120    | 100% |       | $15.00   |

Center tap output windings provide half voltage at full rated current, high side full voltage at half current.

POWER TRANSFORMERS FOR 12-VOLT TRANSISTOR POWER SUPPLIES

Center tapped output windings are provided so that two simultaneous voltages may be used, if the total power in output watts is not exceeded. Especially designed for mobile transistorized power supplies, these new transformers permit an efficiency of 80 to 85% in the entire power supply.

Available now from your Triad Distributor. Ask him for special bulletin giving schematic and specifications or write direct to Triad for this information.

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QST for...
for the final proof of operating excellence . . . compare on the air!

THESE GREAT SERIES OF

Hy-Gain trap tribanders

the FULL-SIZE trap tribanders

the NEW mini-tribanders

the 3-element trap tribander

The 3-element Tribander shown above is now considered as the standard of performance in the field of amateur communications. F/B Ratio: approx. 25 db. Forward gain: 8 db. average.

the 2-element trap tribander

For use in limited space when top quality transmission is desired on 10, 15 & 20M. Single transmission line. F/B Ratio: approx. 18 db. Forward gain: 5.8 db. average.

the 5-element trap tribander


the 3-element mini-tribander

Extremely lightweight, only 23.8 lbs. Turning radius: 19"/10". Installable almost anywhere, yet boasting many features of the full-size line. Hy-Gain top utility performance guaranteed.

the 2-element mini-tribander

Practically a featherweight — only 33.8 lbs., easily one-man installed in the shortest possible time and nearly anywhere. Turning radius: 12'/11". Top features at minimum cost.

Here's the smallest practical size consistent with efficient operation, to which the trap tribanders may be reduced. Install in the smallest city lots. Light weight & rotatable by most TV rotators. Factory pre-tuned, with dimensions given for quick, easy assembly in a matter of minutes.

Perfect 1:1 SWR is made possible by the new, pre-calibrated Triaxial Gamma Match System with coaxially formed reactance cancelling capacitor built in. Exceptional band width maintains low SWR over entire bands. Split insulated dipole feed with coaxial choke results in SWR of less than 2:1 on all bands. No adjustments needed simply attach 52 ohm feeding to dipole terminals. Heavy 12 ga. hot dipped galvanized steel channel construction. Insulated U-bolts support Hy-Gain's driven element. Compare this construction with the flimsy supports using self-tapping metal screws.

The automatic switch action of the Insu-Traps is employed in both series of tribanders. They act as insulators at their resonating frequencies, but allow radio energies of other frequencies to pass, isolating various sections of the antennas. Mechanically and electrically stable, the traps are hermetically sealed at the factory in polyethylene cover and cap, completely weatherproof. Hi-Q coils wound on styron form. Guaranteed for the life of the beam. The Mini-Tribander Traps are specially weight-designed for wind loading efficiency.

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BETTER STILL, COME IN - PLENTY OF PARKING SPACE

on a two-week vacation from Fort. Worth. Some of the
calls you might hear on Sun. mornings around 2050
ke. may be GAD, J3K, KADMN, VSQ, K5K, K5G,
and even FMO. K5GHD heard W6. W2, W7 and
W8 on 6 meters May 22. Traffic: W5CEZ 445, K4AGJ
15, W5MGNO 11, VAV 6.

MISSISSIPPI—SCM. John Adrian Houston, et.,
W5EHJI—The Biloxi ARC held a picnic on the beach
in Biloxi Fri. night May 6. Lighting was provided by
the gasoline-powered generators by the club
president, SPX. New members are DZZ, R2G, USK,
VTI. YEN, W2KOAJ and Michael Lehrman, 12, not yet
licensed. The Biloxi ARC operated two stations from
the V.A. center on Armed Forces Day, The equipment
was furnished by 1000. SPX, KN5LGB and KN5PFX.
The stations operated under the call signs KG5J and
KG5MA and handled 150 messages. Others assisting were
ADF, TDU, I8V, BIV, TRF and ex-QXV. The Biloxi ARC
will hold a hamfest Aug. 23 and 24. A new prize, the
is the new net urge for MIFEN. NIU is the new
secretary. The net time has been changed to 7 p.m. CST.
The Cleveland ARC is looking forward to a large turn-
out at the hamfest Aug. 23 and 24. First prize is fi
TDU, 1SV, RWV, TR.F and ex-QYX. The Biloxi ARC
handled 130 messages. Others assisting were AFD,
Biloxi. For information contact John F. Jackson, 2307 Miller St., Biloxi, KoIHQ

guages from the hard way with 250 origlmtions
again and on the air from McMinnville. Congratula-
tions to BPL winnera PL, 5RCF, WQT and K40NQ.

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CAME TOWER, INC.

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FOR STRENGTH & STABILITY --

GUARANTEED

TO WITHSTAND

80 MPH WINDS

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on a two-week vacation from Fort. Worth. Some of the
calls you might hear on Sun. mornings around 2050
ke. may be GAD, J3K, KADMN, VSQ, K5K, K5G,
and even FMO. K5GHD heard W6. W2, W7 and
W8 on 6 meters May 22. Traffic: W5CEZ 445, K4AGJ
15, W5MGNO 11, VAV 6.
NEW GONSET

GSB-100 TRANSMITTER

Introducing Gonset's big SSB value, the GSB-100.
Completely self-contained with highly stable VFO and power supply, for operation on amateur 80, 40, 20, 15, 11 and 10 meter bands.

Amateur Net . . . . $439.50

- Power input of 100 watts P.E.P.
- Operates on SSB with selectable sidebands.
- Operates also on AM, phase modulation or CW. Keying characteristics are excellent.
- Transmits both sidebands when on AM...avoids thereby, distortion present when carrier-and-one-sideband signals, at high modulation percentages, are received on conventional AM receiver.
- Frequency control is by fixed quartz crystal and exceptionally stable VFO*. Precise tuning is assured by dial assembly having gear ratio of 100:1.

- New Gonset FILTER-PHASING network gives excellent sideband rejection—quartz crystal band-elimination filter gives more than 60 db carrier suppression, avoids entirely all critical carrier balancing.
- Frequency coverage is full 600 kcs. over all amateur bands, 80 through 10 meters.
- Excellent voice operated control system (VOX). Biasing voltage is available for cut-off of external linear amplifier when receiving.

GSB-100 Transmitter. . . . . . Model #3233

*11 meters and CW portion of 10 meter band covered by separate crystals not supplied.

SSB LINEAR AMPLIFIER

New grounded grid linear amplifier is rated at 1000 watts peak input power. It is designed to operate with GSB-100, or similar SSB transmitters supplying 75-100 watts peak power drive. Amplifier is self-contained, includes power supply, pi-network output, antenna changeover relay. Provides bandswitched operation on 80, 40, 20, 15, 11 and 10 meters. Attractively styled. Same size cabinet and general appearance as GSB-100 Transmitter.

Model #3262

See them at booths #3 and #4, ARRL 10th National Amateur Radio Convention, Sheraton Park Hotel, Washington, D. C., August 15, 16 and 17
get a MOSLEY TRAPMASTER MODEL V-3 VERTICAL for 10-15-20M Rated to a full KW—with ease

- Low SWR
- Automatic Band-switching
- Weatherproof Traps
- No Tuning or Adjusting
- 61ST6 Aluminum
- Weight 4 pounds

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Hudson Division

EASTERN NEW YORK—SCM, George W. Tracey

(Continued on page 110)
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Model 50
6 Meters

Model 144
2 Meters

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For AMATEURS—EXPERIMENTERS 1500 KC to 50 MC

Wire mounted, plated crystals for use by amateurs and experimenters where tolerances of .01% are permissible and wide range temperatures are not encountered.

CIRCUIT: Designed to operate into a load capacitance of 32 mmf on the fundamental between 1500 KC and 15 MC. Designed to operate at anti-resonance on 3rd overtone modes into grid circuit without additional capacitance load. 5th overtone crystals designed to operate at series resonance. (Write for recommended circuits)

Prices
Pin Diameter .093*
Pin Spacing .486
(FA-9 Fits Some Socket as FT-243)

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>TOLERANCE</th>
<th>PRICE</th>
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<tbody>
<tr>
<td>1500-1799 KC</td>
<td>.01%</td>
<td>$4.50</td>
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<tr>
<td>1800-1999 KC</td>
<td>.01%</td>
<td>4.00</td>
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<tr>
<td>2000-9999 KC</td>
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<tr>
<td>10000-15000 KC</td>
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<td>4.00</td>
</tr>
<tr>
<td>Overtone Crystals—3rd Overtone Operation</td>
<td>.01%</td>
<td>$3.00</td>
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<tr>
<td>15 MC-29.99 MC</td>
<td>.01%</td>
<td>3.00</td>
</tr>
<tr>
<td>30 MC-54 MC</td>
<td>.01%</td>
<td>4.00</td>
</tr>
<tr>
<td>Overtone Crystals—5th Overtone Operation</td>
<td>.01%</td>
<td>4.50</td>
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Overtone Crystals—5th Overtone Operation

| 55 MC-75 MC     | .01%      | 6.50  |
| 76 MC-90 MC     | .01%      | 6.50  |

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NOTE: The FA units will not necessarily have the correct correlation for Commercial use. For commercial applications, the F-6 type unit should be used. Write for details!

One Day Service! Specify exact frequency and crystal will be calibrated to .01% or better of this frequency, when operated in the specified operating circuit.

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Rated to 300W

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- Weatherproof Traps
- No Tuning or Adjusting
- 61ST6 Aluminum
- Weight 2 pounds

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$17.95

US 80's TRAPMASTER
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FOR 10-15-20M
will get you out
Rated to 300W

- Low SWR
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All the best features of the finest SSB converters, plus the best features of the finest amateur receivers wrapped up in a single, outstanding receiver. Covers the 6, 10, 15, 20, 40, 80 and 160 meter amateur bands. Separate vernier tuning. Dual and triple conversion 17-tube superheterodyne. Adjustable 60 db notch filter. IF passband tuning. Adjustable AVC.

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$359.00*

HQ-160
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Compared with receivers costing hundreds of dollars more! Dual conversion, 540 KCS to 31 MCS. SSB. Q-multiplier. Electrical bandspread. Separate stabilized BFO. Crystal-controlled 2nd IF. Crystal calibrator. Adjustable 60 db notch filter. 13-tube superheterodyne.

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Dual conversion, 12-tube superheterodyne. Full coverage of 6, 10, 15, 20, 40, 80 and 160 meter amateur bands. Built-in crystal calibrator. Q-multiplier. Separate linear detector for SSB and CW. Separate stabilized BFO. Crystal-controlled 2nd conversion oscillator. The set that revolutionized the amateur receiver market!

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The hottest, fastest-selling general coverage receiver on the market! Continuous tuning from 540 KCS to 30 MCS. Electrical bandspread tuning. Q multiplier for continuously variable selectivity, 10-tube superheterodyne with automatic noise limiter.

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NF. 5 db. Sensitivity; 1/2 uv. Will give 10 db. or better signal-to-noise ratio. Mod. 400 cps. 30% Image rejection - 50 db. or better. With 14-18 mc. IF output... $69.50

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144 MC.
NF. 4 db. Sensitivity; 1/2 uv. 30% mod. 400 cps. Will give 10 db. signal-to-noise ratio. Image rejection - 50 db. or better. With 14-18 mc. IF output... $69.50

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For Every Ham Requirement... the complete line... More "Workable" Watts" per Dollar!

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Complete, Bandswitching 16-160M
W/T: $195.00
Kit: $115.00

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60M
70w CW, 60w AM
2M
60w CW, 50w AM
W/T: $195.00
Kit: $115.00
Regulated screen supply. 4-stage RF section. Multicore exciting. VFO! 3-stage RF section. pin-diode speech clipping. Inverse feedback. Ceramic switches throughout. Narrow bandwidth. Forward Look.

Globe's VOX Model 10
For voice operated control, with extra contacts for auxiliary circuits. Plug in socket at rear of DBS Xmitter. Adjustable for other Xmitters.
W/T: $24.95
Kit: $19.95

VFO 755A
160-10 Meters
W/T: $99.95
Kit: $49.95

VFO 6-2
W/T: $99.95
Kit: $49.95

For 10-160M output on 60 & 160M. Verrier drive with short matching feature. Self-contained, well-filtered power supply with voltage regulation.

Model 666 for 6M, w/t only. $49.95

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Use with Xmitter, up to 70w inputs for swamping drive to linear amplifiers. Three power reduction positions. coax input and output.
W/T: $10.95

Antenna Tuner with VSWR Bridge
Globe Matcher Sr.
W/T: $79.50
Kit: $59.50

Shielded Cabinet
W/T: $99.50
Kit: $69.50

Regulated screen supply. 4-stage RF section. Multicore exciting. VFO. 3-stage RF section. pin-diode speech clipping. Inverse feedback. Ceramic switches throughout. Narrow bandwidth. Forward Look.

Globe's FEP DBS Input, Suppressed Carrier
40w AM, 50w CW
Sidebander DSB-100
W/T: $139.95
Kit: $115.95

Complete transmitter, bandswitching 60-105M. Min. 33db carrier suppression. 3-stage RF section. pin-diode speech clipping. Inverse feedback. Ceramic switches throughout. Narrow bandwidth. Forward Look.

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W/T: $124.50
Kit: $99.50

Complete with well-filtered power supply. 300w input AM | Class B 200w | DC or 400w PEP | Input Class B | Linear 150w or CLASS C 100w. 80-1027 MHz | 8kW AM | or 120w PEP | Input Class C 80-1027 MHz | 120W PEP 29K tuned, 3-section RF-MA, 2-section RF-MA, 2-section RF-MA, Xmitter TVI-supplied.

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W/T: $59.95
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W/T: $39.95
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6 Meter Converter
Completely stable, crystal converter for receiving tuning frequencies 1014mc. Insert between outputs for pass coupling, shielded input and output. Crystal for 10-14mc supplied.

W/T: $11.95

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AMATEUR RADIO EQUIPMENT...
HQ-170 — Hammarlund's great new communications receiver that combines the most desirable features of the best amateur receivers with the finest of SSB/CW and AM/MCW converters. Just a few of its many outstanding features: 17-tube superhet, dual and triple conversion, 6-10-15-20-40-80-160 meter bands, separate vernier tuning, 60 adjustable notch filter, 100 KCS crystal calibrator, selectable upper, lower or both sidebands, fast attack AVC — plus much more. $399.00 NET

HQ-160 — Tops in performance, tuning and dependability! Covers continuously the frequency range of 540 KCS to 31 MCS. 13-tube dual conversion superhet receiver with 14 tuned circuits in the IF — crystal controlled. $249.00 NET


MATCHING ACCESSORIES

TELECHRON CLOCK-TIMER — Combination clock and automatic timer. Meet pre-arranged schedules with a warmed-up receiver. Space for clock-timer automatically stabilized BFO — separate linear detector — dual conversion 12-tube superheterodyne. therapist stabilized BFO — separate linear detector — dual and automatic timer. Meet pre-arranged schedules. $249.00 NET

TELECHRON CLOCK-TIMER — Combination dock stabillity, $189.00 NET with a warmed-up receiver. Space for clock-timer high, 9 3/4 wide, 7" deep... $14.95 NET

5 MATCHING SPEAKER — Extended range, 8-watt capacity. House in attractive metal cabinet. 90% high, 95% wide, 7" deep. $14.95 NET

5 MATCHING ACCESSORIES

TELECHRON CLOCK-TIMER — Combination dock stabillity, $189.00 NET with a warmed-up receiver. Space for clock-timer high, 9 3/4 wide, 7" deep... $14.95 NET

5 MATCHING SPEAKER — Extended range, 8-watt capacity. House in attractive metal cabinet. 90% high, 95% wide, 7" deep. $14.95 NET

5 MATCHING ACCESSORIES

Write today for your free copy of Burghardt's newest catalog!
NEW MULTI-BAND ANTENNA COILS

New Plug-in type coils for the Ham, designed to operate with a standard 3'
base section and standard 5' whip

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THE VICTORY

- Rigidly tested &
  engineered—found to
  have "Q" of 525
- Handles 500 Watts input
- Operates into a 52-ohm
cable
- Positive contact—
  noiseless troublefree
  operation
- Weathersealed
- Factory pre-tuned—no
  adjustments needed

No. 900
10-15-20
METERS

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Amateur Net
$14.95

Now! 2 New Coils... just plug in and presto! your
coil is ready for operation on the desired band! No
switches, no sliding contacts, no loose connections,
Built and pre-factory tested in Master Mobile's own
laboratories.

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Design and Manufacturing
of Mobile Communication
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MOBILE SPRINGS

PROTECTS YOUR
MOBILE ANTENNA

Heavy duty flex-
able mounting
spring mounts on
the base and holds
the antenna. Spe-
cial flexible
"give" spring
prevents sharp im-
pacts and break-
age. Lockwashers
included.

MMW-7 Cad. plated, black painted ends $4.50
MMW-7HC Heavy Cad. plated—
Extra Protection ................. $5.50
MMW-7SS Deluxe Stain. Steel........ $8.95

No. 321
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Swivel base body mount,
less spring. Specially
constructed diecast ball
joint for maximum
strength. Amateur Net
$7.95

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This SSB Receiver offers
all the proven Collins features — excellent
image rejection through double conversion,
precise dial calibration and high stability
of Collins VFO and crystal controlled first
oscillator, and the ideal selectivity
of Collins Mechanical Filter in the IF strip.
Net price $95.00

COLLINS KWS-I
Companion transmitter to
the 75A-4. Unmatched
performance in minimum
space for a kilowatt. Ex-
tremely accurate 70E VFO,
Pi-L output network and
Mechanical Filter.
Net price $2,095.00.

COLLINS KWM-I
The first mobile SSB trans-
ceiver in the Amateur field — 175 watts PEP, 14-30
me. Fixed station use
without modification.
Net price $820.00

Time Payments Arranged at Low Cost
Through Our Local Bank on Purchases
of $100.00 Net and Over

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Tel. Victor 2-8350
Ward J. Hinkle, Owner

12, W5VEA 13, VYJ 12, K1EQ 10, W1JJO 9, KDW 8, URC 6, AFQ 4, OCU 4, W3R 3.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Victor L. Crawford, WITYQ — COR, RM; KYQ, PAM; WINE, FEPH. Traffic
Nets: CPN, Sun.-Sat. 1800, Sun. 1000 on 3580 kc; CN, Mon.-Sat. 2145 and 2130 on 3460 kc;
CVN, Mon., Wed. and Fri. 2300 on 29.9 kc, CN, Mon. and Wed. on 3460 kc, AW and YBH made BPL, RM KYQ
reports that CN handled 421 messages, including 153 on the second session, during 27 sessions with an
average of 12 stations per session, High QNI goes to
AW, GYK and KYQ. K1AJJ is trying for a 40-meter
WAS. K1BEB made WAC on phone. The CQRC held
four meetings on 2 meters with an average attendance
of 10. KN1BMM dropped the “N,” FYF was off the
air three weeks with transmitter trouble. DHP has 19
states toward WAS. MWB has a new amplifier using
100s. KN1DMA, KN1CYU and KN1EJB passed the
General Class exam. V.H.F. PAM FHP advises that
CVN handled 17 messages during 13 sessions with an
average attendance of 9. High QNI was FHP II, FYF
10, KN1DZI and K1BMM 9. FIN has 45 states con-
firmed on 6 meters. He needs New Hampshire, Vermont
and Maine for WAS. RLD attended IBM school at
Endicott. N. V. FJ is busy gardening. PAM reports that
CPN handled 215 messages during 31 ses-
sions with an average daily attendance of 28. QNI honors go to DAV, DHP, FYF and
and SH 30, K1BEB 28, KN1DZI 27, ZQO 26, YBH as PAM; EBW, EFR, ECH and
FHP as OPS; ACH, ECH and TYQ as ORS. Reports
received: OES from K1BML, K1CKZ, K1AHS, MWB, FYF, QJM 41, KLK 58, FHP 50, K1DLM 49, V1Y 23, LXV 18, KAM 16, HJ 16, MDB 14, KN1AM 12,
W1NH 11, ECH 10, AV 7, QJM 5, K1DLM 4, K1BML 2. (Apr.) W1XO 3.

MAINE—SOM. John F. Brown, W1JEO—SEC: QJA,
PAM; FYF, VILK as PAM; FYF, W1EXO 2. (Apr.)
W1FVE 2.

(Continued on page 118)
PENTA BEAM PENTODES

for higher power and better linearity at lower plate voltages

Here are your tubes for linear amplifier service—higher power output at lower plate voltages with minimum distortion. The PL-6549 and its zero-suppressor-voltage version, the PL-177A, are for 50- to 200-watt peak output service. The PL-172, a 1000-watt type, features the exclusive Penta vane-type suppressor grid which makes possible extra efficiency and linearity. The new PL-175, a 400-watt tube, also has the vane-type suppressor grid, and gives 25 to 30 per cent more output in Class AB1 linear amplifiers than tetrodes with similar ratings.

**RATINGS**

<table>
<thead>
<tr>
<th>Type</th>
<th>FILAMENT Voltage (Volts)</th>
<th>Current (Amps)</th>
<th>Max. Plate Dissipation (Watts)</th>
<th>USEFUL OUTPUT* CLASS AB, LINEAR AMPLIFIER PLATE VOLTAGE IN VOLTS</th>
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<tbody>
<tr>
<td>PL-6549</td>
<td>6.0</td>
<td>3.3</td>
<td>75</td>
<td>96W</td>
</tr>
<tr>
<td>PL-177A</td>
<td>6.0</td>
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<td>75</td>
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<tr>
<td>PL-175</td>
<td>5.0</td>
<td>14.5</td>
<td>400</td>
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</tr>
<tr>
<td>PL-172</td>
<td>6.0</td>
<td>7.8</td>
<td>1000</td>
<td>--</td>
</tr>
</tbody>
</table>

*Actual power output delivered to load from typical amplifier.

ASK FOR A FREE COPY of "Transmitting Tubes for Linear Amplifier Service." This nine-page bulletin discusses linear amplifier tube requirements in detail. Graphs, characteristic curves, oscillograph linearity patterns and data show why Penta's exclusive beam pentode designs outperform four-element tubes.

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W1XJ

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**VFO 755A**

QT-10

**VOX**

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Plugs directly into VOX unit. Wired & tested only.

VFO 755A

**GROUND-GRID**

**Linear Amplifier LA-1**

Complete with well-filtered power output amplifier Class B or C, with grounded-grid Final. 200 watts input operated AM Class B, 300 watts DSB input, or 420 PEP Input, Class B linear SSB or DSB. Requires 15 watts RF driving power. 300 watts class C for CW (15 watts driving power). Pi Net output circuit covers 50-100 M bands, matches loads 20-150 ohms. 52 ohm Pi Link coupled output on 6 M. Extensively bypassed, filtered and shielded for TVI.

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**ANTENNA TUNER AT-4**

Built-in VSWR Bridge constantly in circuit. For any Xmttr. with final RF input up to 900 watts. 80-10M. Fixed link coupling in output circuit. Coax input, 2-wire balanced output. Special calibrated meter for monitoring actual SWR. RF shielding cabinet.

**EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—New appointments: CWR Newburyport, YWB Norfolk, SCR and QB Sector 1-D as Eqs.; KIAGS and RCR as OBS. Appointments endorsed: W1VCP Concord, HLOQ Stow, DOL Revere, MB Sector 1-D as OBS. OGIJ Woburn, VYS Weston, KEX Lynnfield as Eqs.; KBS as OBS, DOLF and OGIJ as OBS, AYG as OBS.**

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Bandswitching 10-80M; 100w PEP DSB Input

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40w Fone; 50w CW

Covering 10-100M; output on 40 & 160M. Improved vernier dial drive. 1.6:1 tuning ratio. Temperature compensated. Stability time for sideband. Highest output any DSB on market.

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Complete with well-filtered power output amplifier Class B or C, with grounded-grid Final. 200 watts input operated AM Class B, 300 watts DSB input, or 420 PEP Input, Class B linear SSB or DSB. Requires 15 watts RF driving power. 300 watts class C for CW (15 watts driving power). Pi Net output circuit covers 50-100 M bands, matches loads 20-150 ohms. 52 ohm Pi Link coupled output on 6 M. Extensively bypassed, filtered and shielded for TVI.

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Built-in VSWR Bridge constantly in circuit. For any Xmttr. with final RF input up to 900 watts. 80-10M. Fixed link coupling in output circuit. Coax input, 2-wire balanced output. Special calibrated meter for monitoring actual SWR. RF shielding cabinet.

Send for Catalog of the Complete Globe Electronics Line and Your Free Copy of Burghardt's Newest Catalog.
Transistor Power Supplies* and Components

D SERIES (Standard)
Continuous operation at 30 watts. Selective taps at 200, 250 and 300 volts; intermediate voltage at 5 selective taps. Both voltages can be drawn simultaneously if total power does not exceed continuous ratings. Positive or negative ground operation. Input and output filtering included except for intermediate tap.
Size: 4¼” x 3¼” x 1¼” Wt.: 10 oz 6- or 12-V Input: $39.95 24-V Input: $61.95

DA SERIES
Continuous operation at 45 watts. 450 volts and 225 volts simultaneous if total power does not exceed continuous ratings. Intermittent duty to 90 watts, 450 volts at 150 MA; 225 volts at 100 MA (5 min. on, 20 min. off). Positive or negative ground operation. Input and primary voltage filtering; partial high voltage filtering provided.
Size: 4¼” x 3¼” x 1¼” Wt.: 14 oz 12-V Input: $57.50 24-V Input: $79.50

Toroid Transformers for Transistor Power Supply Application

H SERIES
H-6-450-1 Input: 6-VDC. Output: 450-VAC center tapped...450 and 225 VDC from bridge rectifier...45 watts.
H-14-450-12 Input: 12/14-VDC. Output: 450-VAC center tapped...450 and 225-VDC from bridge rectifier...55 watts.
H-28-450-18 Input: 24/28-VDC. Output: 450-VAC center tapped...450 and 225-VDC from bridge rectifier...65 watts.
H-6-100-125-150-D Input: 6-VDC. Output: Voltage doubler configuration. Secondary tapped for either 100, 125 or 150-VAC. DC Output: 200, 250 or 300-V at 100 MA.
H-12-100-125-150-D Input: 12/14-VDC. Output: Voltage doubler configuration. Secondary tapped for either 100, 125 or 150-VAC. DC Output: 200, 250 or 300-V at 125 MA.
H-24-100-125-150-D Input: 24/28-VDC. Output: Voltage doubler configuration. Secondary tapped for either 100, 125 or 150-VAC. DC Output: 200, 250 or 300-V at 150 MA.

HD SERIES — 2000 CPS
HD-14-225-3 Input: 12/14-VDC. Output: Voltage doubler configuration. Secondary tapped for either 225 or 300-VAC. DC Output: 450 or 600-V at 200 MA.
HD-28-225-3 Input: 24/28-VDC. Output: Voltage doubler configuration. Secondary tapped for either 225 or 300-VAC. DC Output: 450 or 600-V at 200 MA.

HDS SERIES — 2000 CPS
HDS-14-225-3 Input: 12/14-VDC. Output: Voltage doubler configuration. Secondary tapped for either 225 or 300-VAC. DC Output: 450 or 600-V at 300 MA.
HDS-28-225-3 Input: 24/28-VDC. Output: Voltage doubler configuration. Secondary tapped for either 225 or 300-VAC. DC Output: 450 or 600-V at 300 MA.

400 CYCLE SERIES
14-115-1.5-400 Input: 12/14-VDC. Output: 115-V at 1.5 amp.
24-115-1.5-400 Input: 24/28-VDC. Output: 115-V at 1.5 amp.

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Broward County International Airport
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NEW HAMPSHIRE—SCM, John A. Knap, W1AIU—SEC: BXU, RMIs: CRW and COC, PAM: CDX, V.H.F., PAM: TA. Congrats are in order to the Hamfest Committee of the Concord Brassbanders, Inc. OC, the most successful State ARRL Convention held in May, with special emphasis on the "Old Crow" supper and bingo. ARRl is now in Texas with the USAF, CNX and AJI are new members of the QWQA, KNIDYK has dropped the "N." PFU is now QRH in Austin with 200 watts on 80, 160, and 40, and 6 meters has a new mobile rig (H456). ARRl is now an OQ (Class III and IV) and an QPS, Ex-LBN is now K4VNC in Florida; ONX has added a modulator to his 300-watt rig and is on phone. Thanks c/o YCZ, Coos Radio Club president, for his FB report of news items. Best wishes to the New York City Radio Club, West Lebanon, RPF is club president. Traffic: (May) KIBCS 416, WJHKA 103, QGU 55, EAM 52, MTX 42, CDX 18, YME 18, KIBBO 10, WIRKG 12, MOI 12, YHI 10, EYN 3, IQ 3, CUE 3. (Apr.) WIEVN 10, YHI 10, FZ 8.

RHODE ISLAND—SCM, Mrs. June R. Burkett, WIWOX—SEC: PAB, PAM: EAN and YMC, BRN and BTV. Although this item has had much local publicity, it bears repeating here because of its general interest. A bill, authorizing the Registrar of Motor Vehicles to issue call letter license plates to amateurs, was passed by the 1958 R. I. General Assembly and signed by the Governor on May 16. Rhode Island has become the 40th state to offer the plates, which will be available by October of this year. The Providence Radio Association will sponsor an ARRL New England Division Convention Sept. 28-29, 9 a.m. to 10 p.m., at Rhodes-on-the-Pawtuxet. More details later. Speakers at a dinner given by the Roger Williams V.H.F. Society on Aug. 11 at the Meadow Brook. Green were Mr. Hallenstein, engineer-in-charge FCC Boston, EOL, OLO and X1C, KBWXX, club president, acted as toastmaster. The La Salle Academy High School Radio Assn. is now affiliated with ARRL. YRC and CMH made RPL in May. New Generals at BYAC are K1EDE and K1DJA. Traffic: W1WYC 388, CMH 172, DDD 170, HKN 104, TXL 44, WED 4.


NORTHERN DIVISION

ALASKA—SCM, Eugene N. Harnett, KL7DZ—MA/ALZ is the first KL7 to work VK via RTTY and is V3K7P's third RTTY contact. The only RTTY contact made into VK-Land, C1F, ex-WF5CB, now is on 40 through 10 meters c.w. and phone. BYA reports that the Sitka Radio Club should be organized soon. New arrivals in Sitka are CFR, CPH, ENC and BAP, BUS rebuilt their transmitter. New appointments: AJI and AUV as OEsS. CDF reports the following new calls on the Arctic Circle: CFS, CPT, CFV, CHA, CHM, QOL and CAV. Armed Forces Day had good ham coverage, DG participated in Kodiak with a new HQ-110C. The Anchorage AARC represented c/d, at Fort Rich with the new club trailer. EARS also had a fine display. BUS and BAP have a new jr. operator. JEV passed the General Class exam at the Concord Hamfest. K1AUE is back from TBM operating 10-meter mobile. UET is hamming in the State and reported ill. Traffic: W1OAK 174, KJG 60, EIB 20, ZY 22, VSA 21, LFF 17, K1BGC 16, BSY 15, BOL 12, CYY 12, W1ZJ 8, K1AUE 4.

E-Z WAYS TOWERS, INC.

P. O. BOX 5491 - TAMPA, FLA.
HARVEY Stocks the New CESCO REFLECTOMETERS

Now! with new dual scale all clear meter calibrated in SWR and relative power.

A quality instrument employing mutual inductance and capacity coupling between linear conductors for continuous measurement of standing waves on transmission lines. Suitable for frequency range from 3 to 200 megacycles. For continuous line insertion at power from 25 to 1000 watts. Will work satisfactorily on power input of 10 watts at 7 mcs. and up. Will work on 5 watts output 100 mcs and up. Line insertion power loss less than 1 DB at 30 mcs.

FEATURES:
- Uses sensitive 0-100 microamp meter calibrated in SWR
- Has relative power scale
- For continuous transmission line insertion
- Power to 1000 watts and over
- Prevents false loading from antenna tuner, match box, PI network etc.
- SWR observed immediately at all times without adjustment of Reflectometer
- Power output indicator
- Makes possible increased radiated power by reduction of line reflection
- Simplifies adjustment of antenna match
- No balancing adjustments, no reversing
- Each unit accurately hand calibrated and perfectly balanced
- Frequency tested from 3 to 200 mcs.

MODEL CM-52
For 52 ohm coaxial cable
MODEL CM-75
For 75 ohm coaxial cable
Contains phasing unit, loading control and reversing toggle switch, equipped with SO-239 at each end for inserting into feedline. Ideal unit for inserting in feedline at antenna for visual readings while making antenna adjustments. Housed in an aluminum box, Hammertone finish. Has all features as specified.

DUAL UNITS
MODELS CM-52-2 AND CM-75-2
Identical electrically to models CM-52 and CM-75 and has all features except in two units for remote control. Supplied with ten feet of cable and plug wired to control and indicator unit. Standard finish Dove Grey.
Amateur and Industrial Net $34.95

SPECIAL CONTROL PANEL
For Collins Speaker Grill or Built-In Installations
Special panel containing meter, control, reversing switch and with ten feet of cable and plug. For use with CM-52-2 or CM-75-2 phase units. Standard finish control panel and phase unit Machine Grey.
Amateur and Industrial Net $34.95

MINIBRIDGE
MODEL CL-52-72
A resistive type unit for observing line standing waves when adjusting antenna match. For use with either 52, 72 or 75 ohm coaxial line. Designed for use with small amounts of RF excitation or Grid Dip Meter. Requires the use of an external indicator such as 0-100 Micro-amp meter.
Amateur and Industrial Net $12.95

We're Generous on Trade-Ins
If You Want to Talk SWAPS and DEALS write... or call W2DIO

NOTE: Prices Net, F.O.B., N.Y.C. Subject to change without notice.

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103 W. 43rd St., New York 36, N.Y. JUdson 2-1500
Established 1927

121
NOW! 6 METERS* ADDED TO THE *HY-GAIN* MULTIBAND TRAP ANTENNAS!

Shown here are two of the great new hy-gain trap verticals, the 14-AV (for 10-40M), roof mounted, and the 18-AV (for 10-80M), side mounted, each using the sensational Insu-Trap to isolate the various sections of the vertical. 14-AV develops 1/4-wave resonance, 18-AV develops 5/4-wave resonance on 40-80M; 9/4-wave resonance on the 10, 15 & 20 M bands. Each uses new Capacity Hat principle to increase radiation efficiency, and new hy-gain base insulator for self-support. Less than 2:1 SWR on all bands, simple 50 ohm feed line. Combination Guy Wire and Radial Mount Kit available for 14-AV for rooftop mounting. 18-AV comes complete with side-mount bracket fixtures and nylon grommet kit, all parts completely weather-treated.

Heart of the hy-gain trap antennas, the Insu-Trap makes possible for the first time a really efficient multi-band antenna system. It acts as an insulator at its resonant frequencies, but allows radio energies of other frequencies to pass freely. This automatic switch action isolates various sections of the verticals to make them the proper length for each band. Completely mechanically and electrically stable, the entire trap circuit is enclosed in a carbon activated polyethylene cover and cap. Traps are effective over the entire band, single single feed line. Combinations Guy Wire and Radial Mount Kit available for 14-AV for rooftop mounting. 18-AV comes complete with side-mount bracket fixtures and nylon grommet kit, all parts completely weather-treated.

Write for Brochure on the Complete Hy-Gain Line Today!

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PERSONALIZED SERVICE • TOP TRADE-INS • LEADING LINES
CONTINUALLY IN STOCK • GUARANTEED SATISFACTION

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NOW...FULL FIDELITY FM RECEPTION FROM YOUR CAR!

A NEW DIMENSION IN LISTENING PLEASURE!

FM CONVERTER

Now!... smooth, static-free reception... the nation's finest music... "living room" listening pleasure... while driving!

QUALITY RECEPITION...

Converter covers standard 88 to 108 mc. FM band, operates with present car radio* and antenna. Brings you all the well-known advantages possible only with FM... virtually constant program level without severe fading or signal drop-out and a minimum of static or man-made noise even when near power lines.

EASY-TO-OPERATE...

No fussy tuning!... merely locate desired signal on dial, a unique "locking" circuit then positively and correctly tunes the FM station to the point of fullest fidelity. Switch on Converter restores auto set to conventional AM reception, if desired.

EASY TO INSTALL.

Installation is easy, non-technical... do-it-yourself in minutes without altering auto radio. Converter power lead connects to 12 volt power source under dash. *FM Converter usable only on cars with 12 volt systems.

See the Gonset FM Converter at booths 3 and 4, ARRL National Amateur Radio Convention, Sheraton Park Hotel, Washington, D.C., August 15, 16 and 17.

49, AIB 42, GJS 87, NWP 35, USO 38, CTO 24, CZY 22, LVB 12, EKQ 12, EVW 3, JEB 1. (Apr.) WTVY 54, BXH 25.

PACIFIC DIVISION

NEVADA—SCM, Albert R. Chen, W7JLV—SEC; JU. YTV received the first VA-JF certificate awarded to a Nevada ham and is working in an MSA. K6QAF, BV1US and V6AET. YNO now is married and living in Newport, R.I., having his W7KI call. JU is operating all "Smokin'V"-class equipment. K6WMM, still is keeping his weekly sprints to southern California and Tucson. YRF now is breaking in his Hy-Gain PA-100-automobile automatic vertical. New officers of NARA are MAB, pres.; PC, vice-pres.; KTEDF, secy.- treas.; KANK, ares. at arms; TQF, BYR and JLY, board of directors; CX, trustee. New calls recently issued are KTEDF and K7DEQ. K7AGZ dropped the "N." ARRl Public Service Awards were issued to PC, AZF and ZVN for their part in the Reno Gas Explosion and after a disaster. Certificate No. 33 went to GYB (No. 60) and AGE (No. 61) for working 26 Nevada stations. SCM elections for Nevada are around the corner. Start boosting your favorite candidate.

SANTA CLARA VALLEY—SCM, C. Donald, W6V51—SEC; W6NOY, RMs.; W6QMO and W6- ZKB, Endorsements: W6CSX as OQ Class I. W6NMY as EC. A section net certificate was issued to K6SRC. W6- MMG's OHS and OQ appointments were renewed, W6- WNI's OHS appointment was renewed. It is reported that W6WX passed away May 29 of a heart attack. K7GHV got tangled up with 2800 volts but is able to tell shots is OK. K6MD0 was elected vice-president of the Merced Radio Club. Bob also worked a CN8 for his WAC. K6VJN is back on the air after an illness using a DX-100 on 40 meters and 3.5 Mc. feeding a vertical, W6VDR has his kw. final going; he made 420 contacts in 60 sections in the CD Party. K6RBD, finding his code speed has dropped, is now working on W6VBM for his current back. WA6T is ORL with garden work so is not QZT the net much. W6DEF is looking for more traffic to originate from his station. K6OJU has fructed in all the well-known advantages possible only with FM... virtually constant program level without severe fading or signal drop-out and a minimum of static or man-made noise even when near power lines.

EASY-TO-OPERATE...

No fussy tuning!... merely locate desired signal on the dial, a unique "locking" circuit then positively and correctly tunes the FM station to the point of fullest fidelity. Switch on Converter restores auto set to conventional AM reception, if desired.

EASY TO INSTALL.

Installation is easy, non-technical... do-it-yourself in minutes without altering auto radio. Converter power lead connects to 12 volt power source under dash. *FM Converter usable only on cars with 12 volt systems.
Hammarlund Model HQ-170
Triple Conversion Receiver

The HQ-170 is "hot". It offers the amateur a practically endless combination of tuning techniques whereby optimum reception of SSB/CW and AM/MCW may be achieved. Using vernier tuning, adjustable bandwidth, and the basic precision front-end of the HQ-170, the user has full control over SSB signals as well as adjacent- or co-channel signals. Provides 10 db signal to noise ratio at 1.5 μV Am or approximately 0.5 μV CW, or better depending on bandwidth. Frequency...to suit the tuning range. A high quality instrument made to rigid U.S. Govt. specs, by International Inst. Co. (Model 100). Only 1" in diameter, ideal for limited space applications & transistorized circuits. A natural for the transistorized grid dip oscillator. Described in June, 1956 QST.

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Tecraf Converters

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109 countries worked and 87 confirmed, K6CG has a new 20-ft. vertical. W67T has 260 countries confirmed. Keep the reports coming in and please try to get them in by the 30th of the month. Tralli: (AJV) K6CFO 5, K6OMW 5, K6USO 5, W6JAH 21, K6DMM 10, K6NJK 9, K6HOC 6, K6CF 4, (Apr.) W6ASI 58, K6HUC 14, K6DMM 5, W6CFL 5, K6NJK 2.

SAN FRANCISCO—SCM, Fred H. Lumbrecher, W6OFL—WX7MK was the honored guest at a dinner at the famous Fisherman's Wharf on June 4. After the banquet date he spoke to the representatives of the Central California Radio Council; a special meeting took place at the National Red Cross Bldg. in San Francisco. W6AFL, held the club members interest with his talk on antennas at the monthly San Francisco Radio Club meeting. K6BBJ is in the Oak Knoll Hospital, Oakland, Calif. John had a heart attack recently and was told to take things easy. It seems one just can't keep a good man down and he insisted on dropping into the business office each day after the doctor decided to put John in the hospital for a complete rest. Latest reports have it that he is getting along nicely. W6Z6S, of Korela, is in the U. S. Public Health Hospital, 15th & Lake Sts, in San Francisco. He had surgery of a serious nature but reports that he is feeling well. The Tri-County Section very much appreciated the net W6SXL sends in a new call—K6NUL. Other new calls from K6ERG lists KN6TPX and two CQs, W6NQA and K6VDG. W6GQY tells us that he will be shocking down on traffic because of other commitments but will bounce back and will be back to his frequent schedules. But will bounce back and will be back to his frequent schedules. By the way, reports the phone report he received No. 28 certificate award from the "Hunters Club Contacts." K6JYV is illness for K6GR of June 2 and thereafter on Mondays. He is able to handle 30 words per minute. W60QA says he handled new DX in May but was busy building 'things.' Congratulations to W6EGY, who was married on May 4 to Shirley Phillips. The couple have moved to Marin County so they still reside in the San Francisco section. K6JCT says that Operation Alert was a huge success. For the first time in the history of the San Francisco Civil Defense program all wartime communications units reported 100 per cent, K6CFP, EC of San Francisco, was net control station. The Mayor of San Francisco, the Chief of Police, the President of the Fire Dept, and Admiral Cook all visited the station and stayed to see how the amateurs put through messages. They were well pleased with the results. Traffic was handled through the Mission Trail Net, the American Legion Net and the Northern Calif. Net. Amateurs who stood by the warden stations were KN6KLD, K6LCP, K6AES, W6GQY, K6EVY, K6KTP, K6MNZ, K6HDL, W60ST, W6ULC and W6GQY. W6QPL and W6QGC acted as home station from GGC's QTH. Coverage was held by amateurs in Marin, Sonoma, Mendocino, Alameda, San Mateo, Santa Cruz, Santa Clara and San Benito Counties. Leuny wishes to express his deep appreciation to all who gave so much cooperation. The RTTY group had a meeting and dinner at Milbrae, Calif., on May 23 with a very good turnout. K6JUI was guest speaker for the evening. Traffic: W6QGY 549, K6JYV 61, W6GQ 25.

SACRAMENTO VALLEY—SCM, LeVangina Shipley, K6CFF—Heart congratulations to the Tehama County Radio Club in Red Bluff, affiliated with the League 100 per cent! K6FYV has been working hard this past West Coast, that is (pine and fir logs) are common. So many of us have complained about Delaware for W6A, that Steve sent May 6 and 7 in Baltimore trying to accommodate us. Seems he could work Los Angeles, Honolulu and Seattle but not Sacramento. Our vice-director, W6ZP, transmits ARRL Pacific Division News Bulletin on 2500 ke. at 3 P.M. on the 2nd and 4th Mon. of each month. W6QX is logging 'em in— in the woods of Butte County, that is (pine and fir logs). Your SCM had a most enjoyable time recently at the Sacramento Junior College discussing amateur radio. The college has applied for a license and has the nucleus of an ASB radio club. Good luck to W6QOR and his boys. It is often said that Fresno knows how. Take it from one who attended the Pacific Division Convention—Fresno does know how. Arrangements were well handled, the daytime program interesting, the displays informative, the entertainment and dance superb. Prizes were numerous and most desirable. The v.H.F. and RTTY demonstrations were exceptionally good, the traffic gang was well represented and their forums also were good. The XYL won a VTM. Traffic: K6FYV 360, W6GQY 45, W6JEF 7.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6LPU—Forty congratulations to the Central California Radio Society for a most enjoyable time recently at the Pacific Division Convention held in Fresno June 7-8 with over 550 in attendance. W6JUL won a Morrow receiver. W6GQY got a B+W final for K6DX is working on projects, W6PFL is working on antennas. The R.D.M. unit is returning from their trip with the Parade Memorial Day in Turlock. K6FLX is going to turn the U. S. this summer. K6GOX is using a

(Continued on page 128)
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mobile ——— fixed SSB
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Component and accessory features of the Collins KWM-1 Mobile/Fixed Transceiver make it one of the finest mobile rigs available—and excellent for fixed use, too. The KWM-1 has 175 watts PEP input on SSB, and 160 watts on CW. Receiver/transmitter tuned to same frequency so you don’t have to zero in. Covers amateur bands between 14-30 mc in 100 kc segments with 10 segments. A DX Conversion Adapter, interchanges with normal crystal box and provides seven transmitting frequencies within the band. It also allows reception over a 100 kc band in or out of the band. Another interchangeable crystal box provides Novice operation of the KWM-1. Switching is easy with crystal switch, automatic antenna switching control and logging scales on PA Load and Tune controls. Front panel meter acts as an S-meter on receive and as the tuning meter on transmit.

The Collins KWM-1 Transceiver is the most compact unit available for mobile operation with anywhere near the power—the only one available for SSB.

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Mobile or fixed, the KWM-1 measures only 6½” high, 14” wide and 10½” deep. Electronic Supply’s price is just $820.

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516F-1 60 cycle 110 (or 115) vac Power Supply for fixed or portable operation. $136.00

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Gusset linear on 6 meters. K4EG, K4BOO and K4EIJJ helped in the drill, drill in Conflina with good results. The Pleasant Valley ARC held Field Day near Comb Pool on top of Kettleman Hills, using one c.w. and one phone rig. The Sangre Radio Club boasted 8 members with Dave Hackett as president and made the 1st Two m. month. K4EEO moved from Stockton to Fresno. W6-AZB is active and is bothered by key clicks. W5V8ABP is the newest Novice in town, in the fold at the K5JHQ. The FCC gave new tests at the convention and had 20 customers. W6UBK won a 2nd switch at the convention. W6QPX is building up on 5-meter phone. The club’s 6-meter project is already complete. W4NIZ has a new Collins and is installing a 75-meter mobile in his rig. W4WFE and his XYL were at the Fresno Convention. W4JPU had his car broken into and lost a Handset and would have lost the converter if W6PSQ hadn’t stepped in. The would-be savant hunters went.

TRAFFIC: W4ADB 150, W4KRL 11, K4ET 9, W4ARE 8, W6PU 4, W6UEU 3.

ROANOKE DIVISION

NORTH CAROLINA—SCM, B. Riley Fowler, W4RHH—SEC: HUL. PAM: DBC. V.H.F. PAM: ACY. Just a reminder for all official appointees: You should submit an activity report to either the SCM or the SEC each month. ECs report to the SEC, all others to the SCM. Congratulations to PCN, elected net manager of the North Carolina Net (c.w. 3500.5 kc). I would like to remind all net managers to inquire of your net managers or secretary as to the requirements for net certificates. They are available upon request of your net official through the SCM. This is interesting to note that of the 3000 amateurs in the state, we have just 15 meters. SRCA has a new DX-100 to celebrate the dropping of the “W” in his call. W4KQZ has a new DX-100. W4KQZ will leave for Germany in August. K4LX is sporting a 10-meter beam and is putting up s.s.b. K4ZP is building a new quad. K4QPZ and K4PSZ have accumulated new gear. SCOCZ and MMK have been busy relaying messages from the Boy Scouts Camporee to parents. K4KMZ and DXK both have new YLs and K4FEDW has a new rig in operation. K4ASA made an illustrated lecture on mobile operation to the Dreher ARC which also received the call K4LZU. K4UNP is a National Honor Society member of Medical College of Virginia and will go to Lexington next fall. K4CTY is the new EC for Conover and Z54J is the new EC for Charlotte and Buncombe Counties. YOS is monitoring the nets and working portable from his summer job in Virginia. H4MG reports that there are now 12 stations on 75 meters in the State. Don’t forget Pawley Island’s Hamfest Sept 5 and 6 and the Rock Hill Hamfest in October. Subscribe to the bulletin Scram and keep up with all activities in the State. TRAFFIC: W4GXR 271, DSO 145, R4H 71, BAW 54, ZNF 4.

SOUTH CAROLINA—SCM, Dr. J. O. Dunlap, W4QWV—SEC: K4JPE, LAM: K4QLO, K4KZC passed the General Class exam and is active on 15 meters. K4QZC has a new DX-100 to celebrate the dropping of the “W” in his call. W4KQZ has departed for Hawaii and K4RSW will leave for Germany in August. K4LX is sporting a 10-meter beam and is putting up s.s.b. K4ZP is building a new quad. K4QPZ and K4PSZ have accumulated new gear. SCOCZ and MMK have been busy relaying messages from the Boy Scouts Camporee to parents. K4KMZ and DXK both have new YLs and K4FEDW has a new rig in operation. K4ASA made an illustrated lecture on mobile operation to the Dreher ARC which also received the call K4LZU. K4UNP is a National Honor Society member of Medical College of Virginia and will go to Lexington next fall. K4CTY is the new EC for Conover and Z54J is the new EC for Charlotte and Buncombe Counties. YOS is monitoring the nets and working portable from his summer job in Virginia. H4MG reports that there are now 12 stations on 75 meters in the State. Don’t forget Pawley Island’s Hamfest Sept 5 and 6 and the Rock Hill Hamfest in October. Subscribe to the bulletin Scram and keep up with all activities in the State. TRAFFIC: W4GXR 271, DSO 145, R4H 71, BAW 54, ZNF 4.

VIRGINIA—SCM, John Carl Morgan, W4KX—VSN has merged with VN until September, according to L.W. ZP5 reports that the Virginia 2-Meter Net still is active and very lively, and K4BJS was on the air from Mc. every night at 2000. The Arlington Co. AREC Net 4 now is active alternate Fri. at 2000 local time. K4BYE reports frequent AREC/RACES drills in the Bristol Area. The Tidewater Mobile Club again is furnishing communications for the Annual Intl Cun Heat Regatta, this year to be held at Elizabeth City, N. C. TA is leaving Virginia and is out of the air. EV will be sorely missed on 2 meters here in the mountains, but we keep trying. Maybe one of these days it will work out. TRAFFIC: W4GXR 271, DSO 145, R4H 71, BAW 54, ZNF 4.

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May 23, 1967

130

WEST VIRGINIA—BOU, Albert H. Hix, W9POQ—Aud. SUU, Frank B., SEGQ; K8WJ, secy. PAM: FLG, V.H.F. PAM: KRAON, RMJ: W9GBF, HLA PBO and VYR. The V.H.F. Weather Net did a fine job of handling emergency traffic during the period of high water on Big Sandy River. HZA was in the hospital with a back injury, K5EAB has a DX-100. Winners of the W1A, W7A, W9A Party were 1st and 2nd XYL, officers of the Tri-State Club are ABP, pres.; EED, vice-pres.; PBS, secy.; and KFYB, treas. New officers of the W1H.F. Weather Club are K5CWT, pres.; K5HRE, vice-pres.; and K5WBO, secy.-treas. The club meets the 3rd Sun. of each month at East Bluff School in Huntington. FNI received a certificate for the highest W Vc, score in the recent YVR Contest. YBN has moved to Kentucky. K5QGO is on a phone mini-DX-100, K9JDT and his XYL, K5GQX, are now in Iowa. Texas, K9HMG is active in the V.H.F. Net. LEQ has a new General Class ticket, K9JED got his Tech. Class ticket. K9BJS is the YL of WHQ. Traffic: W9FLT 242, HHD 91, VYR 59, CQ7 47, BKW 23, CSG/KLI 14, F91/4, HRO 4.

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COLORADO—SCM, B. Eugene Spoonmore, W9DMJ—SEC; NIT, PAMs: CXW and LR, O06; GTR and RRR, New Es's. K9GFX and DQG, New Obs: K9BTU, New QTH: K9OQ. Collins VFO controls freq. for both transmitter and receiver. For all SSB phasing type exciters using 9mc mixer freqs. Automatically zeroes in Xmtr to exact freq. received. Operates upper and lower SB on 75 and 20 meters. Complete with power supply...only $129.95

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SOUTHEASTERN DIVISION

ALABAMA—SCM, Clarke A. Summs, jr., W4HKK; SGC: EBD, PAM; DGH and KBTO, MA: RLQ. Congratulations to POG and OKQ, new ORSs, and to K4KPT for making BPL. K4PFM has moved WAC, WAS and has 60 countries confirmed in one year while handling over 400 messages and taking his turn as NCS of AENF. BPG continues code classes for the Jasper vicinity. Welcome to KN4YBF, the son of CEF and TZU, located in Idar and Ft. Payne, respectively. Every licensed operator in Dekalb County has joined the ARPC. W47G now has 100 plus counties. In fact, wish all counties had an AREC program. If your county is not yet active, please inquire for details to get organized. Write to the Christian, EBD, 8436 No. 7th Ave., Birmingham, Ala. K4ANB now is working 15 meters with a new beam up 60 ft. K4KJLD had a nice birthday last June and made a large group from over the State dropped in with several pieces of new equipment for his station. Traffic: W4HIG 492, KB9T 176, K4J 172. W4BTV 108, K4V 84, P4G 49, MI 34, K40LZ 32, JDA 30, W4HIV 28, CIU 17, CEP 13, K4PH 12, W4RNX 10, IP9 9, K4 decorating a boat cruise of about 60 boats May 31-June 1. Those were POG, DDD, SOI, OOW, MFY, RRH, GSK, CUC, ZH, IDX and SMH. Okaloosa County RACES participated in Operations Alert, May 6-7. Among those active were F4L, MFY, JST, JUA, FEJ, BJW, BZC now is working 15 meters, DX in good shape. Contact your local EC for information on how you can help out. The AREC is for every ham whether a member of the League or not. Don't forget, Florida Ship has been out for a new class so send in your renewals. Traffic: W4JWM 590, K4DSN 515, BJH 500, KDN 225, ICB 200, LCF 187, AKQ 183, OSQ 129. R4J 118, W4TCB 91. K4JLW 89, W4IT 69, K4EX 52, BNE 33, AEE 48, MIEU 34, BR 33, W4LDM 34, K4DOS 30, W4FPE 25, BWR 23, DRY 23, K4JZ 17, W4SST 15, K4HT 11, MTP 11, SPR 12, W4JG 16, K2FZ 6.

WESTERN FLORIDA—SCM, Frank M. Butler, jr., W4HKK; SGC: POG, R4M: AXP and BVE. Among those attending the Mobile Hamfest were POG, DDD, SOI, OOW, MFY, RRH, GSK, CUC, ZH, IDX and SMH. Alachua County RACES participated in Operations Alert, those were JFL, MFY, JST, JUA, FEJ, BJW, RRH, BZC, BVE, CUC, GSK, UBR and UXW, Pensacola, Ft. Walton and Panama City hams furnished communications for a boat cruise of about 60 boats May 31-June 1. Those were POG, DDD, IQ, TVD, OOW and QDO in Pensacola; M4L, SMH, RRH, BBE, BZC and M4P in Ft. Walton; QYL in Seagrove Beach; and COH and HFG in Panama City, OLD is back on with a new Globe.
NEW! SEMI-AUTOMATIC "BUG"
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Fully the equal of keys selling at almost twice the price! 7 adjustments for speed and comfort, so important in developing the right timing when using a "bug". Heavily weighted with solid steel block in base. Speed adjustable 10 wpm to as high as desired. ½" silver contacts; weight scale for reproducible speed settings. A real bargain for radio amateurs and professional CW operators! 6½" long x 3½" wide x 2½" high, exclusive of knobs and feet. Shpg. wt., 3½ lbs. MS-435 Semi-Automatic "Bug" Net 9.95

NEW! CODE PRACTICE SET
Economical and practical code practice key and buzzer unit for learning code. Telegraph key chrome and nickel plated with both adjustable spring tension and contact clearance. The high frequency buzzer has frequency adjustment with locknut to keep tone constant. Screw type pin jack terminals for headphone connection. Works with inexpensive 1½ volt battery. Heavy black molded phenolic base and buzzer housing. Base 6½" x 2½" x 1½", overall length 6½". Shpg. wt., 2 lbs. MS-438 Code Practice Set (less battery) 1.95

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MS-369 Stethoscope Headset .13

NEW! LAFAYETTE "BRASS-POUNDER'S" KEY
- With Ball-Bearing pivots
- Solid Polished-Brass Base
A better quality precision-made key designed for hard usage. Polished brass base; spring tension and contact clearance adjustments; 3/16" silver contacts. Base 3" x 2½" overall size 9½" long x 2½" wide x 1½/16" high. Shpg. wt., 1½ lbs. MS-428 Telegraph Key Net 1.95

NEW! high frequency CODE PRACTICE BUZZER
Reg. Value 2.50
Adjustable frequency buzzer ideal for individual or group code practice. Black molded phenolic housing — Works with 1½ volt battery. Screw adjustment for changing tone. 1½" dia x 1½/16" high. Shpg. wt., 6 oz. MS-436 Buzzer Net .79

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20,000 OHMS PER VOLT DC — 10,000 OHMS PER VOLT AC
A terrific buy in a hand-held, compact, light, accurate, completely wired instrument. Has a 36 µA movement, 1½" precision resistors and simple selector switch with calibration markings protected against wear. Scales: Volts DC and AC; 0-5, 25, 100, 500, 1000; Ohms: 0-5K-600K-60 Meg; DC Currents: 0-50 µA—5-500 MA; Decibels: —20 to +64 in 5 ranges. Size 4½" x 2½" x 1½". Shpg. wt., 1 lb. Complete with batteries and test leads. Imported to save you money. AR-660 Miniature Meter Net 22.50

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BRAVO SOUTHERN TEXAS—SCM, Ray K. Fagleston, W5QEM—SEC: QKF, RM: FOX, PAM: ZSB. NORTHERN TEXAS—SCM, Ray A. Thaeker, W5KYP—Ex-Sec. SCM: E. O. Pool, 4-NFO, SEC.: BNG. NORTHERN CALIFORNIA—SCM: S. K. Armstrong, W6LO—FAC: J. R. H. K. W5QFA.; also that KBQ is the new KC and that W5QEM of Santa Clara is now a proud OM! His XYL has the call KN5QFA. KN5QFA has made over 30 contacts in 15 states so far. NFO, our assistant, suggests that we need more OBSs in the Panhandle area last January. New Novices at Dumas are ONL and ONQ as OOs, PVT and ONQ as OHs, K5DNQ and K5DNQ. KN5QFA; also that GBQ is the new KC and that W6QEM enjoyed a vacation on 21 Me. K6KQL has a new tri-band quad operating on 15, 10, and 6 meters. K6KQL is back on the air after a hospital session. PXV is now a proud OM! His XYL has the call KN5QFA. KN5QFA is doing a bang-up job of traffic-handling on c.w. KN5QPO reports eighteen contacts in fourteen states so far, NFO, our assistant, suggests that we need more OBSs in the Panhandle-South Plains area. If interested, contact either of us and we will put you to work!! The Dumas ARC is now an ARLR, Allied club! Have you "browed" through the FCC regulations lately? Traffic: W5CY 235. BKH 250, SVN 192, BOO 111, K5MTI 58, PXV 36, 11L 27, 2AR 21, W6EAX 20, K5DNQ 18, AGM 16, 2567. W6EOT 411, W6EOT 308, K5DNQ 115, W6VKB 26, K5DNQ 16. WEST GULF DIVISION

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**SOUTHERN TEXAS—SCM, Ray K. Fagleston, W5QEM—SEC: QKF, RM: FOX, PAM: ZSB. It is with deep regret that we record the deaths of W5VCC and CB6 as Silent (Continued on page 138).**
QUICK QUIZ

Q. What are the procedures to be followed in renewing an amateur station and operator license?

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Kit: $49.95 W/T: $59.95

Keys. They will be missed by their many friends. K5LIU made 130 contacts in 43 sections in the April CD Party. She has moved to a new QTH at La Marque where she will have more room for antennas. K5EY has plans for a move to San Diego, Calif. RPH and his XYL are moving back to Corpus Christi after serving in the Air Force in Little Rock, Ark. T5E, another popular keyer, has moved to Texas while on furlough from the Canal Zone. ROY is operating as K5BBY while vacationing in Mexico. The STS CW, Net is meeting with the NTX during bad band conditions for the summer. K5BBY was heard mobiling in Corpus Christi while on vacation. K5CQA is a new graduate from Roy School and is now Amateur Radio's representative. He is the new activities manager for the Baytown Amateur Radio Club. K5BBJ has a new Thunderbolt. ROY is also planning to have the airways both during the SW and family are vacationing in North Texas. K5QON worked 70 stations on 6 meters May 25. He worked 180 stations in 32 states during May while on making RPL for the second month, The 7200 Net had 43 sessions, with 1172 stations and 742 messages. EDG sent 10 ARRL bulletins in May on CW. How is some news as things are getting dull because of vacations. Traffic: W5UMY 211, ZIN 217, FCF 214, EGD 199, K5BBY 174, W5NXX 50, QLT 7.

CANADIAN DIVISION

MARITIMES—SCM, D. E. Weeks, VE1WMB—Asst. SCM: Aaron Solomon. 1OC, SEC; AEB, FP is the second to make the WAZ Honor Roll for the Maritimes, not PZ as originally reported. New calls are VE1CQP, VE1SH and VE2RZ. OD has moved from Grono to Sydney, VQ recently vacationed in the VE7 district. Aaron reports that he was able to arrange schedules with the Maritime HF Net to direct handling of emergency information, VJ, ex-VE1QMB, has been posted to Churchill, Man. Newly-elected officers of the VE1RC are LS, pres.; RS, secy.; HN, treas. ES now has a DX-40. DX contests are reminded that they should keep in touch with FP if they expect to receive these rare cards. KD has many awaiting delivery. A stamped self-addressed envelope forwarded to him will do the trick. OM and WL have a 6-meter circuit set up with ARV on Sable Island. Don’t forget the Convention to be held at Truro during the Labor Day week end. Please assist the Truro Club by registering in advance. See you there. Traffic: VE1CN 50, AJH 32, OM 22, GM 16, AAR 12, VO2N 9, VE1AEB 6.

ONTARIO—SCM, Richard W. Roberts, VE2SG—My sincere thanks to all who so kindly helped to reelect me as SCM. By the time you read this you will have had a wonderful time on Field Day. Some of our clubs were absent from Field Day this year because the date conflicted with that of the North Bay Hamfest. Our National Holiday also fell on that week end. KM has returned from W6-Land; he also visited the Sault Ste. Marie Club. The Hamilton ARC is doing great things with plans for the ARRL Convention to be held in 1943. RH is in good health again. More than 50 mobiles are active on 75 meters in the Metro Toronto Area. The Queen’s ARC has its club transmitter on the air with call BSG. The St. Clair Valley ARC has its FP program lined up for the balance of ’43. Movies are on loan from the U. S. Army. The Nortown ARC has elected RTQ, pres.; HJ, secy.; HB, vice-pres.; EQW, rec. secy.; BOF, corr. secy.; KA, treas. VE09WVE09OH has returned from the Arctic. TSN, Thomas Civil Defense, has published the club recently. The Ottawa ARC held a successful dinner June 6, CJ leads the Ontario Amateur Radio Federation (for TVI). The secretary is DAE. DSN visited AJH at Leamington. Traffic: (May) VE3DGX 256, BUR 129, NG 94, DPO 83, AUA 70, HII 66, DTB 59, BYJ 47, AE 39, KM 38, AMV 37, EAM 24, EAU 22, AOE 13, H1, 100 messages. DPO XX, AUU 70, EU 66, DTB 59, BJV 57, and 50 contacts on 6 meters May 25. He worked 180 stations in 32 states during May while on making RPL for the second month, The 7200 Net had 43 sessions, with 1172 stations and 742 messages. EDG sent 10 ARRL bulletins in May on CW. How is some news as things are getting dull because of vacations. Traffic: W5UMY 211, ZIN 217, FCF 214, EGD 199, K5BBY 174, W5NXX 50, QLT 7.

QUEBEC—SCM, C. W. Skarslett, VE2DR—APR snapped HITOTG on 75-meter phone. He also received appointment as Sherbrooke ARC. EG, AHA, AGH and KQ are consistent mobiles on 75 meters. VE is planning to go to 2 meters. JA is back on 75 meters, S-s-h. notes: JS has a tine signal using a KEW-1. JS is on with 100 watts. IQ is using home-brew, IQ is active. QA is proud of WAC using 20A. WW is the first VE to apply for a WAC certificate. WW led all VE in the RSCC Phone Contest. GE is rebuilding to reduce the big local signal from YA. The South Shore Club arranged a fine evening to celebrate DARC’s 25-year anniversary at Terrebonne, is a newcomer. ATL hopes to join APC for a Volkswagen trip to Washington, D. C. AWR at Hamilton is looking DX and has plans to discuss astronomy during weekly skeds. AWK expects to take a 2-month vacation to Edinburgh, N. B. AZS likes this new AR-88 for DX. K5AUX is moving to the poor 80-meter early evening conditions and e.w. men may move to 7 Mc. AAR also held the experimental call (Continued on page 140)
COGENT REASONS WHY YOU SHOULD USE THE NEW DELUXE
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Finest engineering — best design techniques — years of experience — all assure you of Tecraft's superior performance.

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2. More than 30 db overall gain.
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A Tecraft converter, connected to the antenna terminals of such a receiver, provides the finest reception and control of VHF signals. The resulting system is ideal from the point of view of LOW NOISE, EXTREME SENSITIVITY, HIGH GAIN AND MAXIMUM STABILITY. Virtually any receiver may be used, since Tecraft Converters are built with a wide choice of I.F. output frequencies — to suit the tuning range of the receiver.

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Write FOR ENGINEERING DATA SHEETS ON ROTARY SWITCH AND:
1½ Ruggedized Meters; 1½ and 1¼ Panel Meters; 1½" VU, Db and Illuminated Meters; Miniature Multimeters and Side Indicators.

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monobanders

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10M - 3 ELEMENTS
18 lbs.
Boom Length: 144" Longest Element: 23'10"
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Carefully engineered, incorporating the latest design principles for top performance, the hy-gain monobanders are factory pre-tuned and pre-matched. Complete with easy-to-follow instructions for assembly, these beams sold with 1 year guarantee. Features include large diameter elements and ruggedly built Boom/Mast clamps. Booms hot dipped galvanized steel for maximum strength with minimum wind resistance. Elements 6061T6 alloy. Extremely simple to put up and into operation.

Average Gain: 8½ db. Average F/B Ratio: 24 db.

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VE8ZJ and could operate on 152-174 Mc, with F-3 emission. ATL reports success with the DX forecasting project at $7 per event near Amarillo, TX, giving 80-meter gang with an eight-element beam and rotor. NV and AFO do a great deal of careful listening for rare 20-meter DX which pays dividends. VA took on QSL Bureau chores to build a very fine exciter. W6, reported erroneously last month as moving to VE2, remains in the VE2 district. Traffic: VE7ZOL 91, EK 48, APR 11, VP 6.

ALBERTA—SCM, Gordon W. Hollingshead, VE2BVM—AM; OD, Circle Aug., 29. The MCA Hamfest, which it is promised will be the best ever. Your attendance is a must, 2-meter activity in Calgary is due for a big increase. EC and his construction group are completing their gear. AX has been appointed EC for the Calgary district. The RTTY demonstration by JZ, EN and MJ on C.Q. Excise Co-op II, was a big success. MJ now mobile on 75 meters. Traffic: VE6HM 25, OD 17, TT 8, MJ 3, BL 2. VM 2.

BRITISH COLUMBIA—SCM, Peter M. McIntyre, VE7TT—Hope you all had a good Field Day and found a good location. TF, our Route Manager, and some of his stalwarts are keeping the BCEN (on 3550 kc, at 1830 to 1930 Mon., through Fri.) going along steadily even under poor summer conditions. ALE has finished his setup as radio operator on the MT. Fairweather Expedition so lend him your ear for some humorous recounts of the antics. JX worked VE2 and the VE2-BC A. R. E. RTTY contact during May. TF is looking for members for 3050 kc. It has been proposed that the BCARA Open Forum be held in Nanaimo Aug. 9 and 10. More information can be had from ALE, the BCARA secretary, or the Nanaimo gang whose newsy paper adds spice to anybody's reading. However, the editor, MJX, says the gang is running out of space. We hear there will be a DX Club Convention in Vancouver during August. If you want any information perhaps it can be obtained from ALE. It could be that it is by invitation only or I have not had any information about it as yet. hearty congrats to TF on getting his A-1 Operator certificate. Traffic: (May) KG1DT 335, VE7TT 86, AY 31, AAF 16, AEC 12, (Apr.) KG1DT 235.

MANITOBA—SCM, James A. Elliott, VE4FE—The May c.d. exercise was quite successful with several of the local hams participating. K8SMR, ex-VE4AIV, 4RX would like VE4 contacts on 20-, 15-, and 10-meter phone and e.w. JW has found out the secrets of the DX-40. The Dauphin gang is preparing for the hamfest to be held Aug. 30 and 31. Get your reservations in soon. This is the BIG EVENT of the year. Let's swamp them, gang! We wonder what effect the "Great Alortan," 2AHZ and who are interested in joining the North West OUI old-timers who have held tickets for 25 years or more could be that it is by invitation only or I have not had any information about it as yet. hearty congrats to TF on getting his A-1 Operator certificate. Traffic: (May) KG1DT 335, VE7TT 86, AY 31, AAF 16, AEC 12, (Apr.) KG1DT 235.

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that observed when monitoring transmissions with the picture received fed directly with the outgoing picture signal. With a 20-db. ratio the quality was still good, but with some snow present. When the ratio dropped to about 12 db, the picture contained considerable snow, but call letters could still be distinguished. In all these tests the black level was set at 50 per cent of the sync level.

K4KYY and PJZAO tried valiantly to make a satisfactory long-distance test, but 11 meters had slipped a little too far into the summer slump for success. Phone signals were only slightly above the noise, and the signal received at W4JP from PJZAO, who had recorded and played back the signal sent by K4KYY, was well down into the noise. While this test didn't produce conclusive results, the successful operation of conventional a.m. facsimile systems indicates that long distances can be covered if the signal-to-noise ratio is sufficiently high.

The World Above 50 Mc.

(Continued from page 75)

Indiana (near Terra Haute) for the annual Turkey Run V.H.F. Picnic, July 27. See W6LIT for details.


The Keystone V.H.F. Club is pushing the York area hamfest Aug. 21. They will have 1-meter communication for talking in mobiles. Event is held at Atlana Ranch, off Route 30, about 10 miles south of York, Pa.

New Greenlee Ball-Bearing Drive Nuts and Drive Screws reduce friction and make it easier than ever to cut smooth, accurate holes with Greenlee No. 730 Round Radio Chassis Punches. The new faster drives are available for all round-type Greenlee Punches sizes 11/16" through 2-3/32". Operate with ordinary wrench for quick socket openings, etc., in metal, Bakelite, or hard rubber.

NEW - faster, easier ball-bearing drive for GREENLEE chassis punches

Now, of course, there's the Perseids meteor shower, best of them all. Last month we ran some tentative plans in these pages. W6LIT confirms, with no essential change, the schedule printed therein. He will be monitoring 7002 kc. continuously from 2100 MST Aug. 9 on for schedule information. This is a real chance to catch Wyoming and Idaho on 144 Mc. if you get to Don in a hurry.

W7VMP is back in business at Phoenix, Ariz., for the summer, with two of the Fenwick trio still on the job. W7VMP, himself, is living in California this summer.) Charlie and Bob will keep the Fenwick kilowatt hot on 8 and 2 through the summer, and they are open for Perseids skeds. There is some talk about a trip to the Four Corners (Utah, Colorado, Arizona and New Mexico come together at one spot in the wide-open spaces) area for some 144-Mc. shenanigans.

The World Above 220 Mc.

Throughout all the early days of v.h.f. development, one of the great problems was maintaining activity, so that when you had an opportunity to be on the air you'd find someone to talk with. In most areas we're "over the hump" as far as 2 and 2 are concerned. At least during the times that most hams are free to operate, there is something doing on 50 and 144 Mc. in the more populous areas, though there is still room for improvement.

But on the bands from 220 up we have the age-old problem everywhere, with the possible exception of a few spots where heavy population densities make it possible for the 220-and-up enthusiast to find activity running spontaneously. One way to help the cause along is to set up regular operating schedules for the higher bands. If you can (and will) be on the air at specified times, send us the details of your schedule, and we'll publish it here. The rest is up to you. Remember there's a time lag between the time you write your letter and appearance of the information in these pages — so don't work the schedule for a week or so and then give up. That won't help anyone, including you.

Here's one such 220-Mc. sked. VE3BQN, Toronto, has a go with W3ARW and others in the Scranton area each (Continued on page 144)
working

Mobile or Portable

THIS SUMMER

Then, your log-keeping needs can be met by the ARRL MINILOG. Convenient, pocket-size, it contains proper headings for all necessary entries. MINILOG will help you comply with FCC regs, provide a lasting record of the many pleasant QSOs you'll enjoy this summer.

Spiral bound, 4" x 6" ............................................. 30¢
USA Proper, 35¢ elsewhere

If you prefer more detailed station records, the ARRL Log Book with ruled 8½ x 11 sheets (also spiral bound to lie flat when open), will make record-keeping a pleasure. Useful also for portable or mobile as well as fixed station operation! ............... 50¢
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These are available in loose-leaf form (punched for 3-ring binders), 100 sheets $1.00

The AMERICAN RADIO RELAY LEAGUE, INC.
WEST HARTFORD 7
CONNECTICUT
QSI SPECIAL

$1.50 per 100 cards—Postpaid U.S. only

*These cards are printed on glossy stock with red call letters, one style. Free sample.

changes or additions in form or ink at this price. We have only mailed within ten days. No C.O.D. Sorry, we cannot make any changes or additions in form or ink at this price. The QSI machine is available to amateurs only and it is requested that call signs be quoted when ordering.

HOBBY PRINT SHOP, P.O. Box 155D, Umatilla, Fla.

Friday and Saturday at 2300 EST. If the attempt fails on 220, they try it on 144. Frequencies: VE3QON — 220.05 Mc., W3AEB — 230.08 Mc.

WSVCO, Toledo, Ohio, wonders why we don't have more information on 420-Mc. activity in these pages. So do we! All its takes is better from you fellows who are doing the good work. WSVCO backs up the information from W8JLQ, recently published, with the statement that there is activity in Toledo and Detroit regularly on 432 Mc. He has worked W8QG, W8KJL, LLQ VOX, Van Curen, and DX IRC UCT RTT and K8AAY, Detroit, His rig uses a 2x39 tripler driving another as an amplifier, delivering about 12 watts input. This feeds a 16-element array, which will soon be replaced with a 38-element job.

The San Bernardino Microwave Society lost no time in converting from 3000 Mc. to the new band at 3700 to 3790 Mc. Equipment described in W8JGK's article in June QST was modified for the new band at once, and the first 2-way QSO over any distance was made by W6XED, Van Norden, and W6EVE, over a 5-mile circuit. W6FGE used a 2U30 lighthouse oscillator, but W6SDE had the 726A and juice-polypadex.

Tests made on the beam-can show that it can be made to work on the new band, but the new version is less critical to build and adjust, according to W6OYJ. Ed says that they have come across a new can used for a chocolate drink that is just the right size, 27/8 inches in diameter and 3 inches long. Two of these wedged together work nicely with the dimensions given in the article. It may not be necessary to fiddle with the repeller voltage, when this version of the polypadex is used.

The best distance worked on the new band was upped to 11 miles on June 9, when W6FGE/O, Box Springs, Alt., near Riverside, worked W6RNA, Arlington. New record will be coming up shortly.

QES NOTES

K1BML, Bethlehem, Conn. — Improved mobile coverage on 144 Mc. with folded-dipole halo.

K1XZK, Voorhees, Conn. — "Converted" DX-20 to 50 Mc. by removing all low-frequency components and installing almost completely new circuit for 50 Mc. Used International Crystal Mfg. Co. 300-6 oscillator, 0160 buffer and 06Q6 final amplifier, all shielded. Original high-pass filters on TV receivers effective in every case.

K3ZL, Baldwin, L. I. — Discane installed for general-purpose work on both 220 and 144 Mc. Working across 50-220 with W2SCIU and K2IMV.

W4AZC, Birmingham, Ala. — Phase-modulated emitter, crystal-controlled, giving good results on 50 Mc. K6HGC worked 17th state on 50 Mc. in June; K4A WB/4, Greenville, S. C., 200 miles. This was first time S. C. C had been worked from Birmingham area, yet K4AWB/4 worked a total of 11 Alabama stations, including K4SRU, who was running less than 5 watts input. Distances is about 200 miles.

K5DCO, Irving, Texas — Worked XE1PY and XE1FU on 50 Mc. May 23, and heard K5CW May 27. Band open for Es almost daily in May.

K4MT, Amarillo, Texas — First good Es April 28. DX heard or worked nearly every day thereafter. Season seems better than 1957.

K6JKK, Panama, Cal. — Last LUs and ZLs worked in early May. Single-hop sporadic-E good after middle of month. New social and traffic net organized on 50 Mc. May 18, consists of two divisions, for metropolitan and valley areas.

W5EPZ, Billings, Mont. — Addition of K7CA and K7CMU, Miles City, brings Montana's 6-meter population to about a dozen.

W5M1, Indianapolis, Ind., Members of Central Indiana Mobile Radio Club used 6 effectively in providing communication for sporting car races Alay 10 and 11.

Skeds with K9GWP and W9ULL on 220 working well. Hearing W8s CSW WNN GIL and IGII on 220 Mc., but no contacts. Heard tone-modulated signal on 221.5 Mc. from 2303 to 2305 CST, traveling from east around to southwest before fading into noise. Signal was frequency-modulated and keyed, as if for telemetering. Any info on this one?

W9QST, Clinton, Wis. — Operation on 50 Mc. paid off in successful emergency work following severe storm May 31. Mobile stations K8U AQB K9H BKW FOR and W3-YLV worked with fixed stations W9HGE W9DOW K9LOC (Continued on page 140).
Courses ranging in length from 7 to 12 months. Dormitory room and board on campus for $525.00 a month. The college owns KPAC, 5 KW broadcast station with studios located on campus. New students accepted monthly. If interested in radio training necessary to pass FCC examinations for first-class telephone and second-class telegraph licenses, write for details. New Advanced TV Engineering Course.

PORT ARTHUR COLLEGE, PORT ARTHUR, TEXAS

PORTABLE POWER PLANTS
Push Button Start—115 V AC (6 12 V DC) Always available. Be prepared with reliable emergency power, designed for use with radio gear, etc. Only unit at these low factory prices fully shielded and filtered for radio, and individually checked by scope. Not surplus, but brand new 4 cycle, easy starting, cast iron cylinder engines, fiber glass insulated generators, and control boxes with voltmeter and controls. Conservatively rated. Just the generator for CD Field Day, Camping and Boats. Complete line. Fully guaranteed.

700 watt (A712) Shpg. wt. 77 lbs. $143.50
1000 watt (A1012) Shpg. wt. 90 lbs $195.50
2500 watt (A2512) Shpg. wt. 225 lbs $325.50
Sizes to 3500 watts. Dual voltage models, automatic controls, etc., available. Write:
GENERAL ELECTRONIC SERVICE CO.
P. O. Box 9 Rockwell 3-2425 Burlington, Wisconsin

NEW! . . . 60-ft. 4-BAND ANTENNA TUNES 40-20-15-10 METERS

Same Hi-power design except 4 bands in 60 ft. over all. Tested at 10,000 KV RF, will handle 2 KW of well-modulated AM. Only coils guaranteed to take a KW on the market.

Available for immediate delivery
40M-C 4 band KW coils .................................. $14.95
40M-A 4 band KW antenna ................................ $24.50
All antennas have 88 ft. KW twinline, heavy duty insulators, copperweld wire.

FIVE BAND ANTENNAS STILL AVAILABLE:
HC-F 5 band KW coils .................................. $19.95
HA-F 5 band KW antenna ................................ $33.50
Improved quarter KW 5 band models:
5 BC-F phone coils; SBC-C CW coils $12.50
5BC-A phone; SBC-C CW antennas $27.50

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Tired of formulas and living on ur roof?
Wanna enjoy ur hobby and live-a-little too?

How much for TOP PERFORMANCE AND THE FINEST MATERIALS, TOO?
ONLY $158.00 f.o.b. AP.—N.J.
Wanna write instead? Complete Teck. info, free!
EASY TO INSTALL TElescopes
CRANK DOWN TO ADJUST

Spring loaded ratchet winch can be padlocked.

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Prices start at $40.25
GALVANIZED TOWERS AVAILABLE
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TURN COUNT DIAL

F TUNERS, fine tuning gear reduces, vacuum and other variable condensers. One hole mounting. Handy logging space. Case: 2½" x 4½", Shalt: 4½" x 9½". TC 2 has 4½" dial, 1½" knob. TC 3 has 3½" dial — 2½" knob. Black bakelite. TC 2 $4.25 — TC 1 $4.75 — Spinner Handle 75c extra

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THE HEART OF THE BEAM
by MACH
★ Synchronous motor driven matching systems
★ Absolute 1—1 SWR
★ All final adjustments made from operating position
★ No tower climbing
One KW Gamma match for 10, 15, 20 meters...
In 6, 12 or 115 volt A.C.
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XMTRS FOR 160 TO 2 METERS

TECHNICIAN—NOVICE—GENERAL
or Special Freq. 500 KC. to 160 MC.

MOD. 210 WITH MOBILE CONNECTIONS & AC
SUPPLY. 1.6 to 40 mc. with Hi-Q plug-in coils. For
Phone & CW, Novice, General, CAP, Industrial.
Complete with 8 x 14 x 8 cabinet; tubes, 40 meter coils
& crystal. Wt. 30 lbs. $79.95.
80, 20, 10 meter coils $2.91 per band. 160 meter coils
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MODEL 130 FOR 120 to 130 WATTS—
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MODEL 242 FOR 6 METERS OR 2 METERS—
45 WATTS INPUT—6146 FINAL. Complete with
mobile connections, A.C. power supply, tubes, xtal.
Xtal mike input. Uses 8 mc. xtal or Lettine VFO,
Swing link matches 52 — 300 ohm antennas. Same
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TECHNICIANS! The 6 meter 242 is your ideal trans-
mitter, designed especially for 6 meters. Check these
features, 45 to 50 watts input. Three RF stages with
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modulation with push-pull modulator, High capacity
double tuned circuits for maximum TVI suppression.
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Send full amount or $25 with order — balance C.O.D.

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business for me. So 'I sent for Lampkin Laboratories' booklet "HOW TO MAKE MONEY
IN MOBILE-RADIO MAINTENANCE" and learned about the hourly rates . . . contract
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for you. Better mail it today—while it's fresh in your mind!

THE PREFERRED MOBILE-MAINTENANCE METERS

LAMPKIN TYPE 205-A
MODULATION METER
Range 25 to 500 MC
Price $240.00 net

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Range 0.1 to 175 MC
Price $250.00 net

LAMPKIN LABORATORIES INC., BRADENTON, FLA.
Fig. 5-65—View of the Q multiplier showing its single connecting cable to the receiver. The box can be placed in any convenient spot on or around the receiver.

BEEN looking for a way to combat QRM? Perhaps this is the answer. The transistorized Q multiplier pictured here is fully described in the 1958 Radio Amateur's Handbook. It appears with complete constructional details in the chapter “High-Frequency Receivers.” Numerous other receiver accessories are described that may help you to realize better performance from your receiving equipment. And that’s not all! The twenty-five chapters of this useful book cover the entire field of amateur radio communications: receivers, transmitters, v.h.f., antennas, mobile, measurements, operating, etc. Get your copy of the big 1958 Radio Amateur’s Handbook now: 746 pages, over 1350 illustrations, charts, diagrams and tables.

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“SATURN 6” MOBILEER
- Horizontally polarized
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MODEL S-1
“Saturn 6” Antenna 2-4c, adjustable aluminum mast, bracket, universal bumper rid. No holes to drill. Co-ax lead line inc. Net.............$16.95
HI-PAR PRODUCTS CO. • Fitchburg, Mass.

NEW!
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DOW-KEY
ANTENNA SWITCH
MODEL DKC-TR
The DKC-TR features a gain of zero db at 60 mc to plus 6 db at 3.5 mc. Can be close-coupled to the transmitter for easy, compact installation with a Dow DKF-2 connector. instantaneous recovery, powered from transmitter accessory terminal. Matches 52 and 72 ohm impedance without insertion loss. Handles one kw with ease.

POWER SPECS: B plus 125-150 volts, consumption at 125 volts, 6.2 mils; .450 amps at 6.3 volts; uses 6AH6 tube.

GUARANTEED! Fully backed by factory warranty for unit replacement. PRICE, $12.50 (price subject to change without notice).

DOUBLE MALE-CONNECTOR (DKF-2) for mounting relay directly onto output of transmitter. $1.45

See your local electronics dealer or write direct for complete specifications.

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Includes TVI from 50 Me. as well as 144 Me.

If your Radio Dealer does not have it, send $2.00 foreign for it.

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Over the years, we have built up such a tremendous market for used equipment that sometimes we even have a waiting list for certain items. Because of this guaranteed market, we can offer you a better price for your trade-in. We want it! We need it! We'll allow more for it! Let us give you our top quotation next time you buy.

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Advertising shall pertain to radio and shall be of such nature as to interest radio amateurs or experimenters in their field.

(2) No display of any character will be accepted, nor can any advertising or announcements be accepted as a substitute for an ad. The following capitals letters be used which would tend to make one ad

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(6) A special rate of 7c per word will apply to advertising for the Openings for Equipment section. This section is limited to ads from newspapers, magazines, radio stations, and other commercial sources. The rate applies to the first 10 words, and 7c per word for each additional 10 words, up to a maximum of 50 words.

(7) Where error is more easily avoided, it is requested that copy and address be printed plainly on one side of paper. Typewritten copy preferred but handwritten signature must accompany all advertisements to be considered.

(8) No advertiser may use more than 100 words in any one issue, and no listing or skipping of words may be allowed.

Haring made no alterations in the classified columns every one obvious in commercial character, the possibility of ever finding their origin or the grade or character of the products or services advertised.

HAMFESTER-S Radio Club announces its 24th Annual Picnic to be held Sunday, August 10th, 1958, at Santa Fe Park, near Chicago.

CREATIVE QSL and SWL. Are you proud of your card? If not, you can fight your next one on your own. Personal attention given to all requests. Bob Wilkins Jr., KNRZ, Creative-QSL Printing, P.O. Box 40, Arlington, Va.


PHOTOGRAPHIC QSL’s — Picture post-card type, your shack, home, mobile, etc. You send photo. 1000. $1.00. Baum’s, 4154 30th St., Philadelphia, Pa.

HAMFESTER-S Radio Club announces its 24th Annual Picnic to be held Sunday, August 10th, 1958, at Santa Fe Park, near Chicago.

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FOR SALE: Brand new Telrex 3-element 20 meter beam. Make offer.

FOR SALE: Brand new Johnson Rotomat $125.00. Free trial terms. Write Leo, 625 Fifth Ave., New York, N. Y.

FOR SALE: Brand new Johnson Matchstick II 20 watt 2-meter transceiver, Abbott TR-260, with spare tubes. $20 f.o.b. K2ZVA, Paul Kroll, 3527-203 St., Bayside 61, N. Y.


FOR SALE: Johnson KW and desk like new $1195.00; S-72 UHF amplifier, $200. Will sell both together for $400 cash. Will set brand new Johnson Matchstick. Make offer. Johnson Kilowatt 500 $425.00; Globe King 500A $455.00: Communicator II 6 meter converter, late series, like new with speaker. $150; DB2G SELL SSB, 10-B exciter; 457 VFC, 4-658, PP linear amplifier, 200 watts. All for $350. W9EWU, Herman Nobe, 512 Teulon Ave., Linden, N. J.

FOR SALE: Brand new Telrex 3-element 20 meter beam. Make offer. $25, 625 Fifth Ave., New York, N. Y.

FOR SALE: Johnson QRM $100. W0ZHJ, 2444 "D" St., Lincoln, Nebr.

FOR SALE: Complete Ham station. Viking Ranger, 2244-100 receiver, four months old. Both, $250, W1FNY, 165 Henry Lawy, Dover, N. H.

FOR SALE: One of few complete files in existence. Issue 1 December 1915 to HI5C, 1958. Contains all issues except single copies or otherwise to highest bidders. Will hold bids 30 days, and accept bidders after that time.

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FOR SALE: CB radio $135 handbook, lot exact parts as per ar. $200 watt hi-voltage and low yaw power transceiver. $180 watt coupler, spare $180, $250 cash or trade. What would you offer? W1VLD, Box 105, Hamilton, Conn. Tel: 6-5747.

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WANTED: Have hundreds of excellent tubes, resistors, capacitors. Fantastically cheap. List free, Richard Light, K2UOY, 640 Riverside Dr., New York, N. Y.


WANTED: Johnson Matchbox, $35, Hy-Gain 3-el. Triband beam, never used. $350; Johnson Kilowatt, 500 $425.00; Globe King 500A $455.00: Communicator II 6 meter converter, late series, like new with speaker. $150; DB2G SELL SSB, 10-B exciter; 457 VFC, 4-658, PP linear amplifier, 200 watts. All for $350. W9EWU, Herman Nobe, 512 Teulon Ave., Linden, N. J.

WANTED: Brand new used: Collins coax relay in sealed box (supplied with KWS-1) $7.50 each; Drake or Amphenol 200 JIP filters, $2; National AM-5 dial, $17.50; RA-4 tube, antique driver, $2; National L-2626, $8.50; V-21947A, $10.50; tube for driven antenna, $300. K5AGI, 1710 South Platte St., Denver, Colo.


WANTED: Brand new used: Collins coax relay in sealed box (supplied with KWS-1) $7.50 each; Drake or Amphenol 200 JIP filters, $2; National AM-5 dial, $17.50; RA-4 tube, antique driver, $2; National L-2626, $8.50; V-21947A, $10.50; tube for driven antenna, $300. K5AGI, 1710 South Platte St., Denver, Colo.

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FOR Sale: HRO-60, calibrator and speaker. WSONQ.

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FOR Sale or trade for SSB gear; BX42, VHF-152A, 10B with VFO, $215; Harvey-Wells xmttr complete band-switching 80 thru 2 meters; power supply, APS-50, $20. W2GWT. Penn Yan, N. Y.

FOR Sale: BELL: Elmâc pMR-6 xmttr with 6V Vibrapack; BC-453 revr, PE-103, $63; model B slicer. Lewis West, W0AIO, 3414 Denison St., Hartford 5, Conn.

FOR Sale: CQ-200, $60, AT-1, $17. K5JTP.

FOR Sale: 50 ft. guyed 3000 watt tower, parts alone worth twice the price. W2KXJ.

FOR Sale: Price $60.00. W90DT, 528 E 4th St., Lockport, III.

FOR Sale: 3500 to 8600, $1.00; thin Gonset, $1.45; 1700 to 3499, $1.75; 3500 to 8600, $2.00; GE-1500 $3.00, Beckman $5.00. Radio Shack, 215 Main at Port Washington, L. I., N. Y.

FOR Sale: HRO-60, calibrator and speaker. W50NQ.

FOR Sale: Viking II with VFO and NO183, all In good cond, $295. W9WGG, 1509 Bayard Ave., Chicago 19, 111.

WANTED: Baker comp. $250.00; 80 thru 2 meters, $25.00; 2 KW dummy antenna, cabinet. $5.75; complete 100 watt 6 or 2m power supply. $20, W3PQK.

FOR Sale or trade for SSB gear; BX42, VHF-152A, 10B with VFO, $215; Harvey-Wells xmttr complete band-switching 80 thru 2 meters; power supply, APS-50, $20. W2GWT. Penn Yan, N. Y.

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