QST

March 1957
50 Cents
55c in Canada

devoted entirely to

amateur radio

PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

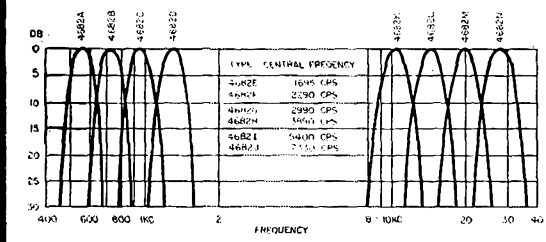
OUR MILLIONTH FILTER SHIPPED THIS YEAR...

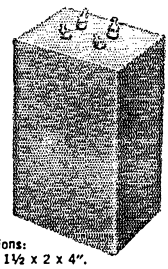
FILTERS

FOR EVERY APPLICATION

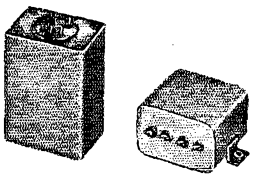
TELEMETERING FILTERS

UTC manufactures a wide variety of band pass filters for multi-channel telemetering. Illustrated are a group of filters supplied for 400 cycle to 40 KC service. Miniaturized units have been made for many applications. For example a group of 4 cubic inch units which provide 30 channels between 4 KC and 100 KC.

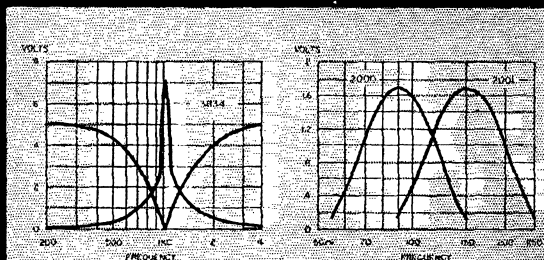




Dimensions:
(4682A) 1½ x 2 x 4".



Dimensions:
(3834) 1¼ x 1¾ x 2-3/16".
(2000, 1) 1¼ x 1¾ x 1⅝".



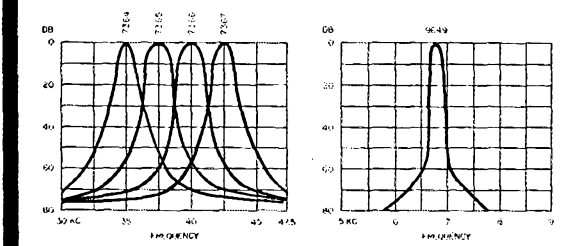
AIRCRAFT FILTERS

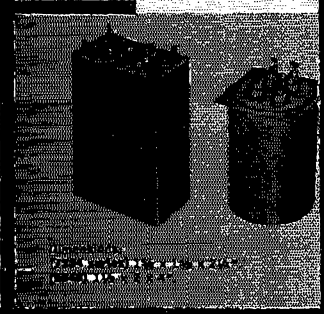
UTC has produced the bulk of filters used in aircraft equipment for over a decade. The curve at the left is that of a miniaturized (1020 cycles) range filter providing high attenuation between voice and range frequencies.

Curves at the right are that of our miniaturized 90 and 150 cycle filters for glide path systems.

CARRIER FILTERS

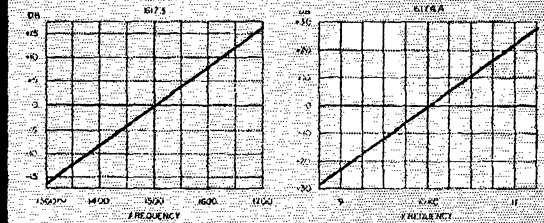
A wide variety of carrier filters are available for specific applications. This type of tone channel filter can be supplied in a varied range of band widths and attenuations. The curves shown are typical units.

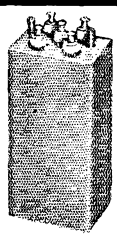




DISCRIMINATORS

These high Q discriminators provide exceptional amplification and linearity. Typical characteristics available are illustrated by the low and higher frequency curves shown.



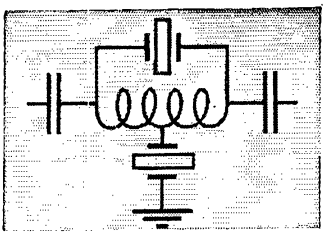


Dimensions:
(6173) 1-1/16 x 1⅜ x 3".
(6174A) 1 x 1¼ x 2¼".

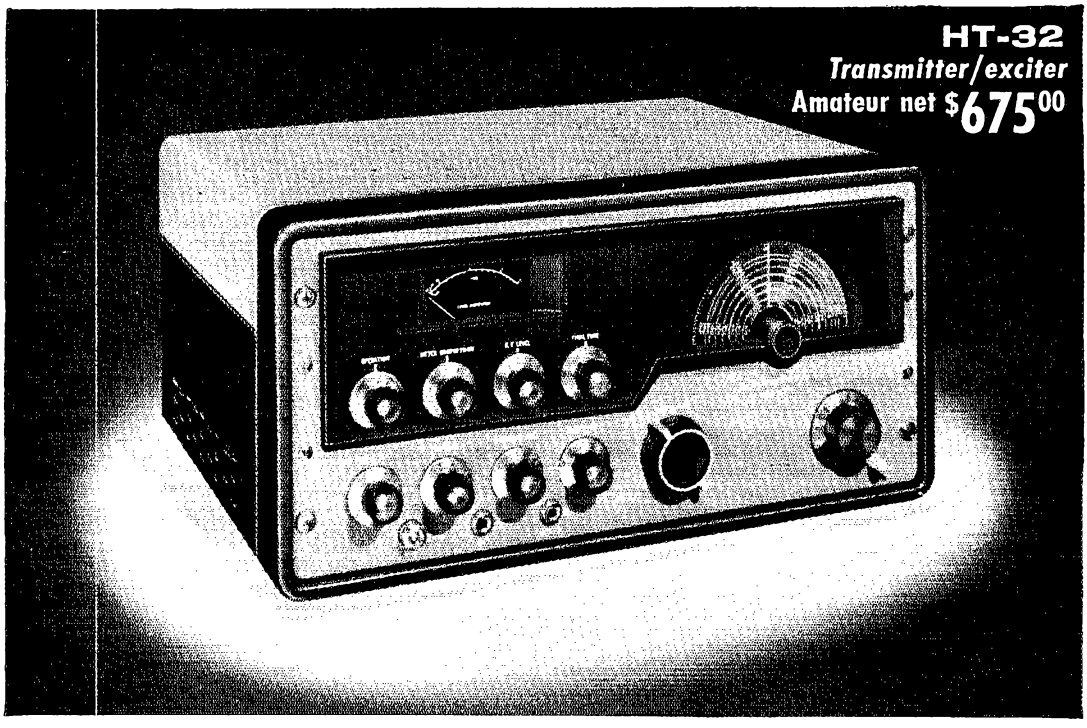
For full data on stock UTC transformers, reactors, filters, and high Q coils, write for Catalog A.

UNITED TRANSFORMER CORP.

150 VARICK STREET, NEW YORK 13, N. Y.
EXPORT DIVISION: 13 EAST 40th STREET, NEW YORK, 16, N. Y. CABLES "ARLAB"
PACIFIC MFG. DIVISION: 4008 W. JEFFERSON BLVD., LOS ANGELES 16, CALIF



From this exclusive HIGH FREQUENCY filter originates the cleanest signal on the air!



Hallicrafters new HT-32 transmitter features 5.0 mc. quartz crystal filter... new bridged-tee modulator...high stability...gear-driven V.F.O.

• Forget your old ideas about SSB signal clarity! The HT-32 establishes *entirely new standards* with two major achievements of the world famous Hallicrafters laboratories—yours exclusively in the HT-32:

1. **5.0 mc. quartz crystal filter.** Result of a 3-year research program, the crystal filter system now is commercially practical at *high frequencies*. System cuts unwanted sideband 50 db. or more!
2. **New bridged-tee modulator.** Temperature stabilized and compensated network provides carrier suppression *in excess of* 50-db. Patented diode application develops sideband energy from audio voltage. World's most stable modulator.

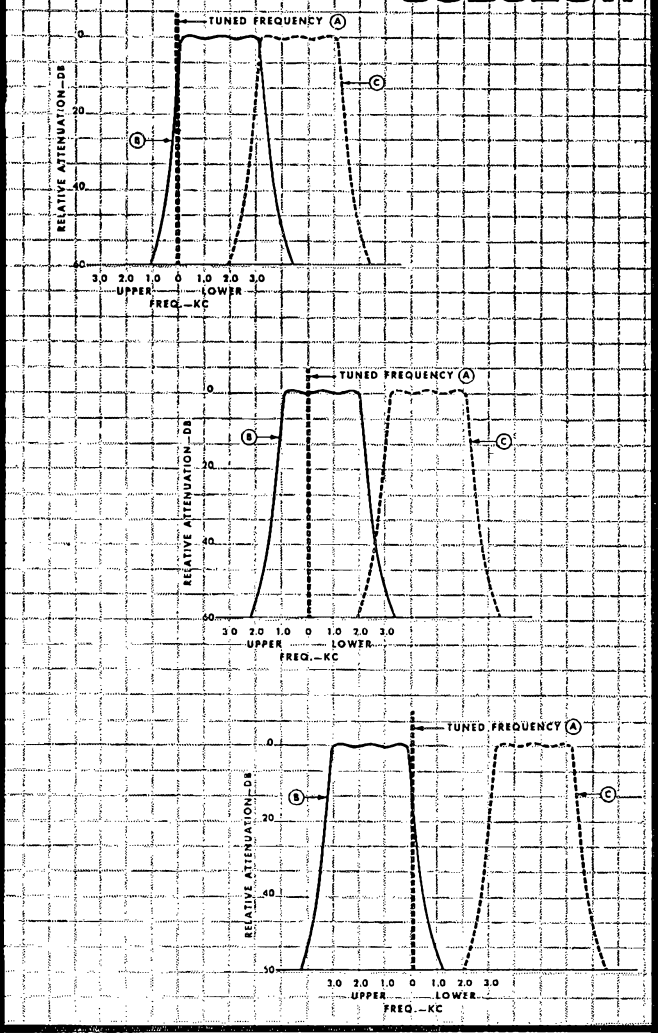
These and many other features make your decision *clear*—compare the HT-32 with any other transmitter available. Your supplier has all the details. Stop by and see him today.

ADDITIONAL FACTS ABOUT THE HT-32

- SSB, AM or CW output on 80, 40, 20, 15, 11-10 meter bands.
- High-stability, gear-driven V.F.O.
- 144 watts peak power input.
- Distortion products down 30 db or more.
- Complete band switching.
- C.T.O. direct reading in kilocycles.
- T.V.I. suppressed.

NEW
FROM
hallicrafters
CHICAGO 24, ILLINOIS
WHERE THE BEST IDEAS IN COMMUNICATIONS ARE BORN

SUBJECT: PASSBAND CONTROL AND COLLINS 75A-4

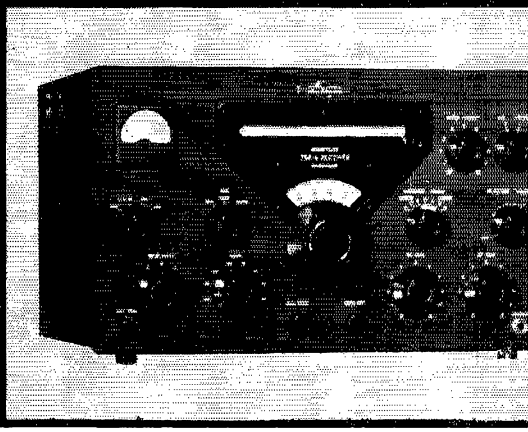


The scourge of Amateur reception is interference from neighboring signals. The most effective method of dodging this interference is passband tuning, and only Collins 75A-4 has it.

With passband tuning, the passband — which is continuously adjustable — is actually *moved around* the dial frequency. As may be seen in the drawings at left, the tuned frequency (A) remains constant while the IF passband (B) may be moved in either direction to drop interfering signals (C) "off the cliff." This same action is also useful for dropping out either high or low audio frequencies.

Passband tuning also provides an effective method of selecting sidebands by merely moving the passband right or left as in the top and bottom drawings.

Passband tuning is augmented by such other features as the Mechanical Filter and Rejection Tuning. The Filter's steep selectivity will sharply cut interfering signals on the passband's edge, and the rejection tuning notch will eliminate any single carrier heterodyne in the passband. These are typical of the features that make the 75A-4 easily the *best* receiver buy on the market.



Collins CREATIVE LEADER IN COMMUNICATION

QST

MARCH 1957

VOLUME XLI • NUMBER 3

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

OFFICES

38 La Salle Road
West Hartford 7, Connecticut
TEL.: ADams 6-2535 TWX: HF 88

Subscription rate in United States and Possessions, $4.00 per year, postpaid; $4.25 in the Dominion of Canada, $5.00 in all other countries. Single copies, 50 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

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INDEXED BY
INDUSTRIAL ARTS INDEX

Library of Congress Catalog Card No.: 21-9421

—CONTENTS—

Superlative AM-CW and SSB with the B&W MODEL 5100-B TRANSMITTER, MODEL 51SB-B SSB GENERATOR

Here's unsurpassed performance on all three . . . AM-CW and SSB! The Model 5100-B gives you:

- *high level push-to-talk AM telephony*
- *clean CW keying—break-in on all bands*
- *sparkling SSB combined with the 51SB-B companion sideband generator*

Check *all* the features built into this fine transmitter: input power of 180 watts CW-SSB,*140 watts AM phone; bandswitched throughout with integral VFO or crystal frequency control; coverage of 80 through 10 meter amateur bands; *plus* unitized construction, pi-network final, and integral low-pass filter. Skillful layout and imaginative circuitry assure effective transmission of signal with minimum harmonic content. Functional design within the r-f section, careful shielding, filtering, and by-passing are your assurance of the most dependable TVI suppression.

*Peak envelope

Trouble-free operation, ease of control and tuning, coupled with excellent quality of signal output with the Model 5100-B are sure to meet the exacting requirements of the most discriminating operator.

FOR OUTSTANDING SSB PERFORMANCE on the same amateur bands, combine the 5100-B with the completely bandswitched 51SB-B companion sideband generator. Powered by the transmitter, the 51SB-B can easily be hooked up to the 5100-B in less than a half hour. Tuning and operation are a breeze, with no test equipment required for installation or operation. And you'll begin immediately to enjoy such features as: voice operated control, push-to-talk, speaker deactivating circuit, true unitized construction, and TVI suppression.

*Net Price { Model 5100-B Transmitter.....$475.00
Model 51SB-B SSB Generator.....$265.00

FOR SPARKLING SSB WITH YOUR PRESENT TRANSMITTER

. . . THE B&W MODEL 51SB SIDEBAND GENERATOR

Enjoy superb single sideband transmission just by adding the Model 51SB generator to your present B&W, Collins, Johnson, or other commercial or composite home built transmitter. Using factory engineered modification kits and step-by-step instructions, you'll find it easy to achieve outstanding SSB operation on all the amateur phone frequencies 80 through 10 meters provided by your present transmitter. And the self-powered Model 51SB gives you all the advanced features of the Model 51SB-B generator.

*Net Price: Model 51SB SSB Generator $279.50

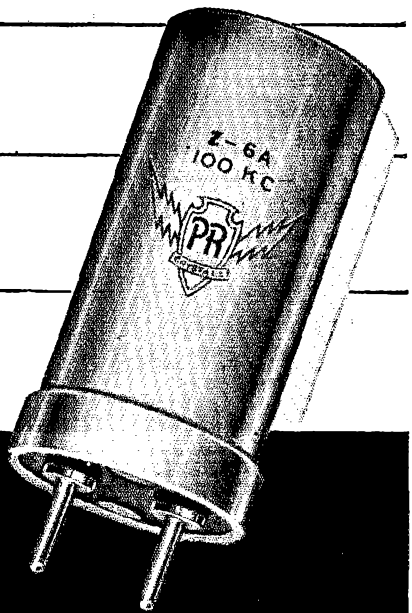
*All prices subject to change without notice

B&W

BARKER & WILLIAMSON, INC.

Bristol, Pennsylvania

Calibration on the nose...



thanks to PR's 100 K.C. FREQUENCY STANDARD

A dependable secondary frequency standard is a MUST for today's amateur station ... to determine band-edge ... to keep the VFO and receiver properly calibrated. Now you can buy a really dependable, commercial-quality PR 100 Kc. Crystal at reasonable cost. The Type Z-6A is hermetically sealed, razor-accurate, unconditionally guaranteed. Get it at your jobber.

Z-6A
100 K.C.
$6.95 net

PR Crystals

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USE PR AND KNOW WHERE YOU ARE

PETERSEN RADIO COMPANY, INC.
2800 W. BROADWAY • COUNCIL BLUFFS, IOWA

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Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. **ARRL Field Organization station appointments** are available in the areas shown to qualified League members. These include ORS, OES, 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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British Columbia	VE7JT	Peter M. McIntyre	981 West 26th Ave.	Vancouver, B. C.
Yukon				
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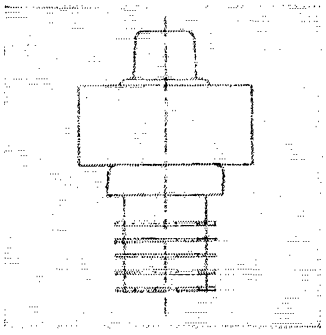
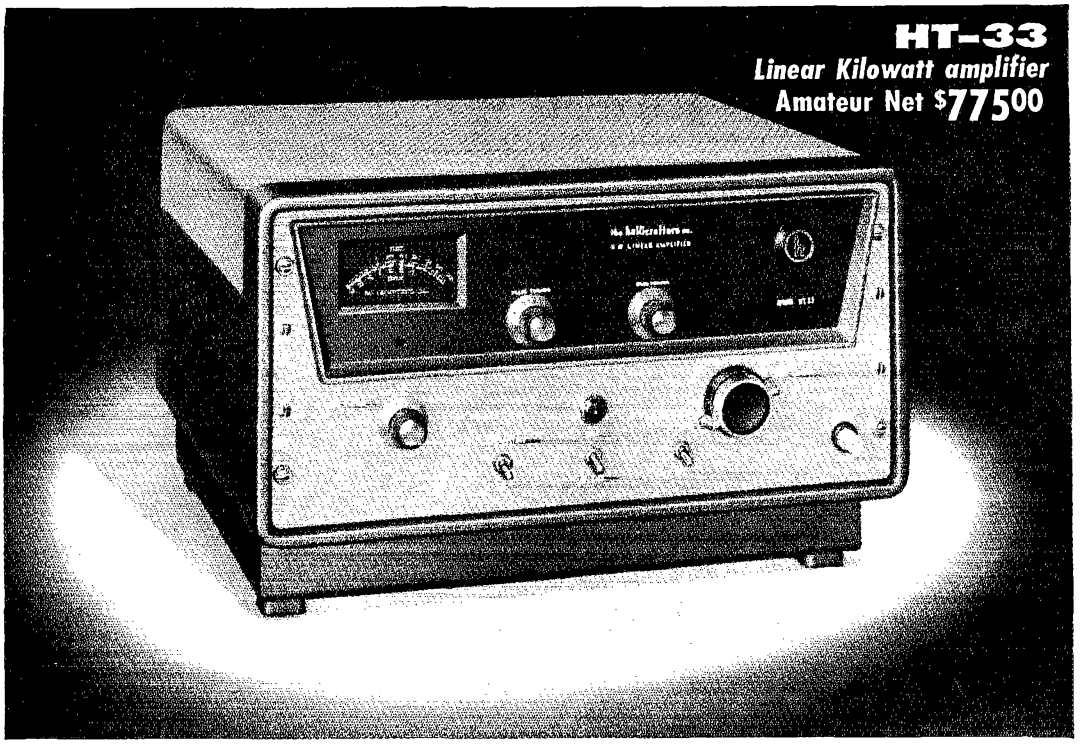
Saskatchewan	VE5HR	Harold R. Horn	1044 King St.	Saskatoon

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



New ceramic tubes assure longer life—greater dependability

Ultra-compact new HT-33 kilowatt amplifier first to employ extra-safe, extra-long-life ceramic power tube



Performance and dependability were key words in the Hallicrafters laboratories when the HT-33 was on the drawing boards. That's why our engineers insisted on new, costlier ceramic power tubes. Result: another Hallicrafters first that means consistently higher performance over a longer life.

Here's what ceramic tubes mean to you: 100 watts greater plate dissipation. Greater overload safety. Unbelievable ruggedness (they'll withstand repeated 11 milli-second shocks of 50g) and reliability. *Advanced design, too.* Notice the clean lines, the *compactness* of the HT-33—just 12⅜ inches high, for trim table-top application. See it, and compare these and other features, at your supplier's today.

MORE FACTS ABOUT THE HT-33

- Six amateur bands: 80, 40, 20, 15, 11-10 meters
- Simplified tuning: greater power transfer and higher harmonic attenuation.
- Low drive requirement: 8 watts P.E.P. will drive to full KW
- New type Neon Indicator light for fuse overload.
- Quieter operation: higher performance allows low speed blower.

NEW
FROM
hallicrafters
CHICAGO 24, ILLINOIS

WHERE THE BEST IDEAS IN COMMUNICATIONS ARE BORN

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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MILTON E. CHAFFEE W1EFW
53 Homesdale Ave., Southington, Conn.
Vice-Director: Frank L. Baker, Jr. W1ALP
91 Atlantic St., N. Quincy 71, Mass.

Northwestern Division

R. REX ROBERTS W7CPY
837 Park Hill Drive, Billings, Mont.
Vice-Director: Howard S. Pyle W7OE
3434 74th Ave., S.E., Mercer Island, Wash.

Pacific Division

HARRY M. ENGWICHT W6HC
770 Chapman, San Jose 26, Calif.
Vice-Director: Harold L. Lucero W6JDN
1113 Fillmore Ave., Dunsmuir, Calif.

Roanoke Division

P. LANIER ANDERSON, JR. W4MWH
428 Maple Lane, Danville, Va.
Vice-Director: Thomas H. Wood W4ANK
1702 N. Rhett Ave., North Charleston, S. C.

Rocky Mountain Division

CLAUDE M. MAER, JR. . . . . WØIC
740 Lafayette St., Denver, Colo.
Vice-Director: Carl L. Smith . . . . . WØBWJ
1070 Locust St., Denver 20, Colo.

Southeastern Division

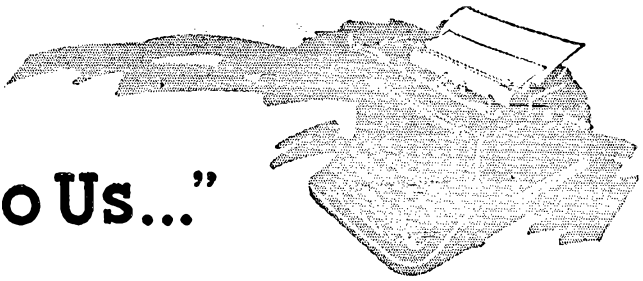
JAMES P. BORN, JR. W4ZD
25 First Ave., N.E., Atlanta, Ga.
Vice-Director: Thomas M. Moss W4HYW
P.O. Box 644, Municipal Airport Branch,
Atlanta, Ga.

Southwestern Division

WALTER R. JOOS W6EKM
1315 N. Overhill Drive, Inglewood 3, Calif.
Vice-Director: Virgil Talbott W6GTE
9226 Alexander Ave., South Gate, Calif.

West Gulf Division

GRADY A. PAYNE W5ETA
5103 Linden St., Bellaire, Texas
Vice-Director: Carl C. Drumeller W5EHC
5824 N.W. 58th St., Oklahoma City 12, Okla



"It Seems to Us..."

T.I.S.

For many years the League has made available to its members a Technical Information Service; without charge, a member may write Hq. concerning any technical problems he may encounter in building ham gear, and receive as detailed an answer as the volume of work permits. We are now handling TIS letters at the rate of more than 4,000 per year, most of them containing several questions. To enable us to continue this service in a form most useful to you, the members, we'd like to offer a few suggestions that will help both you and us toward that end.

In most cases, the information is more completely detailed in a *QST* article or the *Handbook* than we could possibly cover it in a letter. For this reason, it would save many a ham (and us!) a lot of time if he would study previously-published material, particularly in the *Handbook*, before writing. Then, if there is something that he doesn't understand, his letter to the TIS will pay the biggest dividends because his answer will be concentrated on information most useful to him.

From time to time, we receive requests for complete diagrams of a transmitter or receiver according to some specific tube line-up, or containing certain features that the ham thinks he wants. Aside from the fact that such a diagram, complete with values, would consume far more time than TIS or any other "free" service could possibly devote, a circuit diagram by no means assures that the equipment will work satisfactorily when wired according to the diagram. The *Handbook* covers the principles of circuit design in detail. For those who feel incapable of applying these principles to individual design, the best bet is to follow the plans of equipment that has been built and tested and described in *QST* or the *Handbook*.

Many letters, of course, refer to trouble-shooting. Such questions relating to manufactured equipment should be addressed to the manufacturer, since he is in a much better position than we are to be of greatest assistance. Trouble-shooting questions relating to other equipment should be accompanied by as much information as to circuit and behaviour as possible. Trouble-shooting by mail is vastly more difficult than a diagnosis which can be made on the spot.

One more suggestion which will "help us to help you" is to put your questions on a sheet or sheets of paper separate from other Hq. correspondence. If your query is a postscript on a membership renewal card form, or squeezed in at the bottom of a DX log, it probably won't get lost — but it will take more time to get an answer back to you than if the questions can go directly to the Technical Department. And, *please* — include your full name and address; a letter signed "Doc, W1XYZ," only takes additional handling time leafing through the Call Book.

Incidentally, not one ham in a hundred takes the trouble to tell us whether or not the suggestions we make solve his difficulties. Just a few lines on a postcard would not only let us know if we were of assistance, but would help us in solving similar difficulties for other hams.

THE AMATEUR'S CODE

ARRL's Board of Directors feel that, particularly with the current rapid growth of amateur ranks, our newcomers ought to be more fully exposed to the standards and traditions which have been part of our history. As one means to that end, we publish herewith "The Amateur's Code." Drafted by Paul M. Segal (now ARRL General Counsel) many years ago when he was 9EEA out in Denver and also a Board member, today it still remains a creed which every amateur should follow to keep our standards high.

The Amateur is Gentlemanly . . . He never knowingly uses the air for his own amusement in such a way as to lessen the pleasure of others. He abides by the pledges given by the ARRL in his behalf to the public and the Government.

The Amateur is Loyal . . . He owes his amateur radio to the American Radio Relay League, and he offers it his unswerving loyalty.

The Amateur is Progressive . . . He keeps his station abreast of science. It is built well and efficiently. His operating practice is clean and regular.

The Amateur is Friendly . . . Slow and patient sending when requested, friendly advice and counsel to the beginner, kindly assistance and coöperation for the broadcast listener; these are marks of the amateur spirit.

The Amateur is Balanced . . . Radio is his hobby. He never allows it to interfere with any of the duties he owes to his home, his job, his school, or his community.

The Amateur is Patriotic . . . His knowledge and his station are always ready for the service of his country and his community.

A.R.R.L. NINTH NATIONAL CONVENTION

The Convention Committee of the ARRL Ninth National Convention to be held in Chicago, August 30, 31, and September 1 — the Labor Day weekend — is hard at work to make this convention the largest and most comprehensive get-together in the history of ham radio.

Three floors of the famed Palmer House have been reserved for meeting rooms and exhibits, and special rates for rooms have been obtained for convention registrants and their families. Every room is air-conditioned, and for those registering in a group of four or more, dormitory-style accommodations have been arranged at a rate of $3.00 per night; for families of four or more, including extra beds and roll-aways, a special rate of $16.00 per night. All rooms with single occupant, $9.00 per night; single with double bed, $14.00; with twin, $15.00. Requests for room reservations should be made to the ARRL National Convention, Palmer House, Chicago, Ill.

One of the outstanding features of this three-day event is that all activities, including housing, will be under *one* roof. Scores of exhibits by manufacturers, dealers, and Armed Forces representatives will be on display in the spacious exhibition hall of the Palmer House.

Registration is $10.50 each when made by mail in advance, or $12.50 each if paid on the day of arrival. This includes admittance to all activities of the convention, the Saturday night show, and the Sunday night banquet. For those unable to attend the banquet, the rates are $5.50 and $6.50. Advance registrations may be made by sending check or money order to the Treasurer, Chicago Area Radio Club Council, Inc., P. O. Box 6797, Chicago, Ill.

ARE YOU LICENSED ?

• When joining the League or renewing your membership. It is important that you show whether you have an amateur license, either station or operator. Please state your call and/or the class of operator license held, that we may verify your classification.

COMING A.R.R.L. CONVENTIONS

March 8–9 — Michigan State, Grand Rapids

June 1–2 — Oklahoma State, Tahlequah, Okla.

June 7–8–9 — Dakota Division, St. Paul, Minn.

July 27–28 — West Gulf Division, San Antonio, Texas

August 16–17–18 — Southwestern Division, Long Beach, California

August 30–31–Sept. 1 — ARRL National Convention, Chicago, Illinois

A.R.R.L. MICHIGAN STATE CONVENTION

Grand Rapids, Michigan — March 9, 1957

The 10th annual ARRL Michigan State Convention sponsored by the Grand Rapids Amateur Radio Association will begin Saturday, March 9 at the Manger Rowe Hotel in Grand Rapids. The committee promises a memorable get-together with a prominent speaker highlighting the program. An entertaining program is also planned for the XYL, in addition to the YLRL meeting. Featured will be meetings on MARS, Emergency Corps, and s.s.b. Perhaps you will recall the tremendous Swap and Shop. This year, it should be bigger than ever, and you won't want to miss it. FCC examinations and a Mobile-Judging contest will round out a day of interest to all.

HAMFEST CALENDAR

Illinois — The Tri-Town Radio Amateur Club, Inc. will celebrate its 25th Anniversary at a dinner on March 16.

To celebrate its 25 years of continuous ARRL affiliation and group activity, club members and former members will gather at Surma's Restaurant in Homewood on the evening of March 16. Following the dinner, the evening will be spent in renewing friendships with old members who are no longer active in club affairs, as well as those who no longer reside in the area, with plenty of reminiscing for the XYLs, too.

Attendance wil be limited to 175 persons, with ticket sale priority to present and former club members. A limited block of tickets will be available to members of other Chicagoland amateur clubs who may desire to participate.

Tickets for the dinner are $3.25 per person. Former members of the club are invited to send their remittances and request for motel reservations if desired to: W9CNF, Vernon E. Smith, 1337 Vincennes Road, Chicago Heights, Ill., Club Secretary, or to Ticket Chairman W9FRZ, John S. Brown, 1811 Cambridge Road, Homewood, Ill. Ticket sales will close March 9.

Ohio — Saturday, April 6, at the Dayton-Biltmore Hotel, Dayton — the Dayton Amateur Radio Association will sponsor its annual Hamvention. This get-together is one of the most widely-attended, largest and finest held anywhere. The day-long program will again feature outstanding speakers on all phases of ham radio. Several excellent forums will be held throughout the day for DX-ers, Novices, v.h.f., etc. Bring the XYLs, as a fine program has been prepared for them. As in the past, the Grand Banquet will terminate the affair. Plan now to be one of the more than 2000 who will attend. Tickets are $5.50 in advance, including the Grand Banquet, up to and including April 3 — after this date, $6.00. Reservations, more information, and an attractive brochure may be obtained from D.A.R.A., P. O. Box 426, Dayton, Ohio.

Tropospheric Scatter Techniques for the Amateur

An Examination of the Potential of Tropospheric Scatter Communication at 144 Mc. and Up

BY DEAN O. MORGAN,* W2NNT

THE WORD SCATTER is a fairly recent addition to the radio dictionary. It describes a new technique of point-to-point propagation that has revolutionized the old concepts of communication. Admittedly, scatter has been a controversial subject among scientists, even those who have been working with it for some years. Thus, adaptation of scatter techniques to amateur communication may well offer us further opportunities for contribution to the advancement of the communications art.

Actually there is nothing really new about this type of transmission. Amateurs have been using forms of scatter for years, though, unfortunately, not many of us recognized what was going on at the time. For this reason it might be well to explain just what scatter is, in plain and simple language, and to show how we can make use of it in amateur v.h.f. communication.

Two of the most common concepts of communication are shown in Fig. 1, drawn on an arc that represents the earth's curvature. The first is

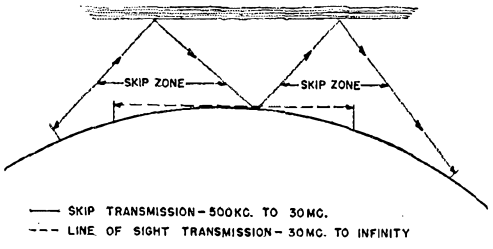


Fig. 1 — Two principal forms of propagation are skip, which involves reflection from an ionospheric layer, and line-of sight, which is essentially a local-communications medium.

called skip transmission. It is used for communication over distances from under one hundred to several thousand miles, and on frequencies from 500 kc. to 30 Mc. It involves reflection of the wave from one or more of the ionospheric layers far above the earth's surface.

The second is known as line-of-sight transmission. It is the means of short-distance communication on frequencies from about 30 Mc. up. Normal reliability for commercial use is predicated on transmission paths of about 40 miles, over open terrain, where it provides very strong steady signals with low power. Even though line-of-sight transmission was once supposed to be the ultimate in reliability at such a distance, ducting, refraction and magnetic disturbances cause blackouts to the degree where over-all reliabilities above 90 per cent are rare. Where extreme reliability is required, neither line-of-sight nor skip transmission can be depended on entirely.

In the process of observing the peculiarities of line-of-sight transmission, unexplained high signal levels were received consistently at distances far beyond the horizon. These signals could not be traced to tropospheric bending, ducting, knife-edge refraction, or to *E*- or *F*-layer skip. This ability to work well beyond the theoretical limit of v.h.f. propagation was also well known in amateur v.h.f. circles. Studies were made of many such observations, and from these Dr. Booker and Dr. Gordon of Cornell University evolved the theory of v.h.f. scattering.[1] Trial and error experimentation has substantiated the Booker-Gordon theory, in large part.

Forms of Scatter

There are two general types of scatter transmission. One is known as *forward propagation tropospheric scatter* and the other as *forward propagation ionospheric scatter*. Both are often referred to as *beyond-the-horizon transmission*. Much has been written about ionospheric scatter in *QST*,[2] so it will not be dealt with here. I will, however, differentiate between the two, and show methods by which tropospheric scatter systems may be set up on 144 Mc. and higher frequencies. From the calculations systems may be planned for any frequency above about 100 Mc.

Ionospheric scatter is useful mainly for distances of 600 to 1300 miles, and on frequencies in the 25–70-Mc. region, with bandwidths of less than 50 Kc. The bandwidth restriction is the result of multipath propagation, which results in the selective fading distortion so well known on lower frequencies.

As its name implies, tropospheric scatter makes use of eddies in the troposphere [3] to accomplish bending. Frequencies all through the v.h.f. range, and up to infinity can theoretically be used. Most present usages are in the 400–1000-Mc. range,

* 40 Pine Ridge Circle, North Syracuse, New York.

[1] Booker and Gordon, "A Theory of Radio Scattering in the Troposphere," *Proc. IRE*, April, 1950, p. 401. The theory was interpreted for amateur readers by Moore, "Over the Hills and Far Away," *QST*, Feb., 1951, p. 13.

[2] Moynahan, "V.H.F. Scatter Propagation and Amateur Radio," *QST*, March, 1956, p. 43.

[3] Tropospheric scattering masses are actually more complex in structure than this simple definition implies. For readers seriously interested in ionospheric and tropospheric scattering masses, the "Scatter Propagation Issue" of *IRE Proceedings* is recommended (Oct., 1955).

with some work having been done at lower and higher frequencies.

Recently the trend has been to frequencies in the lower 300-Mc. region. Bandwidth is limited, theoretically, to a maximum of four or five megacycles, but in practice it has been extended to as much as 20 Mc.[4] In general, distances up to 400 miles or so can be covered with a well-designed system, but there is reason to believe that this is not the practical maximum, and that ranges may eventually be extended to 1000 miles or more.

How the tropospheric scatter signal is propagated is shown in Fig. 2. In effect, the primary wavefront passes through an area of the atmosphere that is turbulent. This turbulence can be

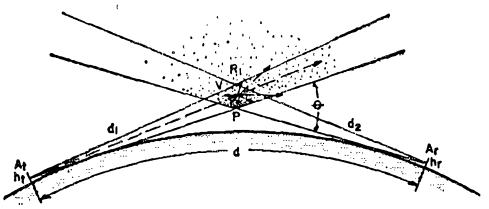


Fig. 2 — Tropospheric scattering takes place when the radiated wave enters a region of atmospheric turbulence. The energy is scattered in all directions, a small portion returning to reach well beyond the visual horizon.

likened to the eddies in a moving stream. The energy is reradiated in all directions (arrows) in the area of turbulence, and a small part of it is returned to the earth at points far beyond the visual horizon. The effect is not unlike that of a sharp light beam entering fog or smoke.

Planning a Scatter System

A typical scatter communications system is shown in Fig. 3, which gives the factors that must

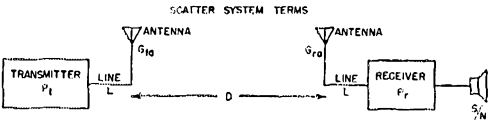


Fig. 3 — Typical scatter system, and definitions of terms involved in its effectiveness.

P_t — Transmitter power above 1 watt, in db.
G_{ta} — Transmitting antenna gain, in db.
D — Distance between antennas, in miles.
G_{ra} — Receiving antenna gain, in db.
L — Losses in transmission lines, in db.
P_r — Input power to receiver below 1 watt, in db.
S/N — Signal-to-noise ratio, in db.

be taken into account in determining its effectiveness. These include the transmitter power, antenna gains at both ends of the system, the line losses in the antennas, the distance between them, the power input to the receiver, and the signal-to-noise ratio. Also required are the system bandwidth and the receiver noise figure.

These terms are largely self-explanatory, with the exception of the input to the receiver, P_r, which is determined from

$$P_r = KTB - NF - (S/N)$$

[4] Bell System Miami-to-Havana Link.

where KTB is the thermal noise, expressed in db. below one watt, NF is the receiver noise figure in db., and S/N is the signal-to-noise ratio in db.

With the use of these terms the performance of a scatter communications circuit can be predicted with a fair degree of accuracy. Let us assume that we want to set up a scatter system on 144 Mc. We have a transmitter delivering 200 watts of power, transmitting and receiving antennas with gains of 10 db. each, and line losses totalling 4 db. over-all. We feel that a 10-db. signal-to-noise ratio will be adequate. The receiver will have a noise figure of 6 db., which is readily obtainable at 144 Mc. All the factors given in Fig. 3 are now available, so we can find the distance over which this combination will operate satisfactorily.

Calculation of the receiver input power, P_r, is greatly simplified by the determination of the factor KTB from the Table below. Thermal noise is

Bandwidth:	100 Mc.	10 Mc.	1 Mc.	100 kc.	10 kc.	1 kc.
KTB in db. below 1 watt:	124	134	144	154	164	174

directly related to bandwidth. If the bandwidth is one megacycle, KTB is approximately 144 db. below one watt. If the bandwidth is decreased ten times, the value of KTB increases by 10, and so on. For amateur work, a bandwidth of 10 kc. is certainly more than adequate. From the table, we see that this bandwidth will yield a KTB of 164 db. below one watt. The receiver input power is thus

$$P_r = KTB - NF - (S/N)$$
$$= 164 - 6 - 10, \text{ or}$$
$$148 \text{ db. below 1 watt.}$$

Our transmitter power output, 200 watts, is 23 db. above 1 watt. Transmitting and receiving antennas add 10 db. each, for 20 db. more. Line losses subtract 4 db., leaving a total system gain of 187 db. This system gain may then be used in the nomogram, Fig. 4, to determine the distance over which it will work. The figures in the middle column of the nomogram are propagation losses for free-space scattering between isotropic antennas. By laying a straightedge at the frequency, 144 Mc., right, through the 187-db. loss point, we find that 180 miles is the approximate distance over which our equipment will cover in communication by tropospheric scattering.

It should be noted that there are other gains and other losses that must be taken into account before a really accurate estimate can be made of the nature of a scatter path. One gain results from the fact that the nomogram is based on isotropic antennas; therefore another 2.3 db. gain can be assumed if our antenna gains were in reference to half-wave dipoles. A possible loss results from the presence of galactic or manmade noise, neither of which is included in the calculations. Coupling and line losses may be difficult to determine accurately in amateur installations.

These are known in engineering circles as

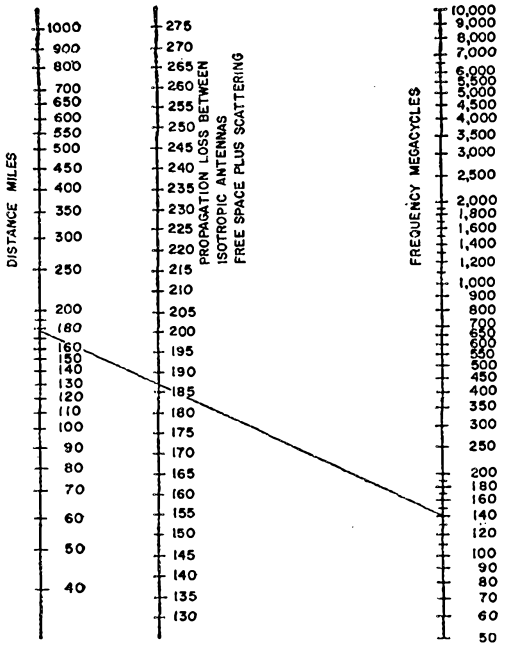


Fig. 4 — Nomogram for estimating performance of a scatter circuit. Slanting line represents example given in text.

"fudge factors" — items that are difficult to measure accurately, but which can affect the results of any system planning appreciably if they happen to add up in one direction or the other.

Now we have other contingencies sneaking up on us. Fig. 5 shows what may be expected in the way of signal variations, with regard to percentage of time. This is commonly referred to as a reliability curve. It shows the percentage of total time that any given median level will be exceeded. As can be seen, the signal level will be at least 6 db. above the predicted value 10 per cent of the time. It will be no more than 8 db. below the predicted value 90 per cent of the time, and no more than 38 db. below the predicted value 99.99 per cent of the time. From this curve we can see what needs to be added to the figure we got from our nomogram, if we want very high degrees of reliability. Amateurs are seldom concerned with such reliability, so the discouraging figures shown for the reliabilities greater than 90 per cent need not worry us.

Reliability better than 50 per cent is probably rare in amateur communication, but if we want to go up to the 90 per cent figure, we need only pick up another 8 db. somewhere in our circuit. There are many ways by which this might be done. Power increases, higher antenna gains, improved receiver noise figure, and the employment of diversity techniques are some of the means by which reliability on experimental v.h.f. scatter circuits have been pushed to the almost infinite figure of 99.999 per cent.

In the example given, we could pick up at least 5 db. through increasing power to the legal limit. We might get 4 db. more at each end by antenna improvements, for a total of 8 db. Going to single-side-band techniques could yield another 9 db. Doing all these things would net us 22 db., and push our reliability up to well over 99 per cent. Or it would extend our transmission distance, with the previous reliability, out to nearly 350 miles. Going to diversity techniques, a step beyond most amateurs' capabilities, could push the effectiveness of the system out still further. Use of narrow-band reception and c.w. transmission with high stability are possibilities that should not be overlooked.

The expected signal level of Fig. 5 includes all the common types of signal variations, such as:

1) *Scintillations* having a time duration of the order of one to ten cycles per second. These are seldom less than 5 db., and may be as much as 25 db. These may be nearly eliminated by the use of either space or frequency diversity. Audio filters in the output also may greatly reduce the effects of scintillations on intelligibility.

2) *Diurnal Fluctuations* ranging from 5 to 10 db. from day to night are fairly common. These should be allowed for if reliable communication is needed over a 24-hour daily schedule, but they can often be avoided in amateur scheduling.

3) *Seasonal Variations* may provide as much as 20 db. more signal in summer than in winter, in middle latitudes. This can be represented as 10-db. improvement with respect to the median of Fig. 5. Up to 15-db. improvement over the

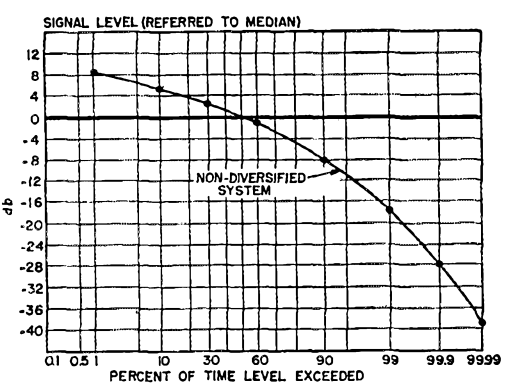


Fig. 5 — Reliability curve for a scatter communications system without diversity techniques.

values in Fig. 4 appears to be realizable in tropical areas like Southern Florida, during most of the year. The latitude of South Carolina should add 5 to 10 db. The values are approximate for the latitude of New York, while upper Canada would have to subtract about 10 db.

Antennas

Using double or triple diversity reception will nearly eliminate scintillations, as well as provide 2 to 4 db. more signal. Space diversity might be applicable to some amateur installations. It involves two or three antennas spaced at least 6 wavelengths center to center, a combiner or switcher, and two or three receivers.

(Continued on page 142)

Parallel Dipoles of 300-Ohm Ribbon

An Easily-Constructed Multiband Antenna System

BY L. RICHARD,* ON4UF

• This article describes a neat and easy way of making a multiband antenna of the parallel-dipole type. If the necessary space is available, an 80-meter dipole of heavy wire can be added, and the assembly described here suspended from it.

THE idea of several dipoles, each cut for a different band, connected in parallel and fed with a common feed line to make a multiband antenna is not new. The principle has been discussed in earlier issues of *QST*.[1]

There are, of course, many ways to build such an antenna. In the scheme shown in Fig. 1, the construction has been simplified by making use of 300-ohm ribbon transmission line. A single length of ribbon makes two dipoles. Thus, two lengths, as shown in the sketch, serve to make dipoles for four bands. Ribbon with copper-clad steel conductors (Amphenol type 14-022) should be used because all of the weight, including that of the feed line, must be supported by the uppermost wire.

Two pieces of ribbon are first cut to a length suitable for the two halves of the longest dipole. Then one of the conductors in each piece is cut to proper length for the next band higher in frequency. The excess wire and insulation is stripped away. A second pair of lengths is prepared in the same manner, except that the lengths are appropriate for the next two higher frequency bands.

A piece of thick polystyrene sheet drilled with holes for anchoring each wire serves as the central insulator. The shorter pair of dipoles is suspended the width of the ribbon below the longer pair by clamps also made of poly sheet. Intermediate spacers are made by sawing slots in pieces of poly sheet so that they will fit the ribbon snugly. The inner ends of the dipole sections are wired together and to the transmission line which is anchored on the central insulator. All joints are soldered and coated with coil dope.

Dimensions, as determined both on scaled-down models and full-size antennas, are shown in the table. They were determined by use of a grid-dip oscillator and an antennascope impedance bridge. The system shows an impedance of close to 70 ohms on all bands, and the s.w.r. on a 75-ohm line is very low and nearly constant.

When this antenna replaced my traditional long wire, nice reports began immediately to pour in. ON4UF is situated in the middle of the city, and the antenna is strung between short poles atop two tall buildings with a vertiginous gap between. At the beginning, I used flat 75-ohm ribbon (Amphenol 214-023) for the feed line. Hoping to reduce the very high noise level here from domestic appliances, business machines, TV hash and other spurious radiations, I tried a line of shielded twin conductor (similar to RG-22/U), but without any improvement. I finally replaced the shielded twin conductor with a semi-air-spaced coax cable of European make because I can connect it directly to my Collins 32V-1 transmitter and discard the antenna tuner necessary for a balanced feeder.

The 7-Mc. dipole, operating at its third harmonic, presents a low impedance to 21-Mc. energy. Therefore it might be possible to dispense with the separate dipole for 21 Mc. However, it was felt that the 21-Mc. dipole might help to fill in the sharp nulls in the third-harmonic pattern.

I have recently built for another ham a three-band ground-plane antenna using the same technique which is also giving good results.

Table of Antenna Dimensions

Frequency (Mc.)	*Length Each Half*		
	Meters	*Feet*	*In.*
7.1	9.95	32	8
14.1	4.60	15	1
21.2	3.44	11	2
28.2	2.34	7	8

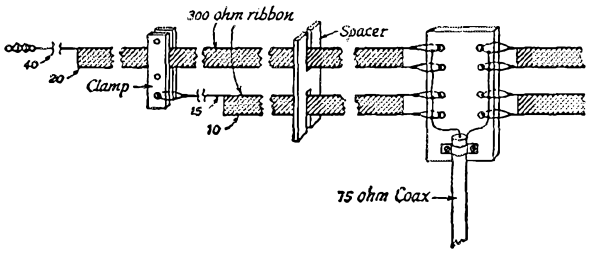


Fig. 1 — Sketch showing how ON4UF's multiple-dipole antenna system is assembled. The excess wire and insulation are stripped away.

* 32 Rue Capitaine Crespel, Brussels, Belgium.

[1] Berg, "Multiband Operation with Paralleled Dipoles," *QST*, July, 1956.

"Proxos"—A Labor-Saving Spotting Switch

Automatic Switching of the Variable-Frequency Oscillator

BY E. LAIRD CAMPBELL,* W1CUT AND BYRON GOODMAN,** W1DX

• In the past a few v.f.o.s have been described that used trick knobs which, given a gentle squeeze, would turn on the v.f.o. for *spotting* purposes. "Proxos" requires no squeeze and can be applied to practically any existing v.f.o.; it is an electronic device that turns on the v.f.o. before your hand touches the knob and turns it off when you remove your hand. This is no gadget for the spot frequency man, but it is just the ticket for the fellow who cruises about the bands.

DURING A RECENT after-hours bull session on "The Perfect Ham Station" a suggestion was made that the v.f.o. should turn on automatically when the operator's hand approaches the dial, thereby removing the need for manually throwing a switch each time a frequency check or change is made. This seemed like a good idea, and suddenly it was realized that there was no need to wait for such a device; it could be built right now. All it requires is a capacitive-operated relay.

At first it was thought that the device could be used only with a specially-built knob assembly that was insulated from the rest of the transmitter. "Why not use a ring, sleeve, or feeler wire?" was the next suggestion. "Placed near the v.f.o. knob it might be sensitive enough to do the job." Fired up with these ideas and the excitement of knowing that there was a good chance they would work, we put together a breadboard model. We experimented with different shapes and sizes of "feelers" and found that a wire loop placed around and slightly back of the v.f.o. knob gave adequate sensitivity. The device kicked on when the v.f.o. knob was grasped but would not trigger when adjacent knobs were touched.

Any proud father will tell you a baby needs a name, and we came up with "Proxos," for "proximity-relay-operated-oscillator-switch."

The Circuit

The heart of the circuit is a thyratron tube. Many hams have never run across thyratrons, because these tubes find very little application in ham radio. They have been used in some electronic bug keys, and a few oscilloscopes use them to generate the sweep signal, but they aren't in widespread use. The thyratron is a gas-filled triode or tetrode, and the gas (instead of a vacuum) gives it a very special property. A negative voltage on the grid can prevent plate current flow but, unlike the hard-vacuum tube, it doesn't control the amount of plate current. In other words, it is an off-on proposition; once plate current has started to flow, when the negative grid bias has been reduced below a critical point, the plate current depends entirely upon the limiting resistance in the plate circuit. Once plate current has started, the grid can be made as negative as you please and the plate current will continue merrily on. *Interrupting* the plate-current flow by making the plate voltage low

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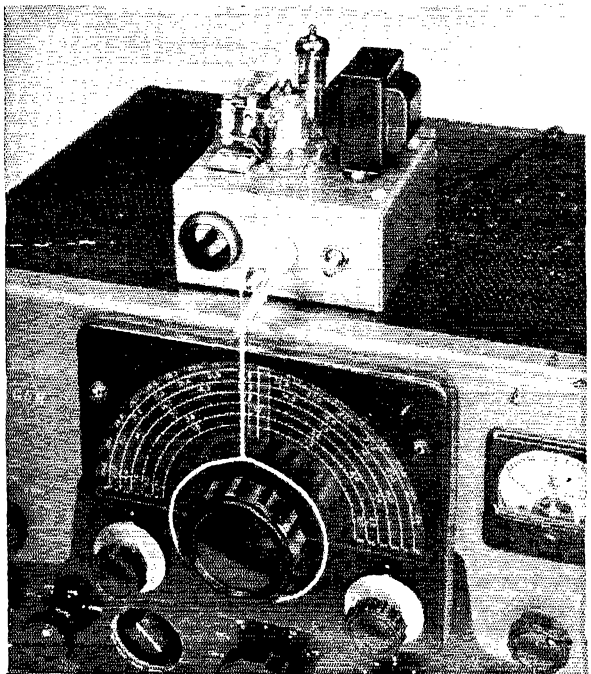


Proxos used on a commercial transmitter. The "feeler wire" is adjustable to facilitate use with different transmitters. The unit is set on top of the transmitter in a position that puts the feeler loop close to the panel.

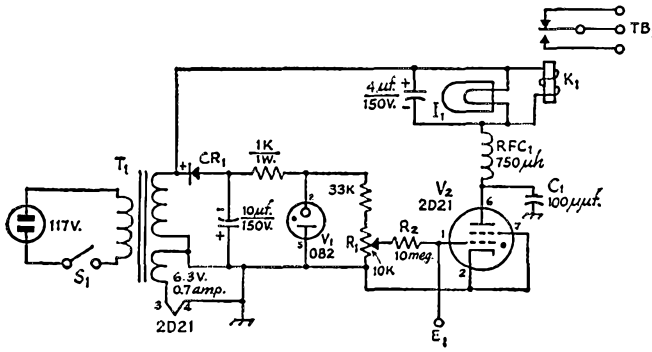


Fig. 1 — Schematic diagram of Proxos, the magic switch. Resistors are ½ watt unless otherwise specified.

CR_1 — 65-ma. selenium rectifier (Federal 1386).
I_1 — 115–125-volt pilot lamp (G.E. C7)
K_1 — 10,000-ohm sensitive relay (Potter & Brumfield LB-5).
R_1 — 10,000-ohm potentiometer (Mallory U-18).
S_1 — S.p.s.t. toggle switch.
T_1 — Power transformer, 120 v. at 50 ma. sec.; 6.3 v. at 0.7 amp. (Thordarson 26R32).

♦

or negative will enable a negative grid to recapture control of the plate current, and block it off even though the plate voltage is raised again. A practical way to interrupt the plate current is to use 60-cycle a.c. on the plate; then the grid has 60 chances a second to regain control.

The schematic diagram of Proxos is shown in Fig. 1, and we can use it to explain the operation. Output voltage from the d.c. power supply is held to close limits by the regulator tube V_1. A portion of this regulated voltage is available for the grid of V_2, depending upon the setting of the arm of R_1. This negative voltage is used as a fixed bias on the grid of V_2. Instead of applying a steady voltage to the plate of the thyratron, it is fed 60-cycle a.c. from the secondary of T_1, via the control relay K_1. Let's assume that we have set the arm of R_1 to a voltage sufficient to hold V_2 off, even at the peak of the positive cycle applied to its plate.

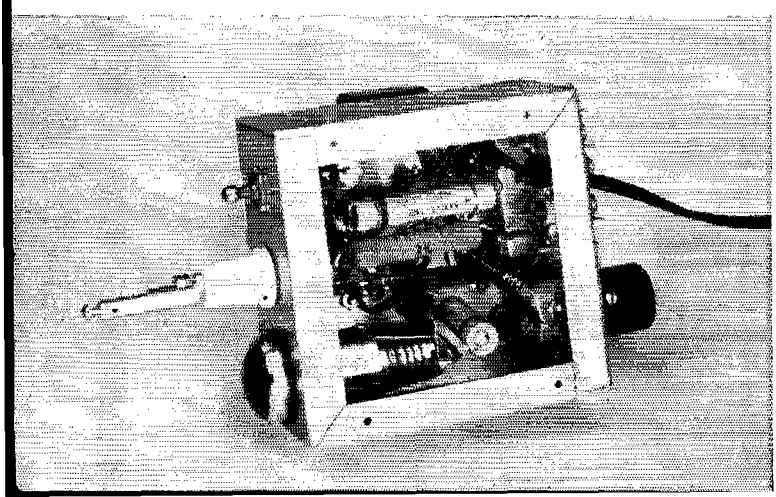
The grid of V_2 is rather "high" above ground, by virtue of the 10-megohm resistor, R_2, and is very sensitive to any stray electric fields. (You know how sensitive the grid of a speech amplifier is — bring your hand or a piece of metal near it and you get a large hum output. That's with a 1- or 2-megohm resistor from grid to ground; here the 10-megohm grid return makes the grid very sensitive.) Your body picks up a.c. hum around the shack and when a hand is brought near terminal E_1 the hum is coupled to the grid of V_2 through the small capacitance between hand and E_1. This hum is sufficient to trip the thyratron and cause plate current to flow. If the coupled hum were exactly out of phase with the alternating voltage applied to the plate of V_2, the tube wouldn't conduct, but you can overcome this condition easily, as will be explained later.

Although K_1 is actuated by pulsating d.c. through V_2, the 4-μf. capacitor prevents any humming or chattering of the relay. The lamp I_1 gives a visual indication of the relay operation, just in case you have headphones on and can't hear the slight click of the relay as it pulls in. Some undesirable "hash" is generated by V_2 as it fires, and this will be heard in the receiver unless the r.f. filter (C_1 and the 750-μh. choke) is included.

Construction

Proxos is built on a 4 × 4 × 2-inch utility cabinet (ICA 29840). The major components, which are wired before placing the cover on the box, are mounted on one of the cover plates. Sensitivity control R_1, pilot lamp I_1, feeler post E_1, power switch S_1, and terminal strip TB_1 are mounted on the box. There is nothing critical in the layout or wiring except that it is a good idea to keep the lead from the control grid of V_2 as short as possible. The lead from resistor R_2 also should be cut very short and soldered right to the pin of the tube socket. A 4-terminal tie point strip is used for wiring junctions; it can be seen in the bottom view photograph, above the 4-μf. electrolytic capacitor. When connecting the electrolytic capacitors, be careful to observe the proper polarity.

(Continued on page 144)



♦

Bottom view of Proxos. A ceramic feed-through insulator is used to bring the "feeler" lead through the chassis.

♦

Design Considerations of 50-Mc. Converters

Steps Toward Solving Overload Problems

BY CALVIN F. HADLOCK,* W1CTW/W1IQD

• With the level of activity rising all the time, designing a satisfactory converter for v.h.f. use involves more than striving for the lowest possible noise figure. Here is how front-end overload and cross modulation were dealt with in a well-known commercial product for the 50-Mc. band.

DURING the past several years, two factors have been instrumental in placing more exacting requirements on the performance of receivers operating in the 6-meter amateur band. The first was the opening of the band to holders of Technician licenses, which resulted in a large increase in band occupancy. The second factor is the growing interest of amateurs in the technique of scatter propagation, a technique demanding the use of very high transmitter power levels. Kilowatt transmitters are becoming more common. It has even been advocated by some v.h.f. men that the legal power limit should be raised to 5 or even 10 kw. to enable amateurs to better exploit the features of scatter propagation! Also, higher gain antennas are being brought into use.

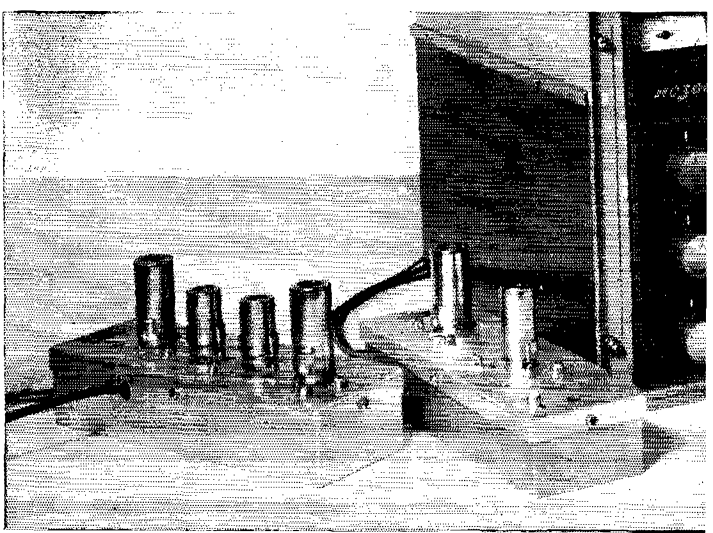
Formerly, the all-important objective in the design of a 6-meter receiver was the best possible sensitivity. Manufacturers and amateur experimenters vied with one another in obtaining the best noise-figure possible. But now the increase in interference has focussed attention on the fact that it is equally important to keep undesired strong signals from deteriorating the performance of the receiver. The situation is particularly bad in areas of high population density such as the Boston area. A property of 6-meter receivers which is becoming more and more important is their resistance to front-end overload and cross modulation, which result from adjacent strong but unwanted signals.

Troubles from Strong Signals

Cross modulation and front-end overload are different effects stemming from the same cause. They are caused by very strong signals close enough to the desired signal to get through the relatively-broad selectivity of the r.f. input circuits, but far enough removed so that they do not get through the relatively-sharp i.f. selectivity. They may not, therefore, be heard as signals, but their presence makes itself known by reducing the over-all gain of the receiver (front-end overload) or by placing the modulation of the offending signal directly onto the desired signal's carrier (cross modulation). Front-end overload is caused when blocking bias voltages are developed on the r.f. amplifier and mixer grids. It is commonly recognized in c.w. reception as a rise and fall in background noise without reception of any apparent interfering signal. Cross modulation is produced by rectification and remodulation in the input circuits, and it is entirely a phone phenomenon. Both can and usually do occur at the same time if the interfering signal is modulated.

Obviously, the less amplification a signal receives before it reaches the mixer stage and is converted into an i.f. signal, the less chance there is of overload and cross modulation. On the other hand, there is a certain minimum gain that must be provided in the front-end circuits to obtain the best sensitivity. One should hear the noise of the antenna (or input circuit) and not that of the first mixer. Achieving the best freedom from overload effects while getting

* % The National Company, Malden, Mass.



The performance of a v.h.f. converter cannot be measured by the number of tubes it uses. The converter at the right provides better performance than its more complex predecessor beside it.

March 1957

satisfactory sensitivity calls for the choice of an optimum front-end gain, as a compromise between the two desired features.

A Front End That Was "Too Good"

Originally, a broad-band 6-meter converter was designed for use with the National NC-300 receiver, which had for its primary consideration the best sensitivity possible. To achieve this, attention was given to providing high r.f. amplification before the mixer stage, and to obtaining the best noise figure possible within the limits of allowable current drain from the accessory socket of the NC-300 receiver. A 6BZ7 dual triode was used in a series cascode circuit, followed by a 6AK5 pentode as a second r.f. amplifier. This was followed by a 6AK5 mixer excited by a 19.5-Mc. crystal oscillator, using the triode section of a 6U8 tube. The pentode section of the 6U8 was unused, this tube type having been used to obtain identical tube complements in the 6-, 2-, and 1¼-meter converters as furnished for use with the NC-300 receiver. The output of the mixer is connected to the NC-300 receiver input, feeding the special X band which tunes from 30 to 35 Mc. The circuit diagram of this original converter is shown as Fig. 1. Noise figures of 1½ db. were measured.

Although this converter had excellent sensitivity, its use on the air eventually showed that where 50-Mc. activity was heavy an improvement in its front-end overload characteristics was desirable. Further, it was considered possible that the excellent noise figure obtained was not really necessary in practical use, and that a higher noise figure might be tolerated without any loss in the ability to receive weak signals. In fact, this approach might be preferable if a better overload characteristic and a simpler circuit could be achieved. A redesign of the converter was decided on.

Pentode vs. Triode

Many years of operating experience on 6 meters had brought a conviction that a good pentode r.f. amplifier stage could give sufficient gain and as good a noise figure as is needed to receive the weakest of signals. If the predominant noise is that coming into the front end of the receiver from the antenna, any reduction in receiver noise will gain nothing, since you are not hearing receiver noise in the first place. Experience had shown that the antenna noise on the 6-meter band is high enough to cover up the noise generated in a good pentode r.f. amplifier stage. Theoretical and empirical support to this conviction are found in a radar paper by Norton and Omberg,[1] and calculations based on this article will be given later.

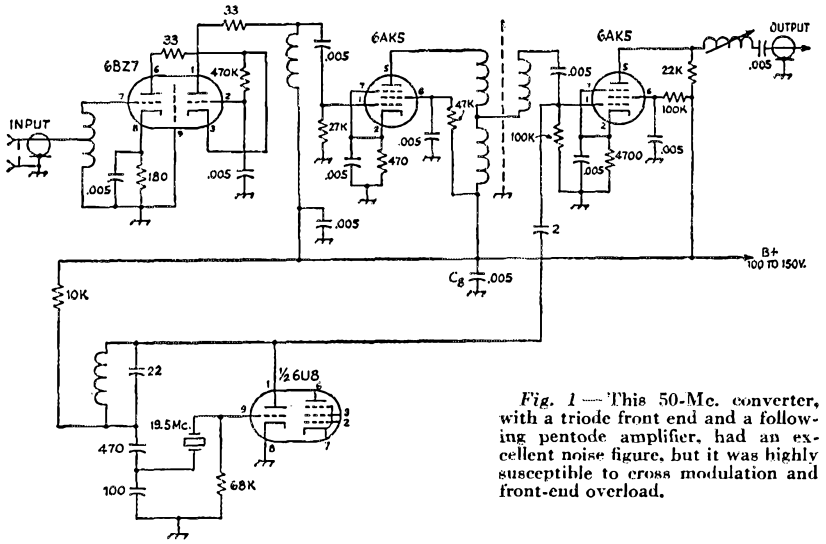


Fig. 1 — This 50-Mc. converter, with a triode front end and a following pentode amplifier, had an excellent noise figure, but it was highly susceptible to cross modulation and front-end overload.

A redesign of the 6-meter converter was undertaken to provide a unit with better overload characteristics, and at the same time the circuit was simplified. The new circuit is shown in Fig. 2. The 6BZ7 cascode amplifier was replaced by a 6CB6 pentode stage. The two triodes of the original cascode circuit were in series across the B+ voltage, which means that each triode had only half the supply voltage on its plate circuit. The higher the plate voltage the greater the input signal that can be handled without producing objectionable rectification. When a pentode stage is substituted, the full B+ voltage can be applied to the tube. Also, the pentode is known to be good with respect to its ability to handle strong signals.

The single pentode stage should give adequate gain to produce good sensitivity. Therefore, the second r.f. amplifier stage was removed, as it would not contribute to better sensitivity, and because the extra gain would be detrimental to the desired overload characteristics. The 6AK5

[1] Norton and Omberg, "The Maximum Range of a Radar Set," *Proceedings of IRE*, January, 1947.

mixer was replaced by the unused pentode section of the 6U8. The crystal oscillator circuit remains intact. The input circuit is single-tuned as is the i.f. output coil of the mixer. The input circuit is tapped so that when it is loaded with a normal 75-ohm input impedance it has a band width equal to that of the output circuit, which resonates the plate capacitance of the mixer tube. These two circuits form a flat staggered pair. The interstage circuit between the r.f. and mixer stages is bottom-coupled, with an adjustable mutual inductance. It is adjusted for a slightly overcoupled condition, thereby providing an additional pass-band filter. The noise figure of the new converter measures 3½ db. over most of the band, rising to 4 db. at 54 Mc. The circuit is very stable.

Sources of Noise

Now, let's see how much difference it has made to settle for a 3½-db. noise figure in place of the 1½-db. figure of the original converter. As pointed out in Reference 1, two types of noise are present in an antenna at all times. These are temperature noise and cosmic noise. Note that radiation resistance is not a real resistance and therefore does not, of itself, introduce noise into a receiver except as it absorbs noise radiation from its environment. Temperature noise is that noise picked up as fluctuation noise energy in the matter surrounding the antenna. Its level is independent of frequency. Cosmic noise is picked up from outer space. Its intensity varies somewhat depending on where your antenna is pointed. However, a reasonable average can be taken for purposes of practical calculations. Cosmic noise grows weaker in intensity very rapidly as the frequency at which it is measured is increased. There are, of course, other forms of noise that are present part of the time such as sunspot noise, man-made noise (e.g., ignition), thunderstorms, etc. These noise energies also decrease rapidly with increasing frequency. Since we are interested in what the converter will do under the best of conditions, we will not consider these part-time noises. At 50 Mc., cosmic noise is predominant, and temperature noise is relatively unimportant.

On page 12 of the IRE article is a set of curves indicating the expected noise level at various frequencies. We are interested primarily in the curve showing a combined cosmic and temperature noise factor *vs.* frequency. An equation is given for use with the curve which will express the combined noise factor for the antenna noise and the receiver noise.

The equation is:

$$NF' = \frac{NF}{LT} + EN - 1$$

where NF' is the over-all noise figure of receiver and antenna

NF is the noise figure of the receiver only

EN is the external noise factor where

$Na = EN\ kT$ ($T = 300$ degrees).

LT is a factor due to loss in the transmission line. We will assume, as did the article, a value of 0.8 as representative of the feeder efficiency. At 50 Mc., the curve shows a value of $EN = 15$. The original converter had a measured noise figure, $NF' = 1.5$ db. Conversion to a ratio for use in the above equation gives $NF' = 1.41$.

For it, then

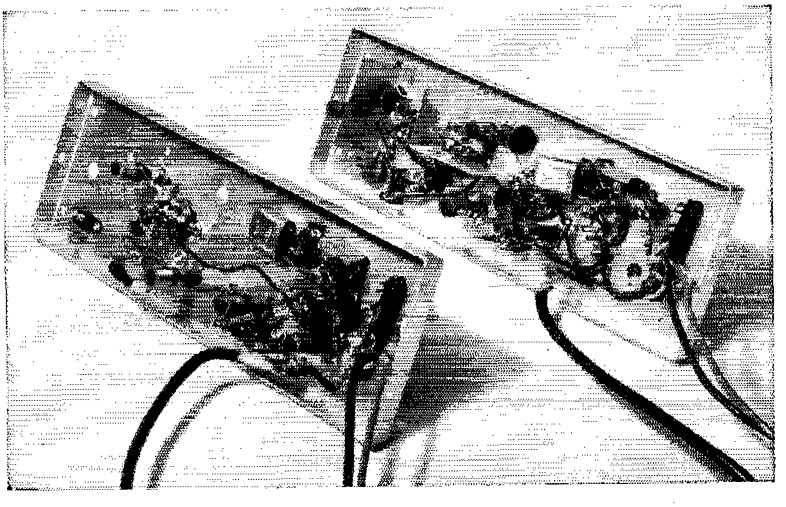
$$NF' = \frac{1.41}{.8} + 15 - 1 = 15.76$$

The new converter had a measured noise figure of 3.5 db. As before, this must be converted to a ratio before it can be substituted in the formula. The result is 2.24.

For the new converter, then

$$NF' = \frac{2.24}{.8} + 15 - 1 = 16.8.$$

Now, how do the noise levels of the two converters sound to the ear? Since sound levels heard by ear are conveniently measured in decibels, it is necessary to convert the over-all noise-figure ratios into decibels. They work out to be 11.98 and 12.26 db., respectively, a difference in



Bottom view of the two 50-Mc. converters shows plainly the simpler circuitry of the revised model, left.

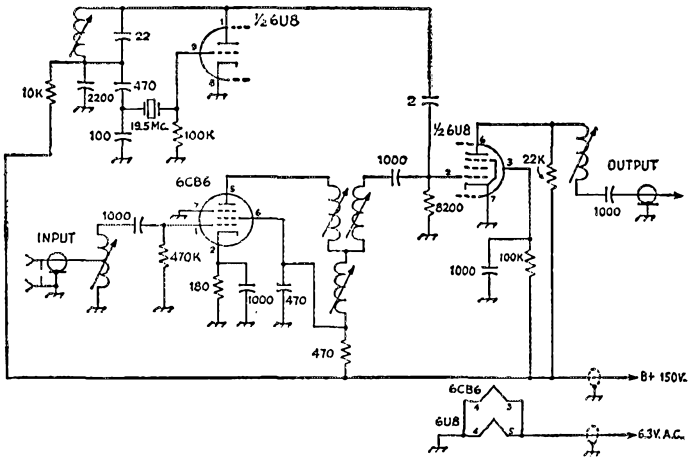


Fig. 2 — Revised model of the 50-Mc. converter shows marked reduction in circuit complexity. Though its noise figure is slightly higher than the earlier model, the over-all performance is much superior.

noise level of approximately 0.3 db. It is quite universally agreed that one cannot tell a change in audio level of less than 1 db. by ear; thus the two converters would sound the same. The second converter with its higher noise factor will receive signals as well as the original converter when the same antenna is used on both. The greater freedom of the second converter from cross-modulation effects, plus its simplicity, indicate that the new design is definitely superior. Listening tests have borne this out.

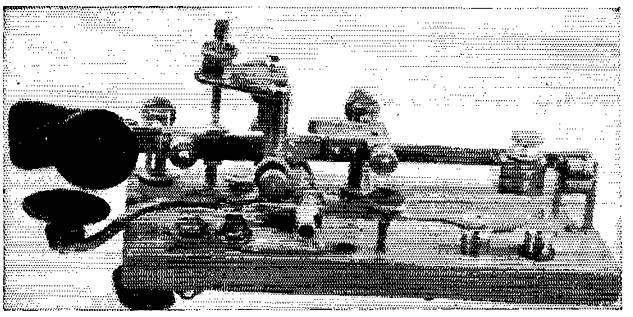
Effects of Frequency on External Noise

While the above is the case at 50 Mc., it is not necessarily so at 144 Mc. and definitely not so at 220 Mc. or higher. The curve shows that the antenna noise decreases rapidly between 50 and 144 Mc., so that at the higher frequencies a better receiver noise figure may produce better reception. The use of directional antennas does not alter the case appreciably, as the noise picked up (at least by the simpler antenna arrays), is relatively constant. Less noise is picked up from some directions, but that "on the beam" is increased by the antenna gain, so the noise fed to the receiver remains about the same.

The design of the new 6-meter converter brings out the fact that, while a good noise figure is desirable, there is a limit beyond which nothing is gained by further improvement. A 50-Mc. converter with a better noise figure may look good on a noise meter or signal generator but still show no advantage when connected to an antenna. If other important features of the receiver are compromised to get the better noise figure, then the resulting receiver is definitely inferior.

A little thought will show that, at still lower frequencies in the h.f. range, the noise figure becomes less and less important. This is why many inexpensive receivers can compete successfully with high-priced jobs at 80 meters, but not at 10 or 15 meters. It also explains why a communications engineer designing h.f. receivers thinks in terms of signal-to-noise ratio and band width, while radar men are deeply concerned with noise figure. The crossover point would appear to lie somewhere around the two-meter band.

Strays



W3CCH wanted both a bug and straight key at his operating position, but didn't want the straight key to take up extra space or require holes in the desk. So, using a little ingenuity and fashioning the rocker bearing from an old volume control shaft and bushing, he combined both keys on a single base.

• Technical Topics—

Suppressed-Carrier A.M.

Among the papers in IRE's single-side-band issue (*Proceedings of the IRE*, December, 1956) there is one describing a double-side-band system[1] devised by John P. Costas, W2CRR, which has been offered as an alternative to s.s.b. The comparative merits of the two systems will probably give rise to considerable controversy — we hope on a level that will develop a higher ratio of light to heat than characterized some of the early s.s.b.-a.m. arguments in amateur circles.

The transmitted signal in this system is double-side-band a.m. without a carrier. Such a signal is no novelty, and the power advantage (in the transmitter) that could be realized over conventional a.m. has been appreciated for many years. The difficulty has been that both side bands cannot be utilized, as a practical matter, on any existing type of receiver, since the carrier must be reinserted at the receiver not only exactly on frequency but also in exactly the right phase. This puts an impossible burden on the conventional-receiver local oscillator.

Dr. Costas has solved the problem by making use of the phase information contained in the two side bands to control the phase of the locally-inserted carrier. This is done by utilizing 90-degree r.f. and a.f. networks in an arrangement that at first glance resembles the s.s.b. reception method based on the phasing system. Full details have not been published, but it appears that such a "synchronous detection" unit would be of about the same complexity as the phasing type "signal slicer" used as an outboard accessory for selectable side-band reception of either s.s.b. or a.m. signals.

Why Detection Is a Problem

The mechanism of detection with a locally-supplied carrier is a basic ingredient of both this and s.s.b. reception, so it is worthwhile to look at it a little more closely. Fig. 1A shows a single side band having a relative frequency distribution more or less typical of voice wave forms. With the frequency scale increasing as shown, this is a lower side band associated with a carrier frequency (normally eliminated at the transmitter and reinserted at the receiver) represented by the vertical line at *O*. Each frequency component in the side band beats against the carrier frequency, in the detector, to produce an audio output frequency equal to the difference between the carrier frequency and the frequency of that component. When the reinserted carrier is properly placed, all the beat tones combine to reproduce the original modulation. In the average voice the maximum amplitude is in the a.f. components in the 200- to 500-cycle region, represented in the drawing by the tallest sideband components.

When this single side band is being received the proper place to put the reinserted carrier frequency is at *O*. Suppose, however, that the tuning is not accurate, resulting in placing the reinserted carrier frequency at *X*. This will cause all the beat tones to be shifted upward in frequency by the number of cycles difference between *O* and *X*. If this difference is not more than a couple of hundred cycles the signal will be quite intelligible still, but will take on a high-pitched and somewhat unnatural characteristic. If the difference becomes too great the intelligibility is lost.

Now imagine the reinserted carrier to be moved in the opposite direction from the correct frequency so that it approaches frequency Y. At first all the beat tones are shifted *downward* by the amount of frequency error, but when the reinserted carrier frequency actually gets into the

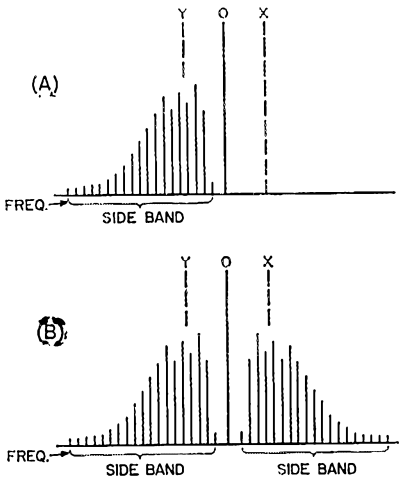


Fig. 1 — (A) Single- and (B) double-side-band signals with properly-placed reinserted carrier (O) and mistuned carriers (X and Y).

side band, some components will be on one side of it and some on the other. If the reinserted carrier frequency is at Y, for example, side-band components equally spaced on either side of Y will give the same beat tones. The components to the right of Y come out either higher or lower than they should and those to the left come out too low. Thus the original relationship between the voice components is far more completely destroyed than it was when the reinserted carrier was moved to X. When the reinserted carrier is in the high-amplitude part of the side band most of the beat tones are quite low-pitched,

[1] Costas, "Synchronous Communications," *Proc. IRE*, December, 1956.

giving a sort of "whump-awk" effect with no intelligibility. The received signal deteriorates more rapidly when the carrier frequency is moved in this direction than it does when it is moved the same number of cycles in the other direction.

Detection with D.S.B.

When both side bands are present, mistuning of the reinserted carrier causes both effects to be present simultaneously. If, in Fig. 1B, the reinserted carrier is moved from its proper frequency, *O*, to *X*, the lower side band (to the left of *O*) will give a detector output corresponding to that described in connection with Fig. 1A with the reinserted carrier at *X*. This part of the detector output will be intelligible to the same extent as in the single-side-band case.

However, the higher side band (to the right of *O*) will give the same sort of output as was obtained when the reinserted carrier was at *Y* in Fig. 1A. Thus an unintelligible signal is superimposed on the intelligible one. It is exactly like a properly-tuned s.s.b. signal being interfered with by another equal-amplitude s.s.b. signal on a slightly different suppressed-carrier frequency. With concentration, the desired message can be copied, but the interference cannot be escaped unless one of the side bands is rejected by the receiver before detection. This is so even though the error in the reinserted carrier frequency may be very small; an error of a few cycles gives the voice a "gravelly" sound that disappears only when the reinserted frequency is exactly right. Even then a very slow frequency drift will give a "rollover" effect like selective fading because of the change in phase of the side bands with respect to the carrier.

Although rejecting one of the side bands will eliminate the self-interference, the tuning continues to be more critical than it is with s.s.b. This is because the unused side band must be highly attenuated in order to avoid the effects described above. This can be done satisfactorily when the receiver has a pass band with high skirt selectivity, but any mistuning which allows a part of the undesired side band to get into the pass band prevents "clearing up" the signal just as much as though the receiver had nothing more than conventional selectivity.

D.S.B. vs. Other Systems

A comparison between s.s.b. and suppressed-carrier double-side-band a.m. should of course be based on proper and complete utilization of each system at both the receiver and transmitter. As applied to amateur communication, such a comparison would have to be purely theoretical at the present time because there are no synchronous-detection receivers in use, nor is there any information available on how to convert existing receivers to synchronous detection. Because of this and other factors we do not propose to discuss s.s.b. *vs.* suppressed-carrier a.m. at this stage. Instead, let's examine what suppressing the carrier of an a.m. signal might offer in the way of advantages over conventional a.m. transmission with a full carrier, using receivers available now.

Side-Band Power

When side-band power is under consideration the question of wave form always has to be settled — usually by choosing single-tone modulation because it is simple to handle. The results are then extrapolated to cover voice wave forms with a few generalities about the differences between them and sine-wave tones. Since this is about the only usable procedure, it will be followed here. There is good justification for it since the two systems being compared are both a.m. With modulation of this type the envelope of a carrier modulated 100 per cent is shown in the familiar pattern of Fig. 2A. The modulation envelope of a suppressed-carrier a.m. signal having the same peak-envelope power is shown in Fig. 2B; this is the "two-tone signal" well known to s.s.b. operators who own oscilloscopes and use them.

In the envelope of Fig. 2A the average side-band power is equal to one-half the carrier power, which in turn is equal to one-fourth of the peak-envelope power — all very familiar relationships. Since $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$, the average side-band power is one-eighth the peak-envelope power, and further is equally divided between the two side bands. Thus each side band has one-sixteenth of the peak-envelope power.

In Fig. 2B the power is all side-band power, since there is no carrier. With this envelope shape

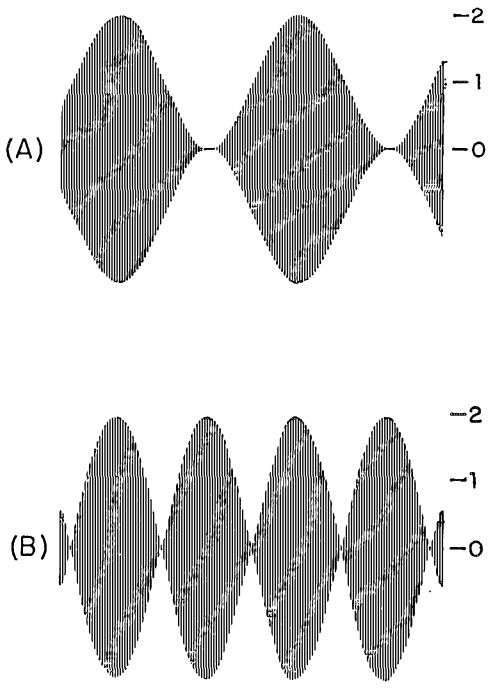


Fig. 2 — A — Envelope of 100-per-cent modulated a.m. signal with sinusoidal modulation; B — envelope of suppressed-carrier signal with sinusoidal modulation. The peak-envelope amplitude is the same in both cases.

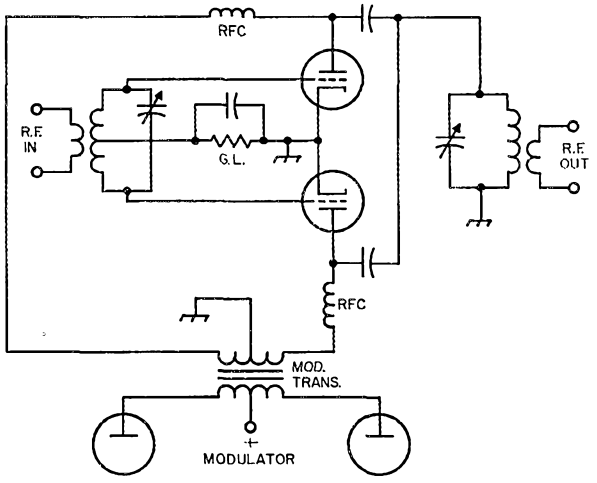


Fig. 3 — Basic plate-modulation circuit for producing a suppressed-carrier a.m. signal, using high-level modulation. The principles of balanced modulators apply. Both r.f. circuits (grid and plate) operate at the r.f. signal frequency. The suppressed-carrier signal also may be generated at low level and amplified by linear amplifiers.

the average power is equal to one-half the peak-envelope power. Comparing this with the side-band power in the conventional a.m. signal, the ratio is $\frac{1}{2} \div \frac{1}{8}$, or 4 to 1. That is, the side-band power in a suppressed-carrier a.m. signal is four times as great as in a full-carrier 100-per-cent-modulated a.m. signal, assuming the same peak-envelope power in both cases. The power is still divided equally between the two side bands, so the power in one side band of a suppressed-carrier d.s.b. signal is equal to one-fourth of the peak-envelope power.

Tube Operation

A natural question here is this: Will the same tube or tubes handle the same peak-envelope power with both types of signal?

The plate loss with either signal is equal to the difference between the average power input and average power output. The average power in the conventional a.m. signal is 1.5 times the carrier power, or, from the figures above, $\frac{3}{8}$ of the peak-envelope power ($1\frac{1}{2} \times \frac{1}{4}$). In the suppressed-carrier signal the average power is $\frac{1}{2}$ the peak-envelope power, as previously stated. If the modulated stage operates at constant efficiency — e.g., plate modulation — the plate loss will be the same with either type of signal when the average power output is the same. For equal average-power outputs, the peak-envelope power in the suppressed-carrier case must be reduced to three-fourths of the permissible peak-envelope power with conventional carrier, so on a plate-dissipation basis the side-band-power advantage of suppressed-carrier transmission is 3 to 1, not 4 to 1.

Now this is all clear-cut and logical enough, but applies strictly only in the case of continuous single-tone modulation. It serves principally as a take-off point for applying factors determined (very often, at least) by the optimism of the estimator and his enthusiasm for one or the other side of the argument. It is known, for example, that the average power of voice wave forms is generally low as compared with a sine wave. Because in suppressed-carrier transmission there is no continuous plate dissipation (amounting to at least two-thirds of the total dissipation in the case of conventional a.m.) advantage also can be taken of the low duty cycle in speech transmission. However, the peak-envelope output cannot be pushed up indefinitely; this would overload the tubes with respect to either plate voltage or plate current, or both, even though the plate loss might be below rating.

Possibly the best conclusion to reach in this case is that with suppressed-carrier a.m. the peak-envelope rating, rather than plate dissipation, is the limiting factor, and that this rating should be the same as with full-carrier a.m. (double the carrier-only values of d.c. plate voltage and plate current). This restores the 4-to-1 power advantage. It might be argued that this is somewhat unfair to carrier a.m., since the plate dissipation will not rise 50 per cent with voice modulation as it does with a sine-wave modulating signal. Taking this into account would permit perhaps 25 per cent greater input and output, but would lead to excessive peak-envelope input in the carrier a.m. case. The details cannot be resolved without study of the maximum ratings and characteristics of the particular types of tubes considered.

Plate Modulation

The suppressed-carrier signal can be generated by using any of several forms of balanced modulators; the technique is familiar from s.s.b. operation. With plate modulation, the basis of the figures given above, the essentials of a typical circuit are given in Fig. 3. The plates of the r.f. amplifier (two tubes are required) must be driven with out-of-phase (push-pull) audio voltages from the modulator; this requires a modulation transformer having a center-tapped secondary. The r.f. circuit shown has push-pull drive to the grids, with the plates connected in parallel. This arrangement can be reversed, if desired, so the grids are driven in parallel and the plate circuit is arranged in push-pull. The actual tubes could

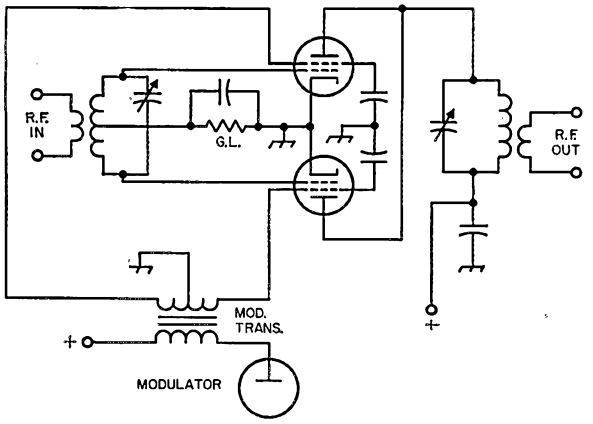


Fig. 4 — Basic screen-modulation circuit for suppressed-carrier a.m. In a practical circuit it may be desirable to use a small amount of negative bias on the screens in order to improve the linearity at the "crossover" point (zero axis in Fig. 2-B).

be pentodes or tetrodes, of course, with the usual dropping resistor (two required here) for reducing the audio voltage applied to the screens. There are no d.c. voltages on the plates and screens, but the control-grid bias and excitation should be normal for the tube types.

It must be realized that the plate input power is supplied entirely by the a.f. amplifier. There is no increase in side-band power output merely because the carrier is eliminated. With any plate-modulation system the actual side-band power is the power output of the modulator multiplied by the plate efficiency of the modulated amplifier. Thus a given Class B modulator will give the same "talk power" with either system, and if more side-band power is wanted, it has to be supplied through the medium of increased audio-frequency power.

Grid Modulation

Since suppressed-carrier transmission offers no possibility of saving audio power with plate modulation, it is probably of more interest to compare it with conventional a.m. when some form of grid-bias modulation is used. With carrier a.m., the rule of thumb is that the carrier power output is equal to one-half the rated plate dissipation of the modulated-amplifier tube or tubes. This is because the plate efficiency at the unmodulated-carrier level is just one-half its value at the peak-envelope level, and the efficiency at the latter level is assumed to be $\frac{2}{3}$. (The actual peak efficiency will vary somewhat with different tubes and the choice of operating conditions, but the figure of $\frac{2}{3}$ or 66 per cent is a fair-enough average.)

If the linearity of a grid-bias-modulated amplifier is good, the average efficiency when generating the type of wave form shown in Fig. 2B will equal 0.636 times the peak-envelope efficiency. At full output, then, the average plate efficiency will be $0.636 \times \frac{2}{3}$, or 42.4 per cent. Thus the plate loss with carrier a.m. is $1 - 0.333 = 0.666$, and with suppressed-carrier a.m. is $1 - 0.424 = 0.576$. The plate input therefore can be increased in the ratio 0.666/0.576, or 1.15 to 1, when the carrier is suppressed. This increases the peak-envelope power in the same ratio. Hence the comparative side-band power is $4 \times 1.15 = 4.6$ to 1. A 15 per cent increase in peak-envelope power input is not likely to exceed any tube ratings in this case.

However, the comparison again is on the basis of continuous sine-wave modulation. Voice wave forms can be neglected in the full-carrier case, since the limiting condition of maximum dissipation is reached during those necessary pauses when there is no modulation. With the carrier suppressed, though, the situation is similar to that occurring with a linear amplifier on s.s.b. The limit to peak-envelope power here is where the rising curve of optimism intersects the descending curve of caution — or, in practice, where the amplifier flashes over, since the safe operating plate voltage (rather than plate dissipation) is usually the determining factor. Multiplying by 2 is probably reasonable with most tubes, so it is no doubt fair to say that, using grid-bias modulation, about 8 times as much side-band power can be obtained from a given tube by suppressing the carrier.

A basic screen-modulation circuit for the purpose is given in Fig. 4. The r.f. connections are similar to those in Fig. 3, but the modulating signal is applied in push-pull to the screens. This is a rather common form of balanced modulator.

Enter the Receiver

Comparisons of this nature are valid from the transmitting standpoint, but are indicative of actual over-all results only when the full side-band output is utilized at the receiving end. This is done in the case of standard a.m. In the case of suppressed-carrier a.m. both side bands can be used only by a receiver having the synchronous-detection system with ordinary detectors, as pointed out earlier, one of the side bands *has to be rejected* in the receiver, turning the signal into s.s.b. before demodulation. This requires selectivity of the same order as is incorporated in modern selectable-side-band receivers.

When only one of the two side bands is utilized,

half the received power is thrown away. Because of the mechanics of detection the two side bands of a conventional a.m. signal, properly combined, produce four times as much audio power output as one side band alone. There is thus a 4-to-1 loss in "talk power" associated with the receiving method.[2] However, since the receiver band width is one-half that required for reception of both side bands, there is a 2-to-1 reduction in noise power, so the over-all reduction in signal-to-noise ratio is 2 to 1, not 4 to 1. Applying this figure to those worked out earlier we have, for the presently-realizable improvement in signal-to-noise ratio using suppressed-carrier *vs.* full-carrier a.m., 2 to 1 (3 db.) in the case of plate modulation (provided the audio power output of the modulator is quadrupled), and 4 to 1 (6 db.) in the case of grid-bias modulation.

These figures are not quite the whole story. One of the principal benefits of s.s.b. in amateur communication is the absence of a carrier, both in the kind of break-in operating it makes possible and in the elimination of heterodyne QRM. Suppressed-carrier a.m. offers comparable voice break-in possibilities and the same freedom from heterodyne interference. It does not reduce the total band width occupied by an a.m. signal, which is why we do not consider it an ultimate "competitor" of s.s.b. in the amateur field. Rather, it seems to us to be an intermediate step — in the right direction, certainly, since any system that leads to the eventual elimination of phone carriers will contribute to better conditions in the phone bands.

A point in its favor, at least for those of us who still build our own equipment, is the simplicity of the transmitter as compared with s.s.b. circuits. Balanced modulators of the types discussed are nearly as easy to adjust as ordinary plate- and grid-modulation circuits. The practical construction of a grid-bias modulation amplifier of this type was shown by the writer in the June, 1951 issue of *QST*;[3] designed for reduced-carrier transmission, this circuit included provision for inserting a desired amount of carrier at the transmitter so the signal could be demodulated in an ordinary receiver. It can be used for suppressed-carrier transmission simply by omitting the positive bias on the carrier-tube screen.

— *G. G.*

[2] For a more detailed discussion of this point see "The A.M. Equivalent of Single Sideband," *QST*, January, 1954.

[3] Grammer, "Practical D.S.R.C. Transmitter Design," *QST*, June, 1951. The principles of the system — which can be considered to be the general case of amplitude modulation, with full-carrier and suppressed-carrier signals as limiting cases — were described in the May, 1951 issue.

VE5s Aid Meteor Observers

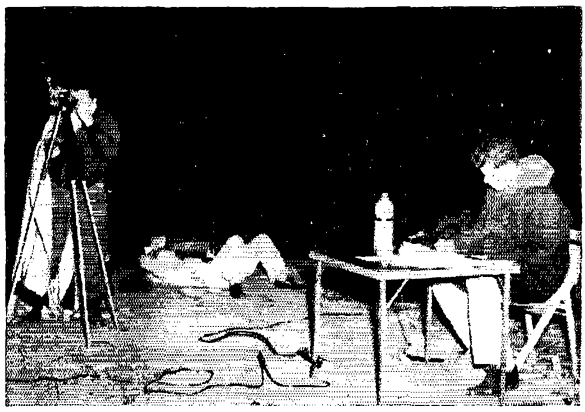
LATE LAST SUMMER the Regina Astronomical Society approached VE5XX, president of the Regina Amateur Radio Association, about using amateur radio facilities to handle traffic between several observing points in connection with the Perseid Meteor Shower. The type of traffic to be handled related to time checks, counts, and photographic data.

Despite some problems in manpower and equipment the Regina ARA successfully provided communications for the Regina Astronomical Society and contributed materially to the satisfactory meteor observations and the collection of data. An indication of the volume of activity and traffic is the fact that for a time meteors were being recorded at the rate of 60 per hour.

One of the lessons learned included the desirability of using something other than 75 meters at a time and season when aurora was prevalent. Also, the necessity for having some good portable gear at hand and the necessity for providing plenty of relief operators for extended operations were other points brought home.

Still another by-product of the sessions was the interests in the opposite hobbies stirred up amongst the radio and astronomy enthusiasts.

Those participating in the planning and accomplishment of an exercise which was of good practical use and good public relations included VE5s CG, CM, DG, FG, GB, GH, HN, JK, JW, LU, WM, WW and XX.



Regina Astronomical Society base line crew operating in VE5LU's potato patch at his farm site. From left to right, George McNeely, John V. Hodges, and Bill Clipsham. — *Photo by VE5XX*

The Evils of Multiband Antenna Systems —And the Cure

BY LEWIS G. McCOY,* W1ICP

• Just when you're happy as a lark with your multiband antenna, some guy will come along and tell you what's wrong with it, as W1ICP does in this article. But he doesn't stop there; he shows how easy it is to correct the situation.

A LOOK through *The Radio Amateur's Handbook* of ten years ago will show that there was only one commercial transmitter and one homemade transmitter using the pi-network output circuit. However, the 1957 edition of the *Handbook* shows that pi networks are the rule rather than the exception. It would be safe to say that over 90 per cent of store-bought transmitters use this type of output circuit.

Why the trend to pi networks? The answer is simple. The pi network lends itself readily to compact band-switching transmitter design. It means the elimination of plug-in coils, and this is exactly what the average Joe Ham wants. He may never operate anything but 40 c.w., but he still likes to know that all it takes is a flip of the switch to put him on another band. He also has heard that a pi network is an excellent circuit to prevent harmonic radiation and is just what he needs to keep from getting TVI. This last is not completely true. A pi network is no better than the "old-fashioned" parallel-tuned, link-coupled circuit. In fact, an improperly-tuned pi network can give very poor harmonic suppression.

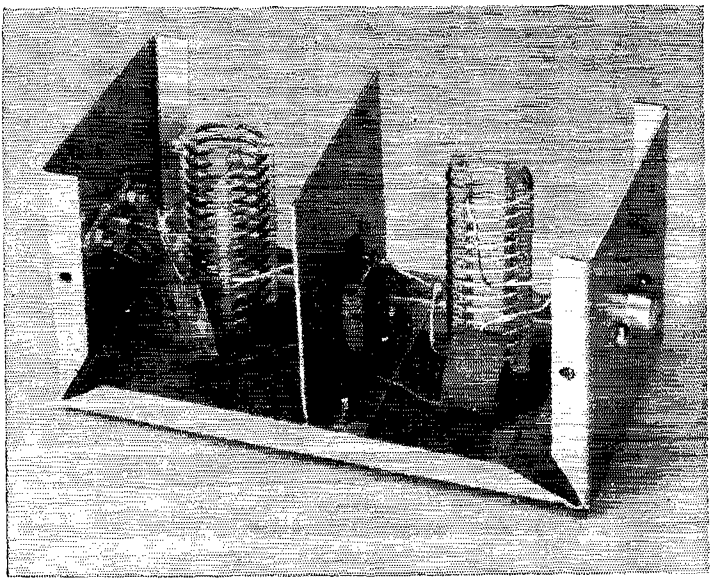
About now the Novice is going to ask, "What has all this to do with multiband antenna systems?" Bear with us and we'll show you. Most transmitters using a pi are designed to work into a 50- or 75-ohm load, which of course suggests the use of coax feed line of that impedance. If you have a multiband transmitter it naturally follows that you want a multiband antenna that is coax fed. This desire has led to the development of trap antennas and multiple dipoles[1] fed with a single coax line. No one wants an antenna coupler between the transmitter and the feed line because this will mean additional adjustments. Right here is where we run into troubles.

A multiband antenna is exactly what the term implies; it is good for more than one band. If we put an 80-meter signal into the antenna the signal will be radiated. If that 80-meter signal has a 40-meter harmonic our multiband antenna is going to accept and radiate the harmonic as well as the fundamental. (Have *you* heard from the FCC lately?) If the antenna were an 80-meter job only it would be resonant at 80 but it would still be capable of accepting and radiating any odd-harmonic (3rd, 5th, 7th) energy.

This leads up to another question: How much harmonic signal can we tolerate? The FCC is quite specific in its definition of our rules on this

* Technical Assistant, *QST*.

[1] Berg, "Multiband Operation with Paralleled Dipoles," *QST*, July, 1956.
Greenberg, "Simple Trap Construction for the Multiband Antenna," *QST*, Oct. 1956.



This unit is the 40-meter band-pass filter. The shield between the two filter sections is a piece of aluminum, slightly narrower than the width of the box.

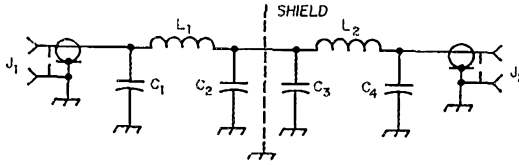


Fig. 1 — Schematic diagram of the band-pass filter.

C_1, C_2, C_3, C_4 — 3.5 Mc. — 820 μμf., 500 volts, mica.
— 7 Mc. — 470 μμf., 500 volts, mica.
— 14 Mc. — 220 μμf., 500 volts, mica.
— 21 Mc. — 150 μμf., 500 volts, mica.
— 28 Mc. — 110 μμf., 500 volts, mica.

J_1, J_2 — RCA type phono jacks.

L_1, L_2 — 3.5 Mc. — 12 turns No. 18, 1-inch diam., 8 t.p.i. (B & W Miniductor 3014).
— 7 Mc. — 13 turns No. 18, ⅝-inch diam., 8 t.p.i. (B & W Miniductor 3006).
— 14 Mc. — 10 turns No. 18, ½-inch diam., 8 t.p.i. (B & W Miniductor 3002).
— 21 Mc. — 7 turns No. 16, ⅝-inch diam., 4 t.p.i. (B & W Miniductor 3005).
— 28 Mc. — 7 turns No. 18, ½-inch diam., 4 t.p.i. (B & W Miniductor 3001).

(Two lengths of Miniductor coil stock are required for each filter.)

point. All spurious signals must be attenuated to a point where they will not cause interference to other services. It is extremely difficult to apply exact figures on harmonic content in a transmitter — there are too many factors that get into the act to foul up our calculations. However, let's make a few assumptions to illustrate what one can expect in harmonic attenuation.

The Decibel

In discussing attenuation of harmonics we use the relative-power unit called the decibel (abbreviated "db." and pronounced "dee bee"). You'll hear the term db. a lot in your amateur career, so it would be well to become familiar with it. To familiarize yourself with power gains and losses expressed in db., look at Table I. You can see from the table that if you had a power increase of "10 db.," it would be the same as a power increase of 10 times. If we had a harmonic reduction of 20 db., the harmonic power would be decreased to 0.01 of its original or comparison value.

Getting back to our discussion of tank circuits and multiband antennas, let's assume for the moment that our amplifier is properly tuned, and our second harmonic is down 30 db. from the fundamental. This is a reasonable figure and about what we can expect in the average tank circuit. It *does not* take into consideration any stray harmonic coupling that might be present in the transmitter. A glance at Table I indicates that 30-db. reduction means a power ratio of 0.001. With a 100-watt signal, the second harmonic would be 0.1 watt if the harmonic reduction were 30 db. Many amateurs would say a 0.1-watt signal isn't worth discussing — it just wouldn't cause you any trouble. Well, let's look at the record. Recently, amateurs have been experimenting with transistor rigs using powers on the order of a fiftieth of a watt. One ham has worked over *10,000 miles* with such a rig. It doesn't take a mathematical wizard to figure out that a tenth of a watt is considerably stronger than a fiftieth.

One of the better methods for finding out if you are radiating unwanted signals is to have a nearby ham listen for harmonics. Don't pick out someone next door to you; his receiver will be overloaded by your signal and he is likely to hear all kinds of spurious signals (which will be generated in his receiver — not your rig). Find someone who is at least four or five hundred yards away. A careful check on his part will soon show whether or not your rig is clean. If there are unwanted signals present, then obviously you must eliminate them if you're going to avoid notices from the FCC. If the signal several hundred yards away is barely detectable above the noise level it isn't worth worrying about, but a solid S5 or S6 signal is just cause for concern.

The Half-Wave Filter

A simple way to obtain the necessary attenuation is with a half-wave filter[2]. A filter of this type installed in the feed line will permit any signal within the band to reach the antenna, but signals above and below the band are attenuated. Thus this type of filter protects against both harmonics and undesired low-frequency signals. The protection against harmonics is always good; the protection against undesired low-frequency signals is something of a variable with different transmitters and antennas.

Harmonic attenuation with this filter is approximately 30 db. for the second, 50 db. for the third, and 60 db. for the fourth, increasing with each harmonic. The filter will eliminate the need for the customary low-pass TVI filter, and thus the band-pass filter does double duty for us. The drawback, and it is not a serious one, is that a separate filter is needed for each amateur band. The simplest way to operate with the filters is to build one for each band and equip the filters with phono type jacks. Then the feed line can be quickly plugged into the proper filter.

It is impractical to switch filters for each band for one very good reason. The purpose of the filters is to stop unwanted signals from reaching the antenna. A switching arrangement

(*Continued on page 146*)

[2] "Harmoniker," Vol. 4, No. 6, *G-E Ham News*.

Table I

Power gain and reduction factors

Db.	Power Gain	Power Reduction
10	10	0.1
20	100	0.01
30	1000	0.001
40	10,000	0.0001

A Dual Keyer for Differential Keying

Using Two Relays To Key a Transmitter

BY LAURENCE B. STEIN, JR.,* W1BIY

A DIFFERENTIAL KEYER using relays is readily adaptable to a variety of transmitters because the relays place no restrictions on how the oscillator and amplifier stages are keyed. For example, the oscillator can be keyed in the cathode (as it probably was in the first place) and the amplifier can be keyed in the grid, screen or cathode. The applications are restricted only by the current and voltage limitations of the relay contacts.

A dual keyer was designed with the following objectives:

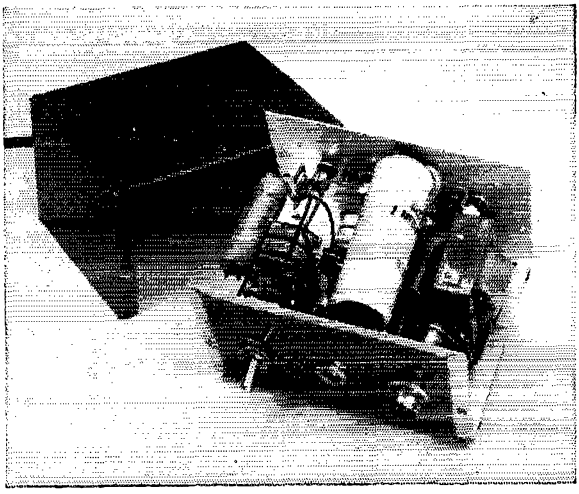
1. A delay of about 2 milliseconds between the closure of the oscillator relay and the amplifier relay.
2. A delay of about 4 milliseconds between the opening of the amplifier relay and the opening of the oscillator relay.
3. Closed time of the amplifier relay equal to closed time of the controlling key.
4. Keyer self-powered and isolated from the a.c. line.
5. Low voltage on the contacts of the controlling key.

The basic circuit that will do the trick is shown in Fig. 1A. Relay K_1 (contacts not shown) is the one that will turn the oscillator on ahead of the amplifier and turn off the oscillator after the amplifier has been stopped. The value of R_1 is low compared to the coil resistance of K_1. Relay K_2 keys the amplifier stage; it will close later than K_1 and open earlier. R_2 has a value equal to the coil resistance of K_2. The resistances of the two relay coils are equal, and the voltages across the coils will behave as shown in Fig. 1B. Since R_1 is much lower in resistance than K_1, the time constant of the rising voltage on K_1 when the key is closed will be determined by R_1C_1, and the final voltage will reach a value almost equal to the source voltage V. However, when the key is open, R_1 is no longer part of the circuit, and the time constant of the voltage decay across K_1 is governed by C_1 and the resistance of K_1. In contrast to this, the time constant in the K_2 circuit at the closing of the key is $\frac{1}{2}R_2C_2$ (R_2 and K_2 in parallel). The final voltage reached is $\frac{1}{2}V$, since R_2 and the resistance of K_2 are equal. The time constant of the decaying voltage is K_2C_2. The pull-in and drop-out voltages are shown

*Sigma Instruments, Inc., South Braintree, Mass.

• There is a growing realization among c.w. men that truly satisfactory keying of a transmitter can only be accomplished in a stage well removed from the oscillator. For break-in operation, however, this usually requires "differential" keying, and the installation of electronic differential-keying circuits often involves quite a bit of digging into the rig. In this article W1BIY describes a differential keying device that can be applied to most transmitters with a minimum of work.

(Mr. Stein lent his keyer to one of the ARRL Headquarters gang, who used it with a DX-100 to key the oscillator and the buffer cathodes. It reduced the chirp considerably, and even without shaping of the buffer keying brought the clicks down to an acceptable level.)



This keyer uses two relays which permit differential keying in a wide variety of transmitters. There is no need to duplicate the keyer in this form, since it also includes the power supply for the relay coils, and that power can often be "borrowed" from the transmitter. Binding posts for the relay-contact connections are mounted on the rear wall.

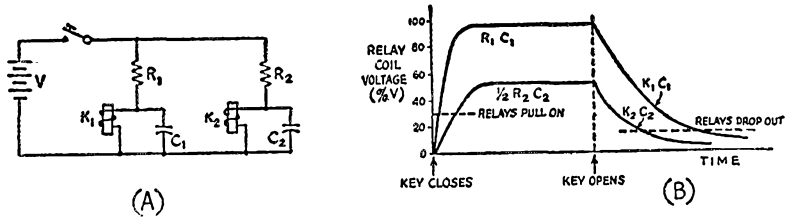


Fig. 1 — (A) Basic diagram of the differential keying circuit using two relays. The relay coil resistances are equal, and R_2 has this same value.
(B) A graph of the voltages appearing across the relay coils when the key is closed and opened.

in Fig. 1B, and it is obvious that K_1 pulls in first and drops out last. It is also apparent that K_1 will pull in first since it has a rather large voltage overdrive.[1]

(The above explanation is an approximation, since it neglects the inductance of the relay coils and the fact that the two coil-and-capacitor combinations are in parallel, through R_1 and R_2, when the key is open. These effects have been found to be small, and the fact that the keyer works as intended is sufficient proof.)

A Practical Circuit

Fig. 2 is the circuit of the unit shown in the photographs. The circuit is straightforward and involves no critical arrangement of parts. It could be constructed in many different ways, depending upon the builder's choice and the availability of components.

In the power supply, any convenient source of voltage can be used. It should deliver 40 to 60 volts d.c. with the key open and 30 to 40 volts d.c. when the key is closed. In this particular unit an old 70-volt center-tapped transformer was used, and the secondary winding impedance was high enough so that no current-limiting resistor between secondary and rectifier was required. If a lower-impedance transformer is used, a resistor of 100 or 200 ohms should be connected between the secondary and the rectifier. Any transformer that will deliver 28 to 40 volts would be suitable; bell transformers and toy train transformers are good possibilities. Many hams would be able to steal the voltage from somewhere in the rig (not from the oscillator supply or other point that will affect the stability, please!) and this will work satisfactorily provided the voltage ranges mentioned above are maintained. Actual measured voltage in this unit is 55 volts key up and 35 volts key down. The pilot light and line switch shown in Fig. 2 are not essential to the operation of the keyer, and could be eliminated if the a.c. supplied to T_1 were taken from the transmitter.

[1] Stein, "Some Hints on Relay Operation," *QST*, June, 1956.

Adjustment

Many amateurs will simply hook this keyer to their transmitters and start sending. No more check of the action is required than to observe if the keying (chirps and clicks, if any) are the same with the differential keying as they are with the oscillator running all of the time (disregarding any slight backwave that might be heard locally from the continuously-running oscillator). A small r.f. filter may be required at each pair of relay contacts and at the key, and of course, some shaping may be required in the keyed amplifier circuit.[2] But if the oscillator goes on first and off last, the keying should sound the same on the air with or without the oscillator running continuously. Any chirp can be attributed to a transmitter design fault; usually it means insufficient buffer action between oscillator and keyed stage.

For the experimentally minded, there are two simple test procedures that can be used. Hams who have oscilloscopes can use the circuit of Fig. 3A. Using a dot string from a bug key and synchronizing the scope, you should be able to observe the pattern as shown. If the scope does not have a d.c. amplifier, the horizontal lines of

[2] Goodman, "Keying the Radiotelegraph Transmitter," *QST*, July, 1956.

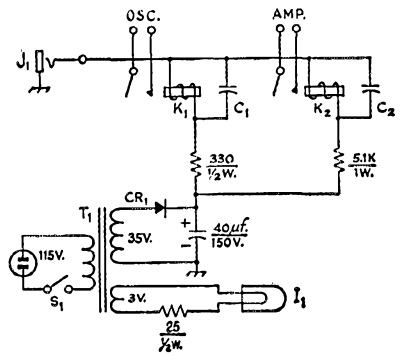


Fig. 2 — A practical circuit for the keyer.
C_1 — 1.0 μf., 150-volt paper.
C_2 — 0.22 μf., 150 volts.
CR_1 — 20-ma. 130-volt r.m.s. rectifier.
I_1 — 2-volt 60-ma. pilot lamp.
J_1 — Key jack.
K_1, K_2 — 5000-ohm relay, 2.5-ma. operate (Sigma 41F-5000SK).
S_1 — S.p.s.t. toggle.
T_1 — 70-volt transformer, ½ secondary is used. See text.

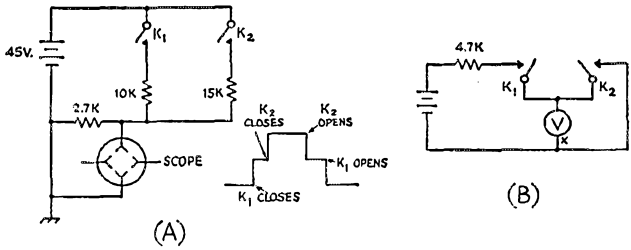


Fig. 3 — Test circuits for the keyer. These aren't essential, but they are very easy to utilize and furnish a method for comparing the delays on make and break. The make delay is about 2 milliseconds and the break delay about 4 milliseconds. Connections shown to vertical deflection plates mean connection to vertical amplifier under most conditions. See text.

the pattern may show some "droop," but this can be ignored since the vertical lines are the important ones from which timing is measured. Of course if there is direct access to the vertical deflection plates, higher voltage and larger resistances may be used to eliminate this difficulty.

If no scope is available, a check can be made with a voltmeter 45-volt battery, and the circuit of Fig. 3B. When this unit was tested, using a Simpson 260 multimeter on the 2.5-volt d.c. range, the needle deflected upward to about ¼ volt on closure of the key and to ½ volt on opening of the key. This indicates, of course, that the opening time delay is approximately twice that of the closing time delay, a desirable condition that permits the use of softer keying on break than on make. Other voltmeters operating at the same battery voltage may produce different readings because of differences in the ballistics of the meters, but they should be in the same ratio of 1 to 2. A milliammeter cannot be used in place of the voltmeter unless sufficient resistance (1000 ohms or more) is inserted at *x*, to make the milliammeter act like a voltmeter when short-circuited. This is necessary because a shorted milliammeter may have much slower transient response than a shorted voltmeter.

In conclusion, it should be pointed out that this unit is presented merely as the basis for a workable scheme, and it need not be copied in great detail. A little experimenting will enable the ham to use other relays, other source voltages and supplies, and an entirely different physical arrangement.

The author wishes to express his thanks to Robert G. McDonald for the layout and construction of the model.

Strays

The grade of Fellow is the highest membership offered by the Institute of Radio Engineers and is bestowed only by invitation on those who have made outstanding contributions to radio engineering or allied fields. On the list of 1957 Fellow awards, we immediately recognize several outstanding hams:

Gerald Gross, W3GG-HB9IA, Assistant Secretary General, International Telecommunications Union — for contributions to international regulation of telecommunications.

Robert M. Morris, W2LV, Radio Facilities Engineer, American Broadcasting Co. — for contributions in the field of radio and television broadcasting.

George S. Turner, W3AP, Chief, Field Engineering and Monitoring Bureau, Federal Communications Commission — for achievements in telecommunications and in their international regulation.

Oswald G. Villard, Jr., W6QYT, Professor, Stanford University — for contributions to knowledge of the ionosphere and its role in the propagation of radio waves.

We are pleased to note also that another on the list is Clarence D. Tuska (co-founder of the League and first editor of *QST*), Director, RCA Patent Operations — for pioneering services to radio communications.

A tube of the new "Sal-Met" soldering flux should prove mighty useful around the ham shack. This non-corrosive flux enables you to use soft solder and a regular iron for soldering aluminum to aluminum, copper to aluminum, and numerous other combinations that have been difficult or impossible in the past. Sal-Met is distributed by LMB, well-known by *QST* readers for their chassis boxes.

—···—

K2BDQ is one of the operators at the Brooklyn Red Cross Station, K2QDB.

—···—

Miscellaneous staff notes. Anne Welsh, W1ZID, who received a bunch of fan mail as a result of her appearance on page 79 of December *QST*, has left the staff and was married on February 2nd. Mr. William Hopke's gain is our loss.

In between *QST* deadlines, our DX editor, W9BRD, found time to become the proud father (aren't they all?) of his first daughter, third child. January 14th was the day.

—···—

The Brooklyn accent has escaped to Britain! *Wireless World* for August, 1956, carries a tube ad reading "maximum peak *invoice* anode voltage," says W1FEO.

A Modified "Standard of Comparison" Mobile Receiver

Packaging a 5-Band Receiver for Mobile Use

BY R. J. GUNDERMAN,* W8INO

• As the author says, "Every amateur attempts to pattern a project after his own likes and improve on an existing design if possible." This is a description of modifications on a receiver specifically designed for mobile work.

MANY AMATEURS have built and used the "Standard of Comparison" receiver.[1] Those who have done so know that excellent sensitivity and selectivity can be achieved with comparative simplicity. For those who cannot afford the price of a complete amateur mobile receiver, or for those who take pride in "do it yourself," it is a project well worth the investment in time and money. It can be used on either 6- or 12-volt systems. For those who do not have either a grid-dip meter or a simple r.f. signal generator, an alternative alignment procedure not requiring instruments is described.

The version of the receiver as described in the *Mobile Handbook*[2] is the basis for this modified receiver. However, as is usually true, every amateur attempts to pattern a project after his own likes and improve on an existing design if possible. This was the case here with the particular intent being to revise the receiver form factor.

After completing the wiring, initial tests on the receiver disclosed an overloading condition and distortion when receiving strong signals. Comparing notes with others who have also built this receiver indicated that this condition is prevalent in receivers of this design. In the modified circuit described here, the overloading difficulty is overcome by adding a.v.c. to the first r.f. stage, changing the tube to a remote cut-off type, and increasing the bias level of the first mixer. Before these changes, sensitivity measurements were better than 1 microvolt for a 10-db. signal-plus-noise-to-noise ratio, and overloading occurred at 33 microvolts. After this change, the sensitivity reduction was hardly measurable and overloading did not occur until the input was increased to approximately 100,000 microvolts.

Addition of an S meter is of much value when tuning a receiver with squelch and a "must" for transmitter hunts. A simple forward-reading meter utilizing the change in cathode voltage of the a.v.c.-controlled r.f. stage has been incorporated in the receiver.

An entire schematic of the modified receiver is shown in Figs. 1 and 2. The only essential differences from that appearing in the *Mobile Handbook* are in the tuner.

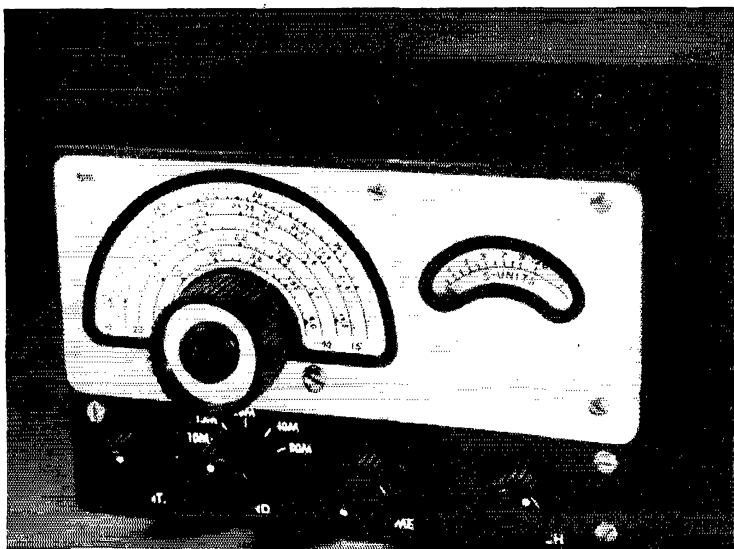
Since this is strictly an a.m. receiver without a b.f.o., the band spread has been modified somewhat. With the values shown the ranges are: 3.75 to 4; 7.05 to 7.3; 14 to 14.45; 21 to 21.45; and 28 to 29.7 Mc. These can be changed but it is necessary that proper L-to-C ratios be maintained so that the r.f. and mixer circuits track with the oscillator.

To facilitate the mechanical layout and conserve space, the necessary tuned circuit capacitor values were achieved by using fixed zero-temperature-coefficient capacitors rather than variable trimmers. In the 10-meter oscillator circuit

*Designers for Industry, Inc., 1241 Fulton Parkway, Cleveland 9, Ohio.

[1] Scherer, "Another Standard of Comparison," *CQ*, November, 1951.

[2] Orr, *Radio Amateurs' Mobile Handbook*, first edition, Cowan Publishing Corp., New York 36, N. Y.



This complete mobile receiver is built in a case that is only 4½ inches high, 7 inches wide and 7 inches deep. Four small holes on the top are for fastening it to a mounting plate.

The combined dial and meter bezel is made from aluminum etched with lye. The four bottom controls (left to right) are antenna trimmer, band switch, volume and squelch threshold.

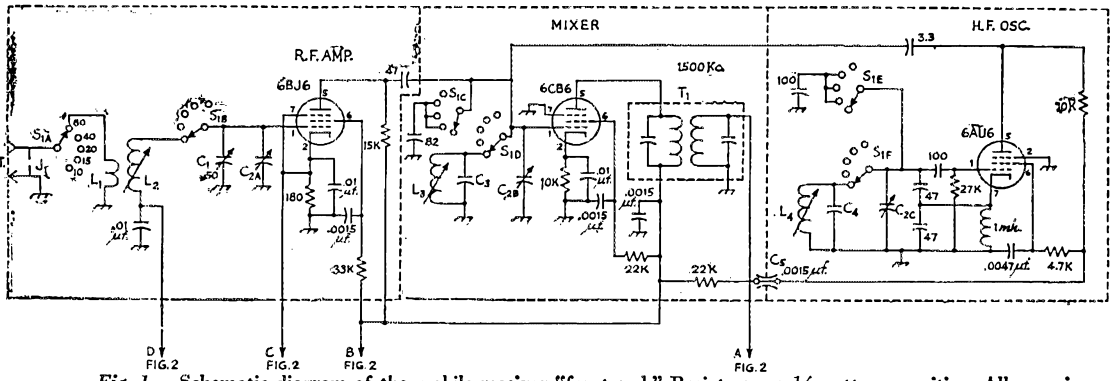
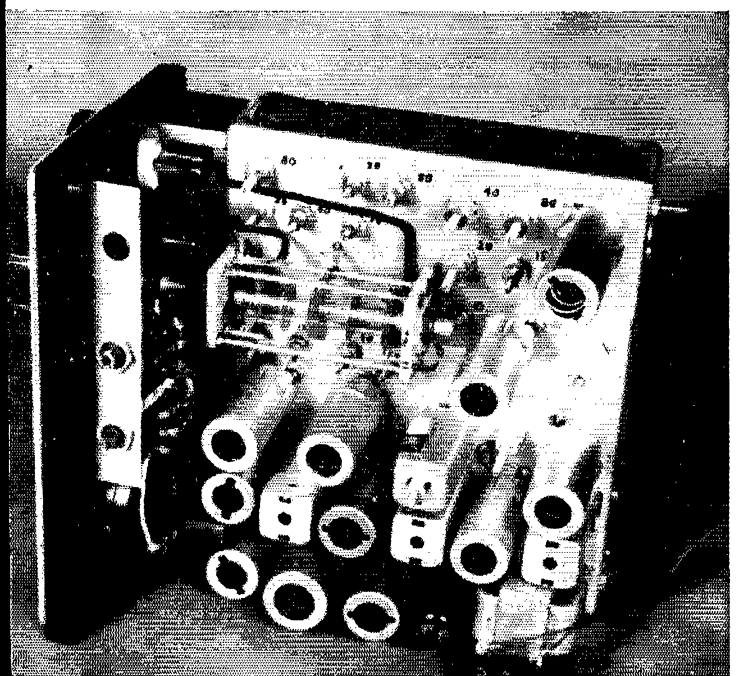


Fig. 1 — Schematic diagram of the mobile receiver "front end." Resistors are ½-watt composition. All capacitances in μμf. unless specified otherwise. All fixed capacitors in oscillator section except 0.0047 μf. are NP0 zero-coefficient ceramic.

C_1 — 50-μμf. air trimmer (Hammarlund APC-B-50).
C_2 — 3-section variable, 25-μμf.-per-section (Bud LC-1845).
C_3, C_4 — See coil table.
C_5 — Ceramic feed-through capacitor (Centralab FT-1500).
J_1 — Antenna connector (Cinch-Jones 81-F).
L_1, L_2, L_3, L_4 — See coil table.
S_1 — Six-pole 3-section 5-position rotary switch (Centralab PA-2 sections on Centralab PA-301 assembly).
T_1 — 1500-kc. input i.f. transformer (Miller 012W-1).

a 15-μμf. negative 750 coefficient capacitor was paralleled with an 18-μμf. zero coefficient capacitor. On the 10-meter band this compensation achieves frequency stability with varying temperature. Compensation was not found necessary on the other bands because of the higher ratio of C to L. Frequency stability within 500 cycles for periods up to one hour was noted. For a fixed station receiver where greater frequency stability would be desired, further compensation might be required. This would involve combinations of zero coefficient and negative coefficient capacitors for the oscillator tuned circuit on each band. It should be remembered that the values of compensating capacitors are also dependent upon the specific physical arrangement of the oscillator section.

Since the plate power requirements are only 200 volts at 50 ma., the power supply portion of a conventional automobile receiver may be used to power this mobile receiver. A s.p.s.t. switch, S_2, on the audio volume control is used to energize the heaters of the mobile receiver and a 6- or 12-volt d.p.d.t. relay mounted in the auto receiver. The relay, in its de-energized condition, connects B+ to the auto receiver and heater voltage to all heaters in the auto receiver except the rectifier. The 6 or 12 volts to the vibrator and rectifier is controlled by the existing switch in the auto receiver. To energize the mobile receiver it is necessary to turn on both S_2 in the mobile receiver and the switch on the auto receiver. This energizes the relay, removing the heater and B+ voltages from the auto receiver, and applies them to the mobile receiver. This arrangement uses the existing auto receiver fuse to protect both receivers. A rear-seat speaker can be installed to accommodate the BC receiver



Top view of the mobile receiver. The VR tube is at the upper right, and the r.f. amplifier tube is at the end of the tuning gang. The next row (left to right) is the h.f. oscillator, mixer, 1500-kc. transformer, 1762-kc. oscillator coil and the 6BE6 converter. The first 262-kc. i.f. transformer is just below the 6BE6, and the 262-kc. i.f. amplifier follows to the left at this level. The bottom row includes the two tubes in the squelch circuit, the two audio tubes and the output transformer. The two S-meter controls mount on the bracket behind the top of the front panel.

and the dash-mounted speaker used for the mobile receiver.

The popular TNS squelch and noise-limiting circuit has also been built into the mobile receiver. Although no special shielding was required on this receiver, it is recommended that the wiring be done carefully and, if possible, a shield partition used between this circuit and the rest of the receiver wiring.

The circuit shown in Figs. 1 and 2 is for 6-volt operation. For 12 volts, the 6BZ6 heaters are connected in series, as are the 6CB6 and 12AU7 heaters. Twelve-volt heater tubes are used in the remaining types. This involves two minor heater wiring changes. The 6BZ6 tubes are recommended even when used with 12 volts since they will handle larger signal variations and minimize the possibility of cross modulation.

In this model, the case, panel, chassis, bezel, and shielding partitions were homemade with ordinary hand tools. This was done because a cabinet suitable to make the receiver as small as possible with a maximum height of 4½ inches was not available. The pictures illustrate the layout and fabrication employed.

The case is 7 inches wide by 7 inches deep and is made of two pieces. The sides, bottom and top are of one piece wrapped around and bolted together at one top corner with flat-head screws. The back is a separate piece held on by sheet-metal screws. The panel was made by folding down the four edges and forming the joints at the corners with a ball peen hammer. Paint will tend to fill and bridge these joints, making them less conspicuous.

The chassis in this model was made of two pieces because of a change during the construction stages. However, it can be made of one piece folded down on three or, if desired, four sides. The chassis is 1½ inches high and may be welded at the corners or reinforced with brackets. Two aluminum blocks 1¼ × 1¼ × ¼ inches space the front panel away from the chassis, allowing room behind the front panel for the r.f. trimmer capacitor, the audio, and squelch controls, and the S meter depth. These blocks are drilled and tapped for 6-32 screws.

The tuning dial mechanism is a National type MCN with the bezel discarded. A new bezel covering both the tuning dial and S meter was made from $\frac{1}{16}$-inch aluminum with the dial opening cutouts patterned from the original bezel. It is spaced from the panel by a $\frac{3}{32}$-inch piece of aluminum which was cut out to clear the meter protrusion. This one-piece bezel helps to give the panel a balanced look as well as to serve the practical purpose of protecting the glass on the meter face. The bezel may be finished by rubbing it down with very fine grain emery cloth or etching with a lye solution.

A proposed method of illuminating the dial and meter consists of replacing the $\frac{3}{32}$-inch piece of aluminum with lucite. A hole should be drilled through the front panel (but not the outer bezel plate) and the lucite near the center of the panel into which a pilot light bulb may protrude. This would transmit the light through the lucite, providing an edge light around the dial and meter faces. The outer edges of the lucite should be painted with aluminum paint to reflect the light into the lucite and to prevent unwanted lighting around the bezel outer edges.

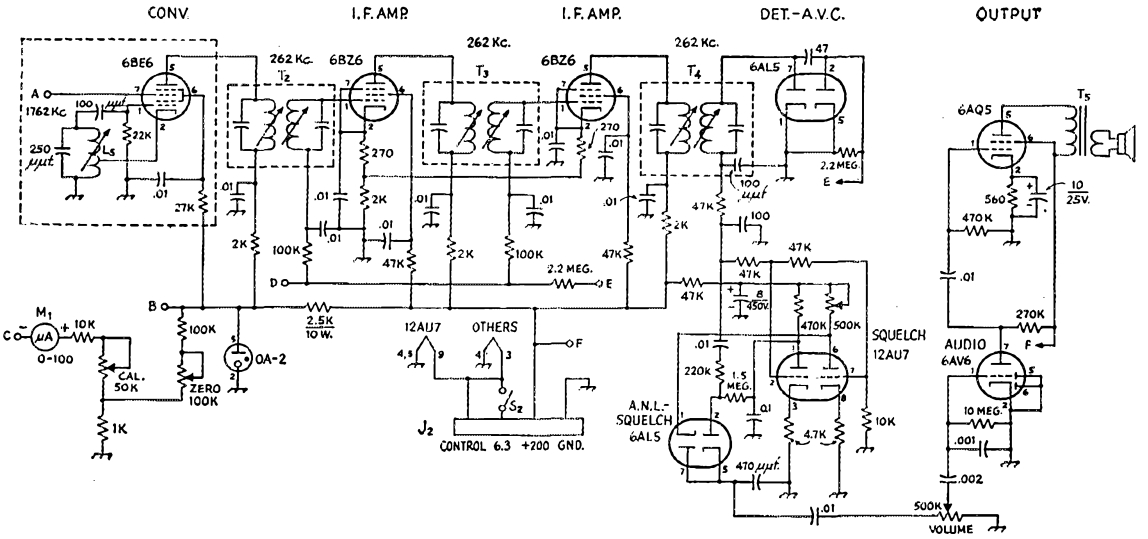


Fig. 2 — Schematic diagram of the i.f. amplifier and audio section. Resistors are ½ watt unless otherwise specified. Capacitances given in μf. unless specified otherwise. Polarized capacitors are electrolytic.

J_2 — Power jack (Cinch-Jones P-304-AB).

L_5 — 63 turns No. 32 enamel, closewound on ½-inch diam. slug-tuned form (CTC LS-4). Tapped 11 turns from bottom. 250-μμf. shunting capacitor is silver mica; 100-μμf. grid capacitor is NPO ceramic (Centralab TCZ-100).

T_2, T_3 — 262-kc. input i.f. transformer (Miller 012-H1).

T_4 — 262-kc. output i.f. transformer with built-in bypass capacitors (Miller 312-H6).

T_5 — Audio output transformer, 5000 to 4 ohms (Stancor A3877).

COIL TABLE

Band	L_1	L_2	L_3	L_4	C_3	C_4
80	15 t. No. 28 enam., scramble-wound over bottom turns of L_2. Insulate from L_2 with Scotch tape.	70 t. No. 32 enam., close-wound on ⅜-inch diam. slug-tuned form (CTC LS-5).	58 t. No. 34 enam., on LS-5 form.	25 t. No. 32 enam., on LS-5 form.	18 μμf. (NP0)	47 μμf. (NP0)
40	4 t. No. 20 enam., around bottom turns of L_2. Insulate with tape.	30 t. No. 28 enam. on LS-5.	25 t. No. 34 enam., on ¼-inch diam. form (CTC LS-6).	15 t. No. 32 enam., on LS-6 form.	None	None
20	3 t. No. 20 plastic-covered, wound over bottom turns of L_2.	18 t. No. 20 enam., on LS-6 form.	13 t. No. 26 enam., on LS-6 form.	9 t. No. 26 enam., on LS-6 form	None	None
15	2 t. No. 20 plastic-covered, wound over bottom turns of L_2.	14 t. No. 22 enam., on LS-6 form.	9 t. No. 20 enam., on LS-6 form.	6 t. No. 24 enam., space-wound ½ inch on LS-6 form.	47 μμf. (NP0)	68 μμf. (NP0)
10	Same as 15 m.	12 t. No. 28 enam., on LS-6 form.	10 t. No. 18 enam., on LS-6 form.	9 t. No. 24 enam., space-wound ½ inch LS-6 form.	33 μμf. (NP0)	18 μμf. + (NP0) shunted by 15 μμf. (N750).

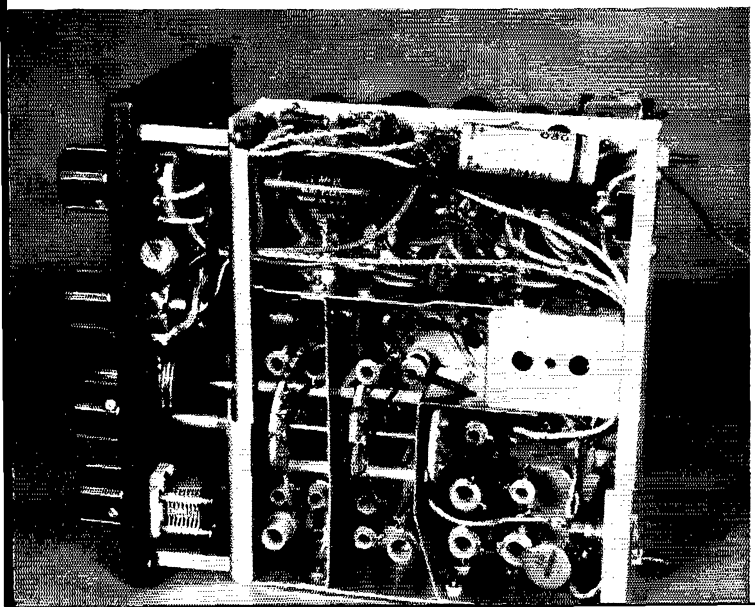
Alignment should be made by conventional methods. However, if an r.f. signal generator is not available, alignment may be accomplished by using incoming signals in the following manner:

Set the S-meter calibration adjustment for maximum resistance and the zero set to the center of its range. Set S_1 to either the 40- or 75-meter position, since more signals are usually heard on those ranges. T_2, T_3 and T_4 are initially aligned at the factory and hence should be reasonably close to 262 kc. The 6AU6 should be removed from the socket and an antenna connected to Pin 1 of the 6CB6. Adjustment of L_5 will then tune in broadcast stations whose frequencies are usually known. T_1, T_2, T_3 and T_4 may then be peaked for maximum output. The approximate frequency setting for L_5 may then be arrived at by interpolation and it should be set for the locally-quietest frequency between 1400 and 1600 kc.

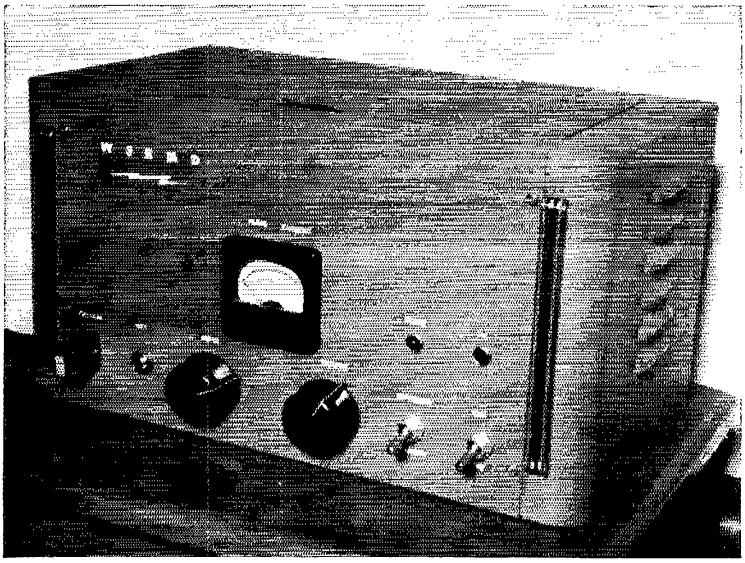
Plug in the 6AU6 and connect an antenna at J_1. The appropriate high-frequency oscillator tuning slug should then be adjusted to bring in the desired phone-band frequency, which is easily recognized. T_1, T_2, T_3, and T_4 should be given a final adjustment by adjusting for a peak indication when the receiver is tuned to a weak signal.

The high-frequency oscillator sections may be adjusted either by comparing signals with a receiver of known calibration or by spotting frequencies with the v.f.o. or crystal oscillator portion of a transmitter. The mixer and r.f. sections are then peaked. The optimum setting of C_1, the antenna trimmer, will of course vary with different antennas. However, the optimum

(Continued on page 148)



Considerable shielding is used in the mobile receiver. Three removable shield walls separate the oscillator, mixer and r.f. sections from each other and the rest of the receiver. The shield can covers the 1762-kc. oscillator circuit components.



W3RMD's simple 3-band transmitter dressed up in its grey-crackle cabinet. Across the bottom, from left to right, are crystal socket, key jack, pi-network input capacitor C_1, output capacitor C_2, stand-by switch S_2, and power switch S_1.

A 3-Band 90-Watt Transmitter

Simple Circuitry for 160, 80 and 40

BY C. CHARLES TIEMEYER,* W3RMD

• This transmitter is designed to operate in the three lowest-frequency ham bands — 160, 80, and 40-meters — at up to 90 watts input on c.w. It includes a built-in power supply, and provision is made for connecting a modulator. The pi-network output circuit is designed for end-feeding half-wave antennas on 80 and 40 meters, and a quarter-wave grounded antenna on 160.

IF ALL PARTS are purchased new, the little yet potent rig shown in the photographs should cost no more than $65, including cabinet, tubes and power supply. Actually, my own cash outlay was (and yours probably will be, too) much less than this, because most of the parts are the sort often found in the junk box.

The circuit is shown in Fig. 1. A 6AU6 in a tetrode Pierce oscillator drives a 6146 amplifier which always works straight through at the crystal frequency. With no tuned circuit between stages, the problem of stabilizing the amplifier is simplified. The combination works well on the three lowest-frequency bands — 160, 80 and 40.

The pi network used in the output of the amplifier looks conventional, but it differs from the usual in that it is designed to feed directly into the high-impedance end of a half-wave antenna on 80 and 40 meters (approximately 2000 ohms). On 160 meters, the 80-meter half-wave antenna is used as a grounded quarter wave. However, an external series capacitor is used to transform the low impedance of the quarter wave to a high impedance at the output of the pi network.

Feeding the hot end of a half-wave antenna directly with a pi network might seem like an invitation to the radiation of harmonics. However, intensive checks have shown the harmonic output to be negligible. The possible reason for this is that both stages work straight through at the crystal frequency with no hard-driven multiplier stages in between. Another favorable condition is that the over-all Q of a pi network is generally higher when working into a high-impedance load than when working into the usual loads of 50 to 70 ohms.

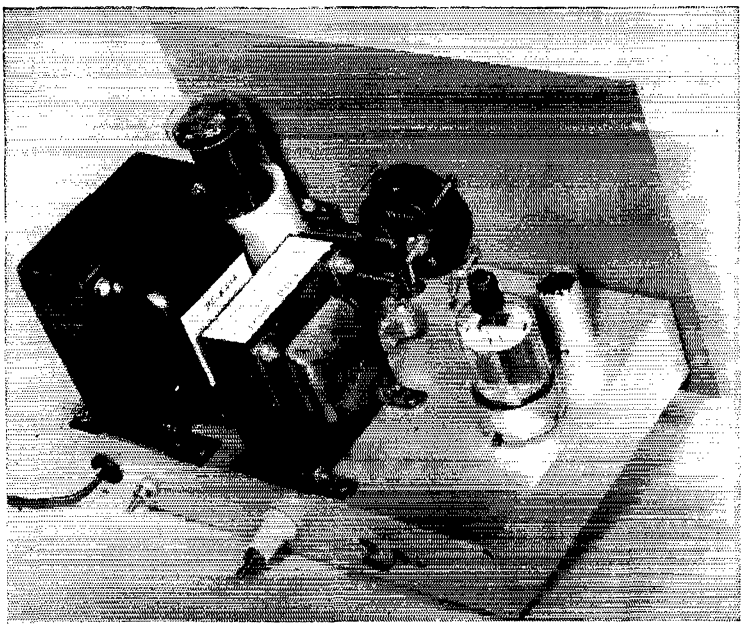
Plug-in coils are used to change bands in the pi network. L_3 is a v.h.f. parasitic suppressor. Both stages are keyed simultaneously in the common cathode lead.

A power supply delivering 600 volts under load is included. This permits running the final at up to 90 watts input. R_1 drops the voltage to the oscillator to about 220 under load. S_1 closes the primary circuit, turning on the filaments and lighting a green panel lamp, I_1. S_2 is a d.p.s.t. toggle switch that closes the center tap of the high-voltage transformer winding and, at the same time, lights a red panel lamp, I_2.

Construction

The unit is assembled on a 7 × 11 × 2-inch aluminum chassis. It is fastened to the 8 × 12-

* 2515 Linwood Road, Baltimore 14, Md.

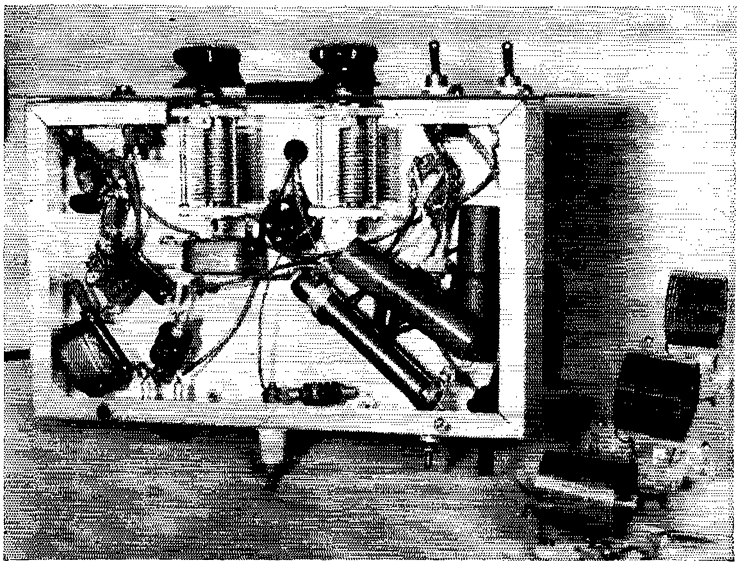


Rear view of the W3RMD transmitter. The power transformer and rectifier are to the left; the filter choke, plug-in coil and meter at the center; and the 6046 and 6AU6 to the right. The jumper in the jack on the rear wall of the chassis replaces modulator connections for c.w. operation.

inch panel of a Bud 14½-inch cabinet (C-1782) with the panel overlapping the bottom of the chassis by ½ inch. The capacitors that I happened to have on hand for C_1 and C_2 were Hammarlunds with "midline" plates. This made it necessary to cut away a portion of the front lip of the chassis, as shown in the bottom view, to provide sufficient clearance. However, similar capacitors with semicircular plates are made by Bud and these will fit under the chassis without removing the lip. The two capacitors are spaced far enough apart to leave room between for the coil socket.

The two r.f. tubes are placed far enough to one side so that their sockets will clear C_1. The insulated plate lead of the 6146 passes through a nearby clearance hole in the chassis to C_3 immediately to the rear of C_1. If the power transformer is moved to the rear edge of the chassis, there should be room enough for the 5R4GYA rectifier tube between the transformer and the panel. If the power transformer and filter choke are not the same as those specified under Fig. 1, it may be necessary to change the arrangement of components a little to accommodate them.

The filter capacitors and the bleeder resistor are placed under the chassis in whatever space can be found for them. The power wiring, including the wiring to the meter, should be done with shielded wire (Belden 8885).



Bottom view of the 3-band 6146 transmitter. Small components are grouped around the associated tube sockets. The three pi-network plug-in coils are to the right.

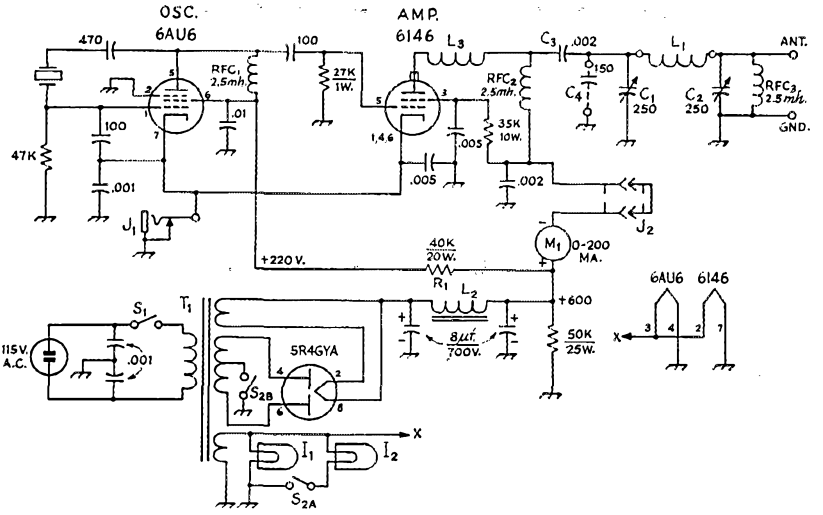


Fig. 1 — Circuit of W3RMD's two-stage transmitter. All capacitances less than 0.001 μf. are in μμf. All bypasses may be disk ceramic. Capacitors marked with polarity are electrolytic. All others should be mica. All resistors are ½ watt unless otherwise specified.

C_1, C_2 — 235-to 300-μμf. midget variable (Hammarlund MC- 250-M, Bud MC-1860 or MC-1859).
C_4 — 150-μμf. NP0 ceramic (Centralab or Erie).
I_1, I_2 — 6-volt panel lamp (see text).
J_1 — Closed-circuit key jack.
J_2 — Double-terminal phone jack.
L_1 — 1.8 Mc.: 50 turns, No. 22 wire, 1⅝ inches diam., 1⅜6 inches long (Bud OES-160 or B&W 160 JEL with turns removed).
— 3.5 Mc.: 26 turns, No. 18 wire, 1⅝ inches diam. 1⅜6 inches long (Bud OES-80 or B&W 80 JEL with turns removed).
— 7 Mc.: 15 turns, No. 14 wire, 1⅝ inches diam., 1⅛ inches long (Bud OES-40 or B&W 40 JEL with turns removed).
L_2 — 8.5-h. 200-ma. filter choke (Stancor C-1721).
L_3 — 1.8 μh. (Ohmite Z-144)
M_1 — 0–200-*ma.* d.c. *milliammeter 2½ inches square.*
RFC_1, RFC_3 — 2.5-mh. r.f. choke.
RFC_2 — 2.5-mh. 300-ma. r.f. choke.
S_1 — S.p.s.t. toggle switch.
S_2 — D.p.s.t. toggle switch.
T_1 — Power transformer: 1200 v.c.t., 200 ma.; 5 volts, 3 amp.; 6.3 volts, 3 amp. (Stancor PC-8414).

Coils

The plug-in coils are modified Bud OES or B & W JEL with the links removed. One of the unused prongs on the coil socket is grounded. On the 160-meter coil base, one side of C_4 is connected to the corresponding pin. The other side of C_4 is connected to the pin that matches the coil-socket prong that is connected to C_1.

Adjustment

As mentioned earlier, the pi network, which is the only circuit requiring adjustment, is designed to work directly into the end of a half-wave wire on 80 and 40 meters. The values are not suitable for feeding a low-impedance line. I use separate wires for the two bands. The one for 80 meters is 130 feet long, and the one for 40 meters is 65 feet in length. However, it should be possible to feed the 130-foot wire on both 40 and 80 if there isn't space for two antennas.

A variable capacitor (one similar to C_1 and C_2 will be satisfactory) is used in series with the 130-foot wire for 160-meter operation. A good ground connection, such as a water pipe or buried radials, is essential. The ground lead should be as short as possible.

The oscillator requires no adjustment, of course, except to plug in the correct crystal. The adjustment of the pi network is very simple. On 80 and 40 meters, C_2 should first be set at maximum capacitance. Then C_1 should be adjusted for the plate-current dip indicating resonance. Then C_2 should be reduced a little at a time, each time re-resonating with C_1. These alternate adjustments should be continued until the final amplifier draws the desired plate current. The adjustment on 160 meters is similar, except that the series capacitor must be adjusted in steps also, until the amplifier is loaded properly.

For phone, I use an external modulator with its own power supply (Class AB_1 6L6s). The modulation transformer secondary is connected at J_2. When on c.w., a jumper should replace the modulation-transformer connection at J_2.

Results on all bands, phone and c.w., have been more than satisfactory. WAS has been completed on 80 and 40 c.w., and good reports are received from Africa, Europe and Central America. On 160-meter phone, 26 states have been worked, from Maine to Florida, and as far west as Iowa. Not so bad for a simple rig!

A 10-μf. 150-volt electrolytic capacitor across the key softens up the keying and reduces clicks to the point where they don't bother another ham only a half block away. And, during the many months that the rig has been on the air, I've had no complaints of TVI.[1]

[1] Baltimore is well supplied with strong TV signals. In weak-signal areas, it might be advisable to design the pi network for low-impedance output to feed coax line to an antenna tuner or dipole antenna, so that a low-pass filter could be used if found necessary. Approximate values for L_1 and C_2 to feed 50- to 70-ohm line are as follows: 1800 kc. : 17 μh., 1500 μμf.; 3.5 Mc. : 11 μh., 1200 μμf.; 7 Mc. : 6 μh., 600 μμf. C_1 need not be changed. — *Ed.*

Simplified Design of Impedance-Matching Networks

In Three Parts
Part I—Basic Principles and the L Network

BY GEORGE GRAMMER, W1DF

• Breaking down the design of matching circuits into a step-by-step process results in a method that is not only as simple to understand as anything of this nature ever can be, but in which the desired numerical results are obtained through the use of the most elementary type of arithmetic. The second part of the article will take up the design of pi and T networks and the third will discuss some special applications and practical features.

THE GENERAL PROBLEM of transferring r.f. power from one device to another is one of "matching impedances." This is a term for the process of transforming the resistance of the device that receives the power into a value which the device that furnishes the power wants to have as a load. The power-receiving device may be, for example, a flat 52-ohm line. The power-furnishing device may be the final amplifier tube in a transmitter, and may require a load resistance of say 2000 ohms for delivering the desired amount of power at good efficiency. To transfer the power from the tube to the line, the amplifier output circuit must transform the 52-ohm actual load into a 2000-ohm load as seen by the tube.

The design of such matching circuits or "networks" is surprisingly simple, provided it is broken down into a series of steps. To use the process intelligently, it is necessary to understand the circuit action that gives the resistance transformation, but this is not difficult if the meaning and behavior of reactance are appreciated.[1] Reactance is the key to the operation of practically all r.f. circuits, and without an understanding of it there is little hope of being able to design such circuits.

Resistance and Impedance

The resistances to be matched are seldom actual resistors. The term resistance is used here in its broader interpretation as the voltage-to-current ratio at which power is consumed or transferred. Thus a resonant antenna has a "resistance" of 70 ohms because the current in amperes that flows into its terminals is 1/70 of the number of volts applied to the terminals. A flat 52-ohm line has a resistance of 52 ohms because the current in amperes is equal to 1/52 of the volts applied to the line. Neither the antenna nor the line actually *consumes* power; each simply passes it on to something else. For the purpose of circuit design it is convenient to substitute the resistance symbol for these and similar devices, because their behavior conforms to that of actual resistances.

The term "impedance" is used in a comparable sense. It too is a voltage-to-current ratio. It is a more general term than resistance because it implies that all of the power supplied may not be consumed or passed on, but a certain proportion of it may be returned to the source during some part of the a.c. cycle. When this happens the actual device, be it antenna, transmission line or whatnot, can be represented by a combination of resistance and reactance. The resistive part represents the voltage-to-current ratio at which power is either consumed or passed on; the reactive part the voltage-to-current ratio at which the power is returned to the source.[2]

Determining the values of resistance to be matched is often a more difficult problem than designing the circuit to match them. This question can in no case be ignored, but in the present discussion we shall lay it aside and deal with the subject of matching as such.

Equivalence of Series and Parallel Circuits

The basis for many kinds of impedance matching is the fact that for any circuit consisting of resistance and reactance in series there can be found a circuit consisting of resistance and reactance in parallel that will have exactly the same impedance and phase angle.

Thus the series and parallel circuits of Fig. 1 are exactly equivalent if, when a voltage of fixed magnitude and frequency is applied to either circuit, the same value of current results in both cases, and if the phase between current and voltage is also the same. If the two circuits were concealed in separate boxes, there would be no way to tell which of them actually was connected to the voltage source. This means that a simple series combination of resistance and reactance

[1] The subject of reactance is covered in sufficient detail for this purpose in the section on alternating currents in Chapter 2 of the *Handbook*.

[2] The energy that is stored in the electric or magnetic fields of the reactive elements during part of the a.c. cycle is taken from the fields and restored to the circuit — i.e., the source of power — during a subsequent part of the cycle. This "reactive power" is not consumed anywhere in the system, but simply is handed back and forth between the power source and the reactive elements.

can be lifted out of a more complex circuit and its parallel equivalent substituted for it without in any way affecting the over-all operation of the circuit. It is necessary to specify that the frequency remain fixed, because the reactance values change with a change in frequency.[3]

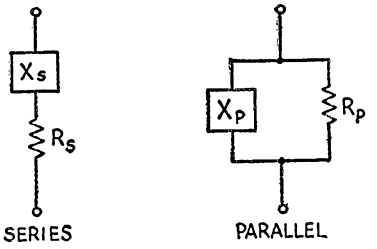


Fig. 1 — Series and parallel circuits containing resistance and reactance. By proper choice of constants, the two circuits will behave identically; i.e., the current and phase angle will be the same in both for the same impressed voltage.

In Fig. 1 the reactances are shown simply as blocks, since the same principles apply whether the reactance is inductive or capacitive. However, if the series reactance, X_S, is inductive the parallel reactance, X_P, in the equivalent parallel circuit also will be inductive, and vice versa. The reactances in such equivalent circuits always are of the same kind. Their values, however, are not identical: that is, X_S is not equal to X_P, and R_S is not equal to R_P. R_S will always be smaller than R_P, and X_S will always be smaller than X_P.

In determining the actual R and X values in the equivalent circuits, it is convenient to introduce the quantity Q. It has the same meaning as the one we ordinarily associate with that letter. That is, in the series circuit

$$Q = \frac{X_S}{R_S} \tag{1A}$$

and in the parallel circuit

$$Q = \frac{R_P}{X_P} \tag{1B}$$

When series and parallel circuits are equivalent, Q has the same value in both.[4]

From ordinary a.c. circuit theory it can be shown that a parallel circuit is equivalent to a given series circuit when

$$R_P = R_S(Q^2 + 1) \tag{2A}$$

$$\text{and } X_P = \frac{R_P}{Q} \tag{2B}$$

while a series circuit is equivalent to a given parallel circuit when

$$R_S = \frac{R_P}{Q^2 + 1} \tag{3A}$$

$$\text{and } X_S = QR_S \tag{3B}$$

When the values of resistance and reactance satisfy these equations the two circuits will have exactly the same impedance and phase angle at the frequency considered.

The significant point in all this is that when the equivalence is achieved, the resistance values are not identical. Herein lies the clue to the matching properties.

Matching by Means of Reactance

Going back to the illustration mentioned earlier, of a 52-ohm load that had to be transformed into 2000 ohms so a tube could deliver its power output to a transmission line, let us assume that 52 ohms (the smaller of the two resistances) corresponds with R_S in Fig. 1. From the preceding discussion we may infer that if a suitable value of reactance, X_S, is added in series with the 52-ohm resistance we can come out with a circuit that is equivalent to a resistance of 2000 ohms in parallel with some value of reactance X_P.

Equation 2A can be rearranged to read

$$\frac{R_P}{R_S} = Q^2 + 1, \tag{4}$$

which says that the ratio of the two resistances, R_P and R_S, corresponds with a specific value of Q, which is

$$Q = \sqrt{\frac{R_P}{R_S} - 1}. \tag{5}$$

This is the relationship we need for matching purposes. In the illustration, R_P/R_S is 2000/52, which is equal to 38.4. Hence to transform 52 ohms into 2000 ohms Q must be equal to

$$Q = \sqrt{38.4 - 1} = \sqrt{37.4} = 6.1$$

The required value of series reactance X_S is found from Equation 3B, and is

$$X_S = 6.1 \times 52 = 318 \text{ ohms}$$

Thus a reactance of 318 ohms in series with the 52-ohm resistive load will make the circuit "look like" a resistance of 2000 ohms (which is what we want) in parallel with a reactance X_P (which we do not want particularly), the value of which is found from Equation 2B:

$$X_P = \frac{2000}{6.1} = 328 \text{ ohms.}$$

The equivalence is shown in Fig. 2. In this figure

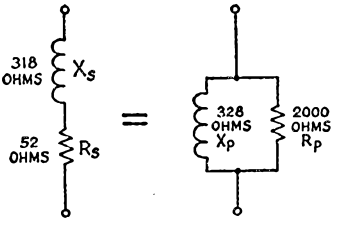


Fig. 2 — An example of series and parallel circuits that are equivalent.

[3] Also, in many practical cases such a substitution might entail a change in accessory circuit details, such as direct-current feed. Obviously, d.c. would not flow through a series capacitor, although it would flow through a resistor in parallel with a capacitor. The discussion here is confined to the alternating-current operation of the circuit.

[4] It is necessary to keep in mind that the Q under consideration is the "operating" Q of the circuit, not the Q of a component, such as a coil. The latter Q is determined by the inherent resistance of the component. In most practical cases the power loss in a component (as represented by its internal resistance) will be very small compared with the power used in the load, so the component resistance can be neglected. The circuit or operating Q is therefore based on the load resistance.

it is assumed that inductive reactance is used, but capacitive reactance of the same numerical value would do equally well.

Since we originally wanted only a *resistive* load of 2000 ohms for the tube, something has to be done about the 328-ohm reactance in parallel with it. Before taking up that question, it may be observed that Fig. 3 gives in graph form the values of Q required for matching any two resistances having a ratio from 1 to 1000. For ratios above 100, the error in dropping the numeral 1 from Equation 5 will be negligible, so the relationship becomes

$$Q = \sqrt{\frac{R_P}{R_S}} \qquad (6)$$

Use of Fig. 3 obviates the necessity for taking the square root called for in Equations 5 or 6. Equations 2B and 3B call for nothing more than simple multiplication and division. It could hardly be said that the process of finding the proper value of reactance is complicated or difficult.

Circuit Action

The physical process by which the resistance transformation takes place poses no mystery. Adding reactance in series with resistance raises the impedance of the circuit, and the total impedance can be increased to any desired value by this method. On the other hand, if we want to develop a given amount of power in R_S, we must put a fixed amount of current through it regardless of the reactance in series. Hence, as the ratio of X_S to R_P (that is, Q) is increased by adding more and more reactance at X_S, more and more voltage is needed to force the same current through the circuit and thereby maintain the same power in R_S.

Suppose, in the illustration, that we want 52 watts in the 52-ohm resistance. In the resistance alone, this would require 52 volts and the current would be 1 ampere. If reactance is now added in series, the voltage must be increased to keep the current at 1 ampere. Eventually, as X_S is made larger, we reach the value of 318 ohms and find that the impedance of the circuit is

$$Z = \sqrt{(318)^2 + (52)^2} = 322 \text{ ohms}$$

To put 1 ampere through this circuit requires 322 volts.

Although the product of 322 volts and 1 ampere is 322 volt-amperes, the actual *power* is still 52 watts, because the reactance does not use up power. Nevertheless, the 52 watts is now being supplied to the *circuit* at 322 volts instead of 52 volts. If a circuit consumes 52 watts at 322 volts, Ohm's Law tells us that the resistance of that circuit should be

$$R = \frac{E^2}{P} = \frac{(322)^2}{52} = 2000 \text{ ohms}$$

On the other hand, a 2000-ohm resistor across a 322-volt source should take only 322/2000 or 0.161 ampere, whereas the actual current through the circuit is 1 ampere. The "excess" current is the current flowing through the parallel reactance, X_P. The current in this reactance has just the right value to make the total current become 1 ampere when combined with the 0.161 ampere flowing in R_P.

The L Section

Demanding that a source of power furnish 322 volt-amperes in order to deliver 52 useful watts would hardly be sporting, so something needs to be done to circumvent this aspect of the otherwise beneficial effect of the series reactance. The solution, which is quite simple, is variously called "power-factor correction," "reactance cancellation," or just "tuning to resonance."

It will be recalled that in a pure capacitance the current is a quarter cycle *ahead* of the applied voltage, while in a pure inductance the current is a quarter cycle *behind* the applied voltage. These currents are numerically equal when the reactances are numerically equal and the same voltage is applied to both. If we place two such reactances across a source of voltage, the leading current through the capacitance just balances the lagging current through the inductance, and if the two reactances are the only circuit elements connected to the voltage source that source

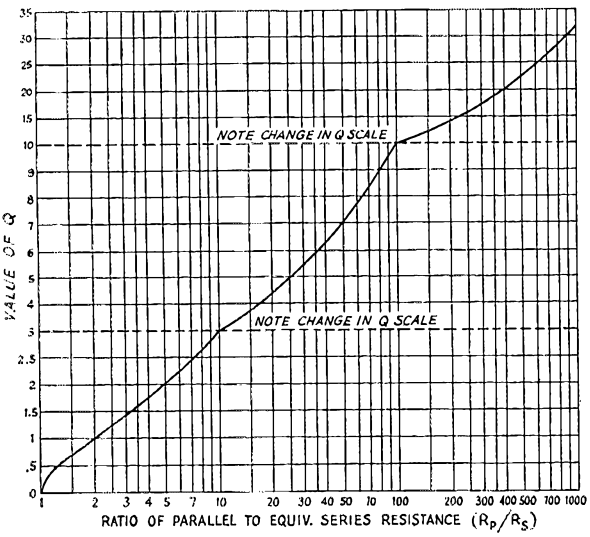


Fig. 3 — Q required for matching resistances having ratios (R_P/R_S) from 1 to 1000.

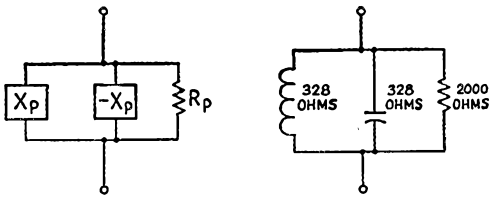


Fig. 4 — Reactance cancellation in the equivalent parallel circuit.

does not even know the reactances exist. In other words, no current flows out of the source even though large currents may be flowing in the capacitance and inductance.[5]

This type of circuit action is just what is needed for getting rid of the unnecessary volt-amperes. By placing a reactance having the same value as X_P, but of the opposite kind, in parallel with X_P all the reactance is effectively eliminated from the equivalent parallel circuit and the resistance alone is left. This is indicated in Fig. 4 by using a minus sign to show that the reactance is of the opposite kind. In the illustration of Fig. 2, where we have 328 ohms of inductive reactance in parallel with 2000 ohms of resistance, it is necessary to add a capacitive reactance of 328 ohms in parallel as shown at the right in Fig. 4. This cancels the inductive reactance and leaves just the 2000-ohm resistance.

Of course the actual circuit we began with is the one at the left in Fig. 2. The parallel equivalent at the right in that figure is just that — an equivalent. It is not the physical circuit even though it exhibits exactly the same impedance and phase angle as the series circuit. So when the compensating reactance, $-X_P$, is added in parallel the resulting physical circuit is as shown in Fig. 5. R_P is now shown with an arrow to indicate that it is the resistance that a power source connected to the terminals would "see." The physical configuration of the illustrative circuit is also shown in Fig. 5. If a flat 52-ohm line were connected to replace the 52-ohm resistor, a power tube connected to the circuit terminals would see the 2000-ohm load it wants, and the power output would be delivered to the transmission line without loss.

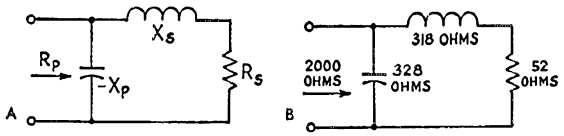


Fig. 5 — Typical practical circuit corresponding with Fig. 4.

This circuit is the "L section," and it develops quite naturally and easily out of the equivalence of simple parallel and series circuits. The process that has just been described is the process of designing an L section to match two resistances. Since the L section is the building block from which more complicated circuits such as the pi and T are constructed, it is necessary to understand it thoroughly before taking the next step.

Summary of L Section Design

At this point it is well to summarize the step-by-step process of L-section design because the same procedure is used in any network calculation, whether it is the simple L section or a more complicated type:

1) Given the two resistance values to be matched, place the smaller in the series arm of the circuit (R_S) and the larger in the parallel arm (R_P).

2) Find the ratio R_P/R_S.

3) From Equation 5 — or, when Q is 10 or more, from the simpler form of Equation 6 — find the required Q for matching. Alternatively, use Fig. 3 to find Q.

4) From Equation 3B find X_S. X_S may be either inductive or capacitive. The choice will depend on the purpose for which the circuit is to be used, as discussed below.

5) From Equation 2B find X_P. The reactance used in the actual circuit will be of the opposite type to that chosen for X_S.

These five steps determine all the necessary values, but one more is necessary for arriving at circuit constants:

6) Convert the reactances to inductance and capacitance. The following formulas may be used:

$$L = 0.159\frac{X}{f} \qquad (7)$$

$$C = \frac{159{,}000}{fX} \qquad (8)$$

where L = inductance in μh.
C = capacitance in $\mu\mu$f.
X = reactance in ohms
f = frequency in megacycles

Choosing the Kind of Reactance

Purely from the standpoint of matching, either inductive or capacitive reactance can be selected for the series arm and the circuit performance will be exactly the same. The circuit of Fig. 5B could be changed to that of Fig. 6, for example, and the tube would still see a purely-resistive load of 2000 ohms. However, in this particular

[5] This is called a "circulating" current, since it is confined to the loop formed by the inductance and capacitance alone. If there is difficulty in visualizing how a current can exist in such a loop with no current coming from the source of energy, it may help to recall that if the inductance and capacitance were perfect (they never are, of course) any energy supplied to them would be passed back and forth between them, in their electric and magnetic fields, without loss and so a current could circulate in such a circuit forever. Hence no continuous supply of current is required from the source. However, the source does have to supply the energy originally. This transfer from the source to the circuit takes place in an initial "transient" state that is not covered in ordinary circuit theory. The latter assumes "steady-state" conditions — i.e., it deals with what goes on after equilibrium has been reached in the circuit.

application no doubt Fig. 5B would be chosen in preference to Fig. 6, for the reason that harmonic suppression would be better with the former circuit. In Fig. 5B harmonics generated by the tube tend to be by-passed through the shunt capacitance, and are choked off from the 52-ohm load by the series inductance. In Fig. 6, they would be more or less forced to flow to the load

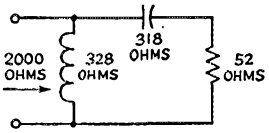


Fig. 6 — An alternative form giving the same impedance ratio.

because the inductance does not by-pass them effectively and the capacitance transfers them readily to the load.

In short, the choice frequently is determined by considerations that have nothing to do with impedance matching as such. In each problem, such things as harmonic suppression, d.c. feed, whether one terminal of a condenser may be grounded or whether both terminals must be insulated from ground, and similar points not related to matching impedances should be given consideration in arriving at a decision.

There are times when a free choice is not always possible or convenient, as when one of the resistances to be matched has unavoidable reactance of one kind or the other associated with it. This occurs frequently in antenna problems. Some typical cases will be discussed later.

Efficiency

The reactances in the foregoing discussion have tacitly been assumed to be completely loss-free. While this is never so, the power loss in the circuit itself is small, in the average case, and can be neglected as a factor in the circuit design. Such losses as occur are almost entirely in the coils. Air condensers, at least at frequencies below 30 Mc., have extremely low losses.

The power loss in a coil depends upon the inherent Q of the coil — that is, the ratio of coil reactance to coil resistance. (This is not the Q figure used in the calculations described above; the latter is the "circuit" or "operating" Q. See Footnote 4.) In circuits handling appreciable power, the coils are generally of good-enough construction to have Q's of the order of 200 or more. If the coil in the circuit of Fig. 5B has a Q of 200, its effective resistance is X/Q, or 318/200. This is approximately 1.6 ohm. For higher accuracy in designing the circuit the coil resistance should be added to the load resistance to find the actual resistance in the load circuit. In most cases this is an unnecessary refinement because the coil resistance usually will be but a small percentage of the total resistance, and the tuning elements usually can be varied over enough of a range to compensate for even greater discrepancies than are likely to arise from this cause.

The efficiency of the circuit is the ratio of the power consumed in the load to the power put into the circuit by the source. It will be equal to the ratio of the actual load resistance to the total resistance, considering the series arm of the circuit. In the example the efficiency is

$$\frac{52}{52 + 1.6} = 0.97 \text{ or } 97 \text{ per cent}$$

when the coil resistance is included. Other cases might not be so favorable; in general, the efficiency will decrease if the coil Q is decreased and if the circuit Q is increased (increasing R_P/R_S). However, an L section uses the minimum possible circuit Q for matching, and so is inherently the most efficient type of matching circuit.

Strays

"Your Novice Accent," by Keith Williams, W6DTY, which appeared in *QST* for November, 1956, has made such a hit that the Hq. has reproduced it in the form of a small pamphlet and is mailing it to all new licensees. Any others desiring an extra copy may obtain one by sending ARRL a stamped, self-addressed envelope.

A bibliography of material published between 1921 and July, 1956, on single-side-band technology has been compiled by the Department of the Navy and released through the Office of Technical Services in the Commerce Department. Entitled "Single Side Band in Communications Systems," the bibliography (PB111837) may be obtained for $2.75 a copy from the Office of Technical Service, U. S. Department of Commerce, Washington 25, D. C.

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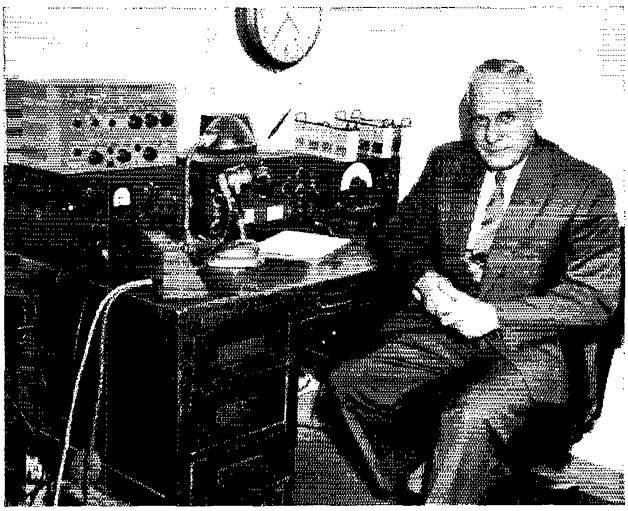
The Signal Corps has vacancies for electronic equipment installers and repairers at the Pentagon Building in Washington and in Woodbridge, Virginia. These jobs pay between two and three dollars per hour depending upon experience, the requirement for which ranges between two and five years. The work involves a rotating shift and a 40 hour week, with a ten per cent differential for night work. Interested applicants should apply to the Office of the Chief Signal Officer, Civilian Personnel Branch, Room 2C200, The Pentagon, Washington 25, D. C.

Strays

Let's face it — back in November we goofed. We gave some publicity to a "first" on s.s.b., and now it turns out that W8GZ, a man who has made several records through the years, had the cards proving he had worked 100 countries using s.s.b. as long ago as June 27, 1955. W8GZ has done pioneering on 10 meters, on low power DX on 7 Mc., and it is now our pleasure to congratulate him on his prowess on s.s.b. Here is pictured W8GZ and some of his gear. At the extreme left are controls and indicators for the two rotatable antennas. Back of that is the National NSM speech amplifier and on top of the NSM is a Central Electronics 20A exciter. The receiver is an HRO of 1938 vintage, converted to an HRO-50-1. Other equipment includes modulation indicator, control box, frequency standard, and mike. The transmitter uses a pair of 250THs in the final, and can be run on either a.m. or s.s.b.



Is this a Field Day party? Nope, these are some of the Iowa Mountaineers at Assinobine Province Park in Alberta, Canada, last fall. It turned out that by pure coincidence the party of 50 included five hams. Shown left to right are WØTGS, W8QLL, W5TRD, WØECN, and WØNFM. WØTGS is president of the Iowa Mountaineers.

What have we here? Oh, just a few choice DX cards, more than enough to qualify for the coveted DXCC award. And whose cards are they? Man, that's the sad part of this tale — those cards belong to a number of different hams who have never claimed them from the W7 QSL Bureau. QSL Manager W7ASG sent in this photo, and the same sort of thing happens at every QSL Bureau. Come on, gang, claim them cards!

• Recent Equipment —

The TMC Model GSB-1 Single-Side-Band Adapter

SELECTABLE-SIDE-BAND adapters have been with us for quite a while now, ranging from those using band-pass filters to phasing principles and back to filters. It shouldn't be necessary to point out that, regardless of the circuitry, these are devices intended to add selectivity to a receiver and permit the reception of only one side band of a phone signal. In recent years their use has become more widespread, triggered by the use of single-side-band transmissions. Some amateurs labor under the delusion that these adapters make a single-side-band signal easier to tune in, which isn't strictly true. They *appear* to make s.s.b. signals easier to tune because they have sufficient selectivity to make a good s.s.b. signal out of a mediocre one in the receiver, and the tuning *tolerance* on a good s.s.b. signal is greater than on one with inadequate side-band suppression.

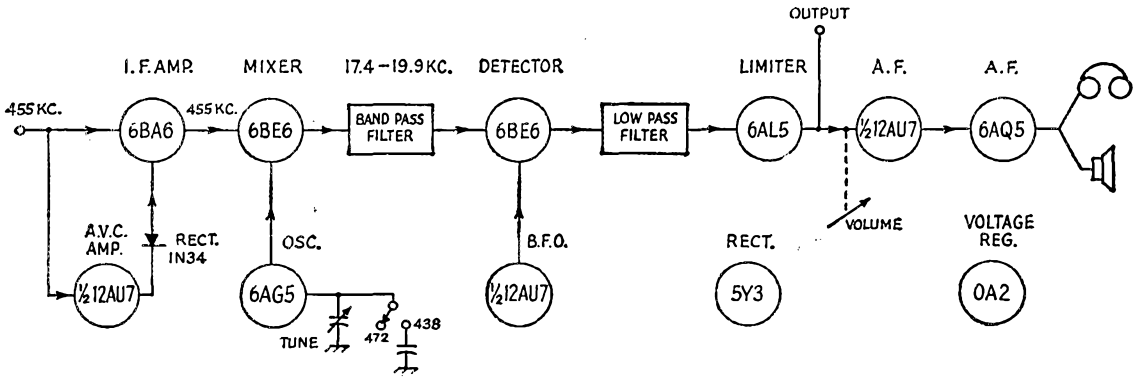
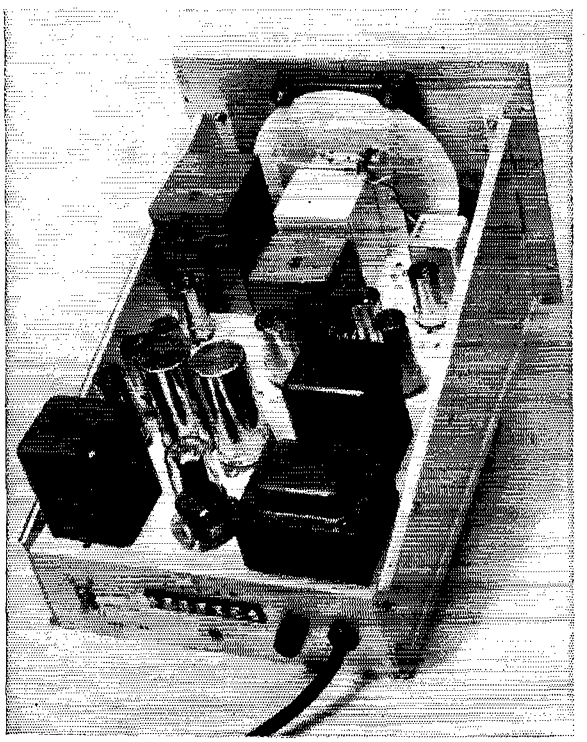


Fig. 1 — Block diagram of the GSB-1 single-side-band adapter.

The Model GSB-1 Single-Side-Band Adapter departs from previous approaches in one major respect. Other adapters have always been fixed-tuned devices that were set up to match the i.f. of the receiver in use by twiddling some screw-driver adjustments, and from then on all of the tuning was done with the regular receiver. If the receiver has a fast tuning rate, the operator is still in for a Charley horse of the tuning hand after a long session. The Model GSB-1 helps to alleviate this to a large extent by providing a supplementary tuning dial that covers only a few kc. This means that if your present receiver tunes too fast for easy s.s.b. tuning (and most of them do!), you can do your final tuning with the GSB-1, which has a tuning rate of 1½ kc. per knob rotation for the lower side band and 2 kc. for the upper. With a tuning rate as slow as this, tuning s.s.b. is a cinch.

A block diagram of the adapter (Fig. 1) will show you how it works. The signal is taken from your receiver i.f. at 455 kc. (it can be anywhere from



♦

A top view of the GSB-1 removed from its case shows the clean and sturdy construction. The large tuning scale for the oscillator uses a rim drive. The band-pass filter, the heart of the adapter, is housed in the large can to the left of the tuning scale.

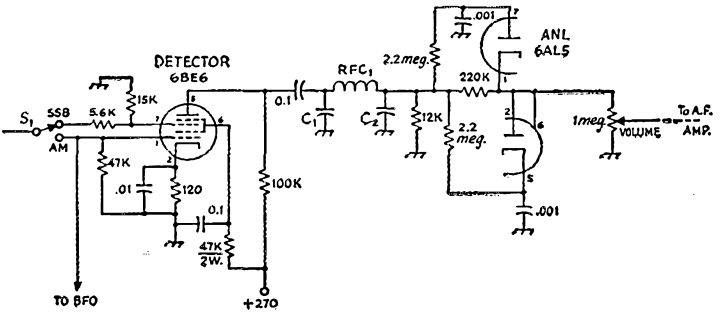


Fig. 2 — Circuit of the detector and noise limiter circuits of the GSB-1. Another section of S_1 turns the b.f.o. off when switching to the AM position. RFC_1, C_1 and C_2 form a low-pass filter to reject the i.f. and pass the audio.

The noise limiter uses contact-potential-biased diodes (bias developed across the 2.2-megohm resistors) that act as shunt limiters on both halves of the audio cycle. Limiting level is less than ½ volt.

452 to 458 kc.) and amplified in the 6BA6 i.f. amplifier. This amplifier has its own a.v.c. system which extends the dynamic range of the adapter by permitting it to handle a wide range of signal levels. The a.v.c. in your receiver can be left on, so you will have quite a bit of a.v.c. protection. The a.v.c. in the GSB-1 offers a choice of two time constants, for fast and slow a.v.c.

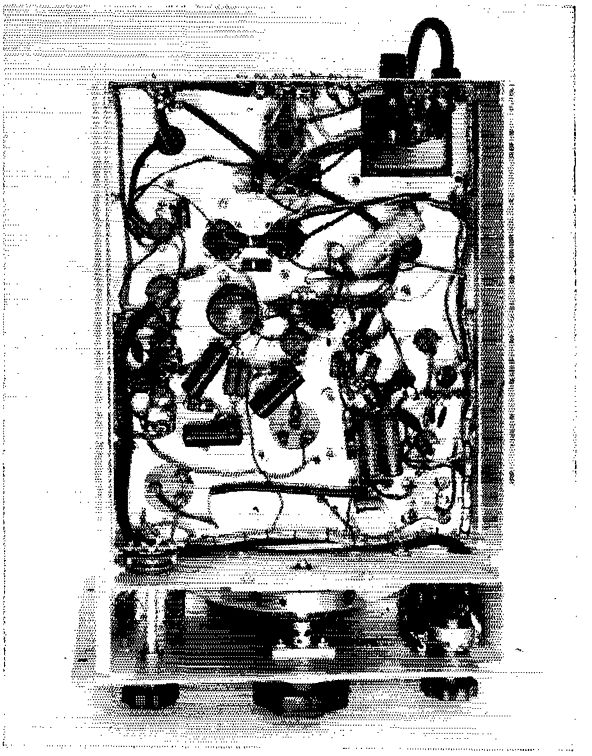
Following the i.f. amplifier, the signal is heterodyned to a low i.f. through a 6BE6 mixer. A separate oscillator (6AG5) can be tuned to either (for example) 438 or 472 kc. at the flip of a switch, for receiving an upper or lower side band. This oscillator is tunable from the panel, at the slow tuning rates mentioned above. The discrepancy in the tuning rates comes from the difference in frequencies and the change in *L*-to-*C* ratios.

From the mixer the signal passes into a bandpass filter at 18 kc., and this filter is a sharp one. It is 2.5 kc. wide at −6 db. and only 3.5 kc. wide at −50 db. From the filter the signal goes to a 6BE6 detector, used with the b.f.o. as a conversion detector for s.s.b., c.w. and exalted-carrier reception, and on a.m. as a hybrid detector by feeding the signal to the No. 1 (injection) grid and turning off the b.f.o. This portion of the circuit is shown in detail in Fig. 2, for those who might want to apply the principle to an i.f. strip of their own making.

The audio output of the detector passes through a low-pass filter, to remove any 18-kc. components that might tend to overload the audio, and into a noise limiter (Fig. 2). Audio can be taken off at this point and fed back to the receiver's audio amplifier, or you can use the audio amplifier in the GSB-1 and work the speaker from its output. A 5Y3 and a OA2 round out the tube complement. The regulated voltage is applied to the two oscillators.

Panel controls on the GSB-1 include the tuning, side-band-selector switch (cuts the pad on the oscillator in or out), a.m.-s.s.b. switch (changes detector connections and turns off b.f.o.), toggles for a.v.c. on-off and a.v.c. fast-slow, and an audio volume control (and a.c. switch). A headphone jack is on the panel, and loud-speaker terminals are at the rear of the cabinet. Speaking of the cabinet, the entire unit measures 12 inches wide by 10 high by 15 deep. The photographs show some of the construction of the unit, which is quite typical of the high standards of TMC. Although the unit is obviously designed to be a companion unit for the GPR-90 receiver (which has the i.f. connection brought out to a jack), the GSB-1 can be used with any receiver having an i.f. around 455 kc. I.f. signals from 0.1 to 10 volts can be handled at the input; the audio at the "output" terminal is 0.3 volts for 0.3 volts i.f. input, and the audio output from the 6AQ5 amplifier is 1 watt.

— *B. G.*



A view of the underside of the chassis shows the dial drive with heavy flywheel and the wiring of the unit. Coaxial line and shielded wires are used at several places.

The Viking 6N2 Transmitter

NOW AND THEN a piece of commercial equipment comes along that is an ideal subject for a *QST* write-up, because it contains circuit features or mechanical innovations that are of interest to readers who like to build their own gear, as well as those who are concerned mainly with ready-made packages. The Viking 6N2 r.f. unit recently introduced by the E. F. Johnson Company is such an item. V.h.f. men who never expect to own a commercial transmitter will find that the 6N2 has ideas worth looking into.

As its name implies, the 6N2 operates on 50 and 144 Mc. Designed as an accessory for use with the Ranger, the Vikings I and II, or the Valiant (Johnson rigs for lower frequencies), the 6N2 may be used as the v.h.f. r.f. section of any other station that has the necessary power supply and modulator equipment. When hooked up to the Ranger the 6N2 requires no modifications in the low-frequency package. Minor changes are required with the other Johnson rigs. The power and audio equipment of the "parent" transmitter are used in the operation of the 6N2. Since it contains only the r.f. circuitry, the 6N2 is a compact assembly, measuring only 8 by 9 by 13 inches in size. Its external finish is designed to harmonize with other Johnson transmitters.

The Viking 6N2 is a compact r.f. unit for 50 and 144 Mc. Completely shielded and filtered for TVI protection, it is housed in a metal case only 8 by 9 by 13 inches in size.

Tubes employed are a 6U8, a 6360 and a 5894A, plus a 6AQ5 clamper tube. The oscillator is the pentode section of the 6U8. Crystals in the 8-Mc. range are used, with the plate circuit doubling. The triode portion of the 6U8 is a tripler, with output between 48 and 54 Mc. This drives the 6360, tripling to 144 Mc., or working straight through on 50 Mc. The final amplifier works straight through on either band.

The elements of novelty are the means by which this straightforward lineup is made to work effectively on both 50 and 144 Mc., with proper operating conditions for all stages on both bands. As anyone who has attempted to work out a simple layout for a 6- and 2-meter transmitter can testify, this takes some doing!

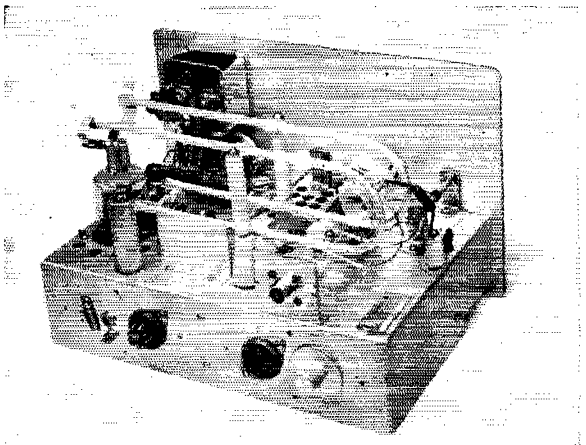
Two-band operation begins in the plate circuit of the 6360, where coils are switched at the hot ends of the push-pull circuit. The proper amount of drive to the amplifier is assured by cutting in a bleeder resistor from the 6360 screen to ground, when the band switch is in the 6-meter position. This reduces the input to the stage, and holds its output to a point where the grid current in the final stage is the same on both bands.

The band switch is a neat trick, too. It is actuated by a simple mechanical linkage on the shaft of the butterfly capacitor that tunes the 6360 plate circuit. Using a butterfly-tuned circuit, there are two 90-degree tuning ranges, of course. The tuning capacitor shaft is brought out to the front panel, where its ranges are marked "6" and "2". On one side the 6-meter plate and grid coils are switched in position, and the screen circuit includes the bleeder to ground. This is removed from the circuit, and the 2-meter coils are switched into place in the driver plate and amplifier grid, when the tuning capacitor is rotated to the 2-meter side.

The final plate circuit requires no band switching. It borrows an idea from Lighthouse Larry's "Bonus 100-Watter"[1] and carries it one step further. The final plate circuit is a half-wave line for 144 Mc., with its tuning capacitor at the far end of the line from the tube. The 50-Mc. plate coil is connected to the line at the point where the r.f. voltage is at zero for 144 Mc. It thus has no effect on the operation of the line at the higher frequency, and the line acts like good low-loss plate leads at 50 Mc.

Effective coupling to this dual tank circuit is

[1] Lighthouse Larry, "Bonus 100-Watt Transmitter," *G-E Ham News*, Nov.-Dec., 1955.



Some interesting plate circuit features in the 6N2 show in this interior photograph. Final tuned circuit works on either 50 or 144 Mc., without band switching. Output coupling circuit, a combination of hairpin loop and 1-turn coupling coil, is seen at the bend in the plate line.

provided by a combination of hairpin loop and coupling coil that is plainly visible in the rear-view photograph. The small turn of wire at the middle of the loop couples to the 50-Mc. tank circuit, and the sides of the loop couple to the 144-Mc. line. Both are at the point of lowest r.f. voltage, which is as it should be, for minimum capacitive coupling. A variable capacitor is in series with the coupling loop for tuning out its reactance on either frequency, and to serve as an auxiliary loading adjustment.

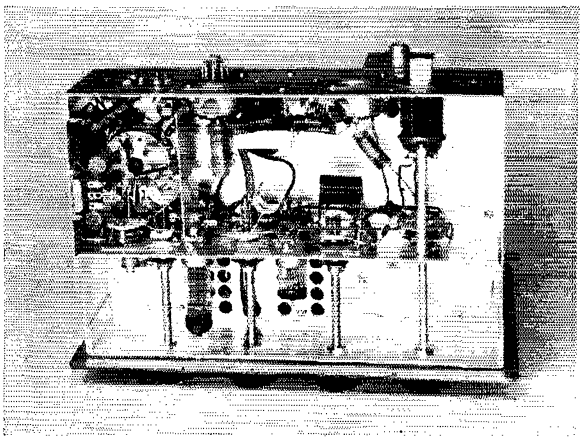
The entire r.f. plate circuit is silver plated. A novel parasitic-suppression arrangement is used at the plate end of the line. The flexible straps connected between the heat-dissipating connectors and the tuning of the plate lines are visible in the photograph. Soldered across the first inch or so of these straps are 47-ohm 2-watt resistors. These load the circuit sufficiently at the parasitic frequency so that no oscillation is possible, yet they have substantially no effect at either desired operating frequency. Parasitic oscillations can be found in many v.h.f. amplifier circuits if you go looking for them with some care. They may not always be there, but potentially they are a lively source of TVI, and other forms of interference often blamed on harmonics.

Extensive precautions against TVI are taken in the 6N2. Shielding is complete, and all leads leaving the case are filtered. Even the power connectors are housed in shields, as may be seen in the bottom view. The crystals are inside the cabinet, accessible through a plugged hole in the rear wall of the chassis. They are selected by a switch on the front panel, which also has a position for v.f.o. input. The meter on the front panel is housed in a metal container.

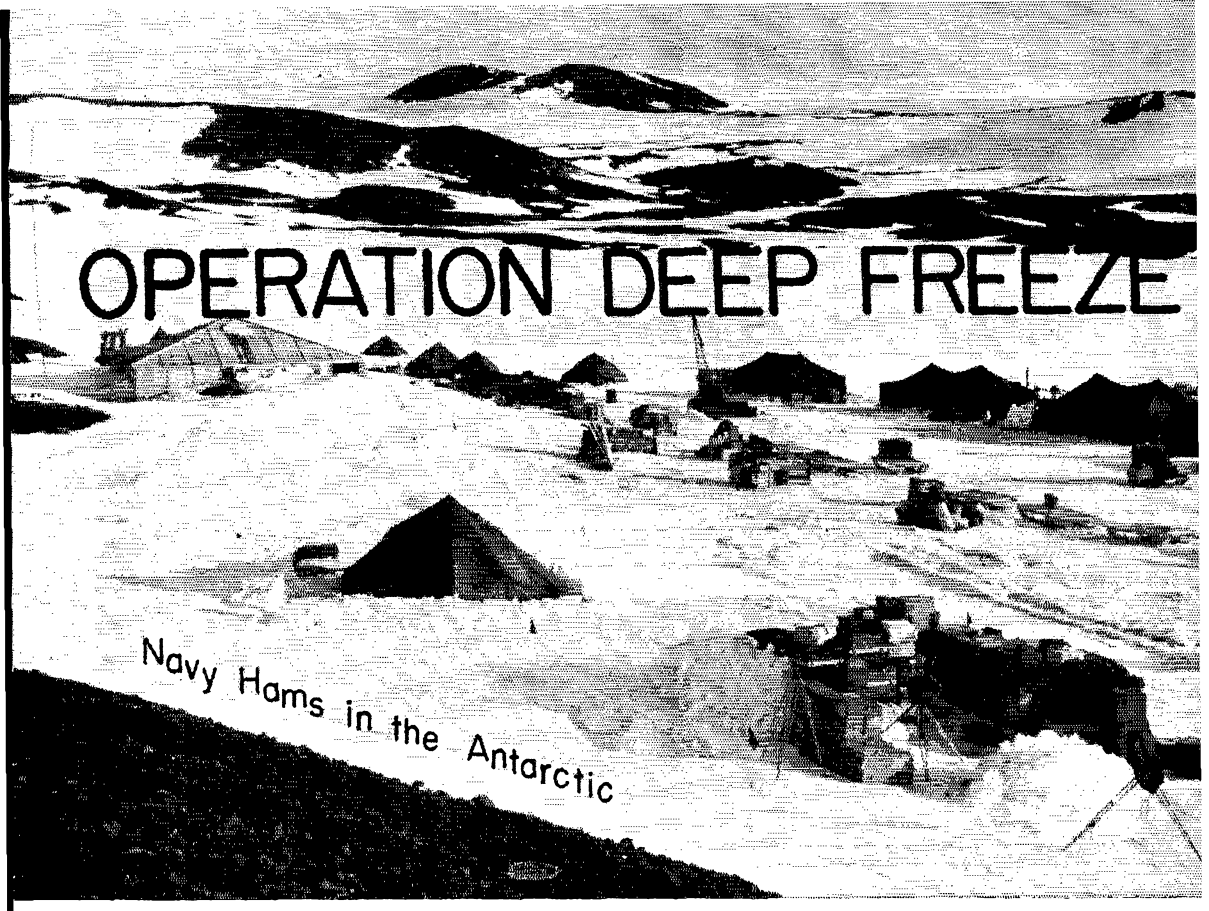
Front panel controls on the 6N2 are, bottom row: the crystal switch, oscillator tuning, multiplier tuning, and the combination driver plate capacitor and band switch. The upper row includes the two output coupling controls, the final plate tuning, the meter switch and the tune-standby-transmit switch. Provisions for keying and the operation of an antenna change-over relay are made on the back of the transmitter.

Keying is done in the cathode of the 6360, and the keying circuit has a built-in click filter. A 6AQ5 clamper tube holds the final stage plate current down when the drive is keyed or otherwise removed. The meter can be switched to read the oscillator, multiplier, driver or final plate currents, as well as the final grid current. There is also an off position to save the meter from excessive activity during c.w. operating.

The maximum input that can be run to the 5894A final stage is 100 watts on voice, or 150 watts on c.w. This will not be obtainable with the Ranger power supply, which delivers only about 450 volts under load. Testing with the Ranger in the lab, we got best efficiency at about 75 to 80 watts input. With the Vikings or the Valiant, the higher voltage power supplies allow operation of the 6N2 nearer the maximum ratings of the tube. — *E. P. T.*



Shielding and compartmentation of the 6N2. Final amplifier stage is at the upper left. Note that power cable connectors are shielded. Crystals, upper right, mount inside case.



BY COMMANDER J. J. ZAMMIT,* USNR, W5HKP

WORLD ATTENTION is focused on the Antarctic because of the simultaneous residence there of representatives of many nations for the International Geophysical Year, in the interests of science. The simultaneous presence of twelve nations in Antarctica is unique in history. In support of the American scientific contingent in the Antarctic is the Navy's Task Force 43 operating under the code name, "Operation Deep Freeze."

In connection with this project, among the noteworthy accomplishments for amateur radio in 1956 were the re-establishment by the U. S. Navy of amateur radio operations in Antarctica, the liberalizing by the Navy of a long-standing policy prohibiting amateur radio operations aboard naval ships, and Arctic to Antarctica DX for the first time by radio amateurs aboard a naval ship and by amateurs aboard Strategic Air Command aircraft, with the Navy's amateur stations in Antarctica.

The Navy activated amateur stations KC4USA at Little America, KC4USV at the Naval Air Facility, McMurdo Sound; KC4USB at Marie Byrd Land; and KC4USN, South Pole, during 1956. During 1957, Navy amateurs will be operating KC4USK, the Knox Coast Station; KC4USH, the Cape Adair Station; and KC4USW, the Weddell Sea Station, for a total of seven amateur Navy stations in operation in the Antarctic when Operation Deep Freeze II ends and phase III begins. During phase III the Navy may activate even more amateur stations in Antarctica.

Without the Navy's amateur stations in the lower latitudes, personnel of Operation Deep Freeze in the Antarctic would be shut off from their families. The Navy's amateur stations in the Antarctic are taking over the functions of ships and aircraft which usually carry mail to service men but which cannot operate in the polar regions during the long winter night. The purpose then for the growing number of amateur stations in Antarctica is that of performing individual service for the personnel of Operation Deep Freeze and their families and relatives. Therefore, U. S. Navy radio amateurs and U. S. amateurs located stateside are making a major contribution to the success of the historically unique operation by making it possible for South polar personnel to keep in stateside contact through any of the 150,000 amateur radio stations in the U. S. In that connection, more than

* Head, Naval Reserve Liaison and Informational Services, Office of the Director of Naval Communications, Chief of Naval Operations, Washington 25, D. C.

3,000 messages were handled by KC4USA (Little America) and KC4USV (McMurdo Sound) during Operation Deep Freeze's first Antarctic winter, February to October 1956.

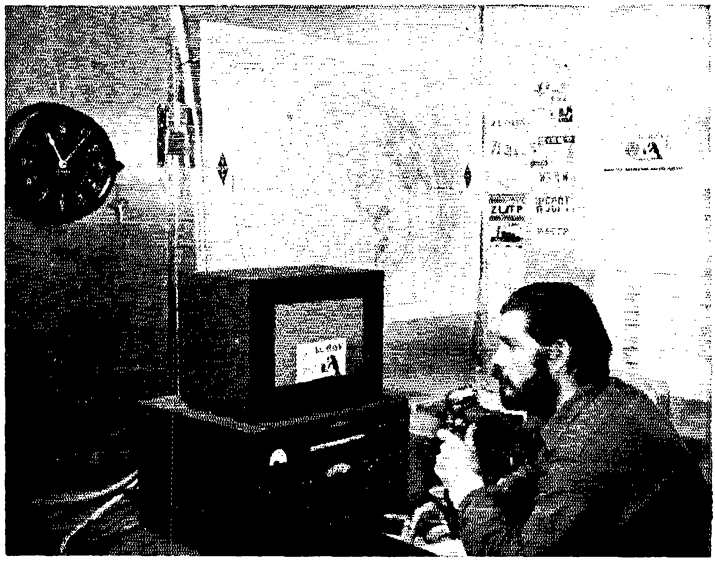
The idea of an amateur radio communication team composed of the Radio Amateurs of Greater Syracuse (RAGS), New York, to handle the personal messages of the officers and men of the Navy's Operation Deep Freeze was conceived by Kenneth W. Thomas of Syracuse, coordinator of the American Red Cross Amateur Radio Morale Message Service. By November 1956, RAGS' organized message traffic reached a total of more than 2,000 messages. The American Red Cross guarantees delivery of all messages received by the amateur radio link at Syracuse through 3700 chapters and more than 4000 branches in the U. S. Thus Navy hams in the Antarctic, and hams stateside, and the American Red Cross together are bridging more than 8000 miles with a two-way radio service which brings personnel located at the South Pole continent into direct contact with families and relatives in the United States.

Navy radio operators in Antarctica recognize the world-wide amateur interest in DXing the South Pole regions and strive to satisfy. Using single side band, a.m. and c.w., radio hams are getting an opportunity to get through, and some of them are. The Antarctic amateur stations have been receiving and transmitting on the 80, 40, 20, 15, 11 and 10 meter bands. While side-band emission has been employed in the majority of amateur communications activity to date, as more amateur stations are set up in the coming year, a.m. and c.w. operators stateside will have equal opportunity for Antarctica contacts. In fact, it is hoped that at least one KC4 station will be able to devote much of its time to Novice band operation.

During 1956 Arctic-to-Antarctic DX was also achieved by WØTWT/KL7, the *U.S.S. Eldorado* (AGC-11), and KC4USA, Little America, when W9RUK at Glenview, Illinois, moved WØTWT to KC4USA's frequency in the 20-meter band and arranged for the contact which resulted in a solid 20-minute QSO. LTJG Dan G. Haney USNR, WØTWT, of Minneapolis, who was the only licensed amateur radio operator on board, handled all amateur activity when not engaged as electronics officer of the *Eldorado*. This historic radio amateur "first" was accomplished as the result of the Navy's liberalizing its policy of prohibiting radio operations aboard its ships by permitting radio amateur stations in some ships that are on isolated or unusual duty when security requirements are met and when the ham stations are manned by *members of the ship's company* who are licensed amateurs and the ham stations and their operations meet the requirements of the FCC. On vessels engaged in normal operations or training, however, due to the unusual number of tactical communications and radio navigation systems in use, amateur operation is usually found electronically incompatible.

Another "first" for amateur radio was direct radio and voice contact for a total of more than ten hours between KC4USA and KC4USV in the Antarctic and WØCXX aboard a Strategic Air Command VC-97 Strato-Cruiser over northern Greenland near the North Pole.

The year 1956 brought increased prestige for hams and world attention was focused on their usefulness. In Operation Deep Freeze, both the Navy and the amateurs share the credit. From all indications, 1957 will be an even bigger year for America's radio amateurs.



From the ham shack located in the communication building, Audrey B. Garrett, RMC, USN, operates KC4USV.
(*U. S. Navy* photos)

Keeping Your Station Log

Suggestions from Three of the Headquarters Staff

FCC REGULATIONS contain no specific form to be used in keeping a log of amateur station operation. They do specify certain items that must be entered, a list of which can be found in section 12.136. If you have a written record of just those things, your log is legal.

But that record won't tell you much. It won't tell you, for example, where the station you worked was located, what signal reports were exchanged, what you were using for a transmitter, receiver or antenna, what he was using, his name, QSL information, or any of a number of other things you will wish you could remember in years to come as you leaf through your old log books in a reminiscing mood.

The station log can be more than just a legal requirement of FCC, as we shall attempt to point out. It is a written diary of your amateur operation and should include everything that will be of interest to you in years to come, of which the required entries are just a small part. When was it that you installed that new rig? What were the dimensions for that extended double zepp you used in '51? What kind of a score did you rack up in the SS? What was your message count in December of 1954 when you handled all that Christmas traffic? These things, and more, will be in your log if you put them there. So all you have to do is figure out what is of most interest to you, then devise a log form that will fill the bill.

Log-keeping has room for display of much individuality, just as do QSL cards. We've seen some that are so sloppy that even if you could read them they are impossible to understand, except possibly by the operator who made the entries; and others are as neat as a pin, everything in perfect columns, legible (sometimes typed) and complete. Your log reflects your personality.

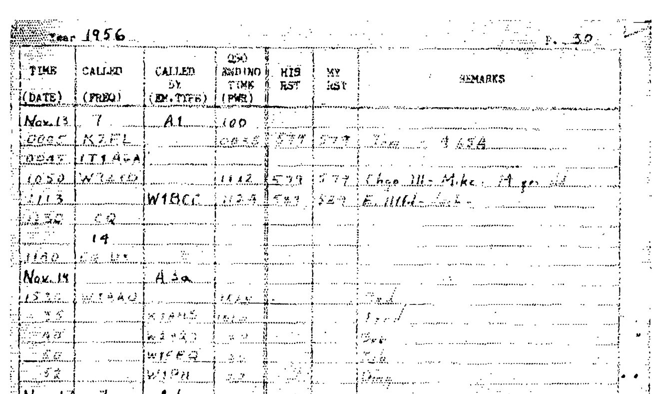
Methods for keeping logs are as varied as designs of QSL cards. Seldom will you find two amateurs who do it the same, even though both use the standard ARRL form. As long as you meet FCC requirements, the method and form used are up to you. Our purpose here is to describe some different methods in use; not necessarily to suggest that you adopt one of them, but just to give you some ideas on the subject.

W1DX Says. . . .

The log form I use was cooked up some years ago by W1JMY and me. We got interested in the general subject of logging procedure, had a few skull sessions, designed a couple of prototypes that showed up some faults, and finally came up with the log form shown on this page. I've been using it ever since because it suits my needs fine and it doesn't waste very much paper.

The four columns to the left of the double-ruled vertical line contain the essential data required by the FCC. There are four column heads in parentheses (date, frequency, emission type and power input). These are entered once, on the first line of a page. When there is a *change* in one or more of these entries, a separate line is used for the entry or entries. For example, when a new page was started on Nov. 13, the rig was on 7-Mc. c.w. with 100 watts input. (For contrast I make these entries in ink, but it isn't essential because the nature of the entries distinguishes them from the other types of entries in the same columns. W1JMY uses a dime-store rubber stamp for the date — it's very neat.)

K2FL was called at 0005 (I use the 24-hour time system) and the ending time shows that a QSO resulted from the call. The signal reports and "remarks" further indicate this, but I don't always make these non-required entries. Ten minutes after finishing with K2FL, IT1AGA was called but no QSO resulted, as indicated by the absence of an ending time. Some ten hours later W9ZYD was called and worked, and the log shows that W1BCC called me when the QSO with the W9 was completed. A CQ sometime after finishing with the W1 brought no reply. A shift to 14 Mc. and a CQ DX brought no answer. (This was one of my better days!)



Year 1956 P. 30

TIME (DATE)	CALLED (FREQ.)	CALLED BY (EM. TYPE)	QSO ENDING TIME (PWR.)	HIS RST	MY RST	REMARKS
Nov. 13	7	A1	100			
0005	K2FL		[illegible]	577	577	[illegible]
0045	IT1AGA					
1050	W9ZYD		1112	[illegible]	577	[illegible]
1113		W1BCC	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	CQ					
	14					
[illegible]	[illegible]					
Nov. 14		A3a				
[illegible]	[illegible]		[illegible]			[illegible]
[illegible]		[illegible]	[illegible]			[illegible]
[illegible]		[illegible]	[illegible]			[illegible]
[illegible]		[illegible]	[illegible]			[illegible]
[illegible]		[illegible]	[illegible]			[illegible]
Nov. 1[illegible]	7	A1				
[illegible]	W1AW		[illegible]	[illegible]		[illegible]
[illegible]		[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]					

One of the current problems in log keeping is that presented by the round tables that quickly develop on s.s.b. An example of how one is recorded in this log form is shown in the entry for Nov. 14. Here the date and emission type (A3a for s.s.b.) are entered; the band is still 14 Mc. and the power is still 100 watts. W1AAO was raised on the first call at 1530; presumably he had just called CQ. K1AHS called in at 1535, followed by W2AQT, W1FEQ and W1PH at the times shown in the first column. K1AHS pulled out at 1610, and W1DX signed out, or the round table broke up, at 1620, as indicated by the several similar ending times. (Everyone was loud and clear that day, and no signal reports were recorded.)

In a contest, log keeping becomes a bit of a chore, but I have found the form shown here to be quite useful. Sweepstakes records, for example, can be kept as shown in the entries for Nov. 17. The ending time entry is based on the assumption that during a contest the ending time is in the same minute as the beginning time *or not more than a minute later (and a statement to this effect is recorded in my log)*, and the QSO Ending Time column is used for recording the transmitted message number. The only other required information for the contest is the signal report, and that goes in the usual column. For example, the log shows that I started the second weekend of the Sweepstakes on 40-meter c.w. At 1805 I raised W1AW and received his NR402 589 CONN 1806 NOV. 17. I gave him my NR1 with a 599 and a time of 1805. (When it comes to sending in my contest score, I'll fill in my call and section as required, but there's no need to put them in the log.) I was getting out like crazy just then, because W3WKX called me right after that and I gave him my NR2 with a 579 and a time of 1807. He gave me NR310 579 EPA 1807 and the date. Flushed with success, I called W4KFC but he didn't come back. (When Vic doesn't come back on the second weekend of a Sweepstakes you just haven't got it, so that's the last entry.) Other types of contest logging can be handled in the same general way, depending upon the required exchanges.

A log isn't much good unless you can check to see if you have sent a QSL or not. I use dots outside the right-hand edge to indicate QSLs; the right-hand dot shows I've sent a card, and the left-hand dot shows I've received the precious pasteboard. (Of course DX QSLing is a study in itself, requiring elaborate records and carbon copies of the letters and bills of lading involved, and no effort is made to keep that specialized and classified information in the log book.)

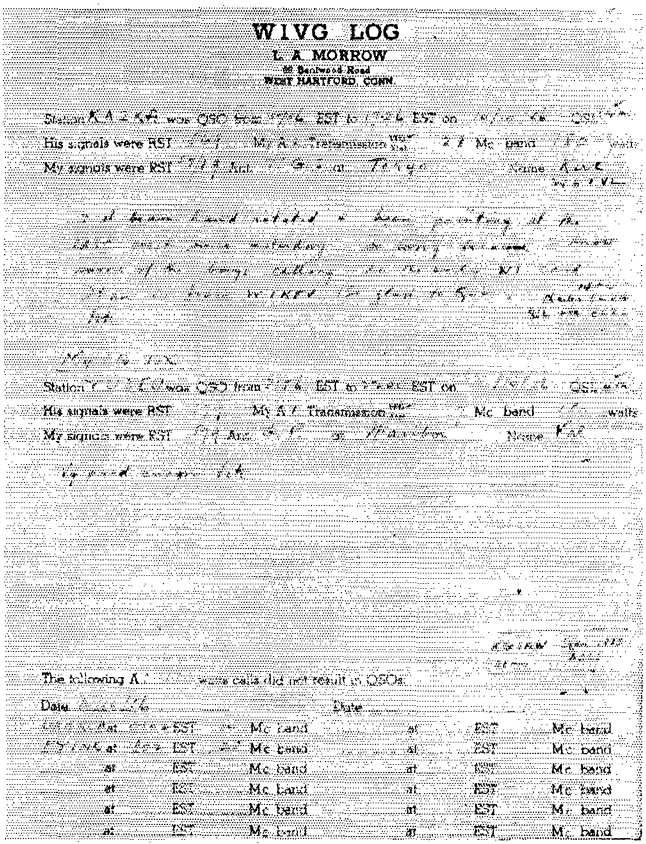
In my opinion you should be able to look back in your log and find out what kind of equipment you were using at any given time. To this end I record some notes on the unprinted left-hand pages of the log, describing the gear and any changes or observations. (I've always promised myself to include some photographs some day.)

It shouldn't be necessary to add that the other legal requirements for log keeping — name of operator and location of station — are written on the inside cover of the log. Guest operators sign the log in the "Remarks" column.

And Now W1VG. . . .

The conventional log with one QSO to a line is good; in fact, it's probably the best for general operating. However, as the time spent at W1VG in chasing DX increased, I became more fed up on trying to keep track of stray pieces of paper with addresses on them and of not having enough room in the log to record other information I wanted to keep handy.

The need for plenty of writing space resulted in a loose leaf log which I've been using for quite a number of years. Let's look at a typical page. The one reproduced here discloses that



although one of the QSOs on the evening of October 10th was on 28 Mc. and another on 7 Mc., I had been doing some tuning around on other bands. The notes on EL2C and on KG1AW show listening on both 20 and 15 meters. Unsuccessful calls were made on 20 and 10. (Incidentally, I have not heard EL2G since — but if I do work him I won't have to keep the line-up waiting while he gives me his name and QSL directions).

Not all QSOs are the same old exchange of reports and "Dr OMs". It was interesting — to me, at least — to learn that KA2KA had received only one W1 card and was using a hand rotated beam that he was inclined to leave in one position for a while. Sometimes notes are made on the other fellow's remarks. At other times everything the DX station says is copied in the log.

The printed part of the log sheet is for data required by FCC plus other information I like to keep. The check mark after *QSL* shows a card was sent, while the *14 Mc.* tells me that I had worked KA2KA on 20 meters. The 7 Mc. QSO with YU3EU made it four bands with Val and the check mark indicates that a card was mailed. I like to know the antennas used, too, and the other fellow's name. *T.G.S.* means the Triple Globe Spanner beam while *G.P.* stands for the Premax ground plane. It's a kick to thumb through some of the old log sheets. Here's LA5OF's description of a week of spring weather above the Arctic Circle when we were recovering from New England's worst ice storm. Back a few pages is a succession of daily notes that JA3AB was coming through on 10 meters when the band was otherwise dead. The low power used by some of the Europeans is noticed: OZ7TE — 8 watts, OY1R and GC3HFE — 12 watts, PAØUZ — 26 watts, for example. The DL/LX boys promised to write up the expedition for *QST*, I see. Ah, here it is — my 100th country on 21 Mc., at last: ZP6CR, complete with name, address and promise to QSL. Yeah, but my card came back "No reclamodo en listo" . . .

This log with its two QSOs per page is not well suited to contest operating, so another type is used during those hectic periods. The form was designed for the Sweepstakes because more information is required for that contest than for most. However, it can be used for other contests as well. The page shown here is from the 1956 DX Contest.

It might be asked why the log sheet provides only two QSOs per page, a twelve to two ratio of calls to QSLs. The reason is simply that the going at W1VG is pretty rough sometimes. No doubt the kw. boys should print three QSOs per page and leave four lines for unanswered calls, but for most of us in the 150-200 watt class that would be the height of unwarranted optimism.

Handy Tips From W1BDI. . . .

The Editor has asked me to put down some notes on how I use the League log. My log, first of all, must meet FCC requirements. It must be bound, since loose leaf versions are scarcely better than scraps of paper when it comes to the possibility of losing part of an essential record or getting the order of the pages mixed up. My log has to serve me both for periods of casual operation in which I want to record a lot of the information sent and received, make antenna tests or compare transmitters, or in other periods to record contacts in more rapid succession such as in contests. The ARRL logs have the big advantage of lying perfectly flat to write on, and the form is preruled to make it easy for the general worker, like you and me, to keep a good FCC log. Log keeping in any log can be made easy by putting the entries that change in the columns and covering non-changing items by the statements covering call, your name (operator) and brand of time for the whole book. A Novice who can work but one band and power can certainly group such information and cover it by a statement instead of repeated entries. But as he grows in amateur stature he will find the need for some system and uniformity, and columns for these entries. He may end up with a neat shelf full of the familiar ARRL standard log books, even as at W1AW!

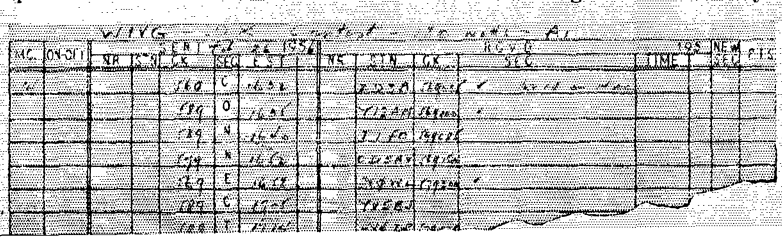
Getting back to my personal log, it's a very simple listing of all calls and QSOs. The ARRL logs can be made to meet a variety of user's requirements. Most questions we receive are from fellows who want to know just how to handle such simple points as logging a CQ. So in the sample logging presented I first show how it is when I send a CQ and work a station. I have to put down the ending time of the QSO on the latter.

0905	CQ	x	21.1	A-1	120	
0906	x	K6XXX	"	"	"	0943

My next example gives the type of entry when I tune for the other fellow and answer his CQ, which doesn't have to be logged.

1218 K6XXX x 7 A-1 90

He didn't answer the call, so there is no QSO and no ending time. My CQ must be entered whether there are any replies or not (also any QSTs or addressed one-way transmissions). You *can* log "heard" items like the other fellow's CQ if you have a mind to. But FCC is interested only in your station transmissions. Unless it's some rare DX or a station I want to come back to I would not normally use the log for recording stations heard, though with notation as to the dial setting and time of customary operation I do have such entries. An X is used throughout wherever my own call appears — as



stated with the other recurring data. I probably keep more detailed notes than most amateurs. My "opposite" pages contain monthly message tallies as sent the SCM, also ARRL field notes as received in LO Party QSOs, antenna tuner data, FMT results, and antenna s.w.r.-*vs*-frequency tabulations.

Visiting c.w. operators have to sign my log (12.136b) in the Other Data column if they operate my station; if another person speaks over the mike and I sign off and throw switches I have to record the names there myself.

My logging is on the principle of meeting FCC requirements using the ARRL log and for contest purposes making running entries in a contest log as I go along, these showing all the SS preambles or number exchanges, signal reports, etc., that may go with a given test.

The next example is right from my log and shows reporting in a traffic net. I'm not the NCS but a net member reporting into the Connecticut net. I have a couple of messages on the hook to be moved. One is to a chap way across the country; the second is for relay. I got it off another net and it's for another Connecticut city.

The log spells it all out. The NCS (W1CUH) calls the net (CQ CN) on the dot at 1900. As a heard-only entry and not a transmission I could skip this as an entry or put it in, if I like. All my other entries are a record of stations I transmitted to. Each requires and gets one line in the log.

1903 W1CUH x

I have called in, sent my traffic list (1 thru, 1 Norwalk . . . not logged information) briefly and have been stood-by until more stations have answered on roll call. All through the net session I'll be working with the NCS. Therefore no entry will be put in the Ending Time column on this line until the net closes or I'm excused or dismissed (QNX, QNO) earlier.

Five stations report in their turn and I jot the calls down at the right. This is not FCC-required. It just helps me to know who is around and fills out the interesting picture of who has what for where. Should I be an alternate for the NCS (control station) spot, this would be vital information. Now four minutes have elapsed and W1CUH directs W1IUC to take my Norwalk traffic.

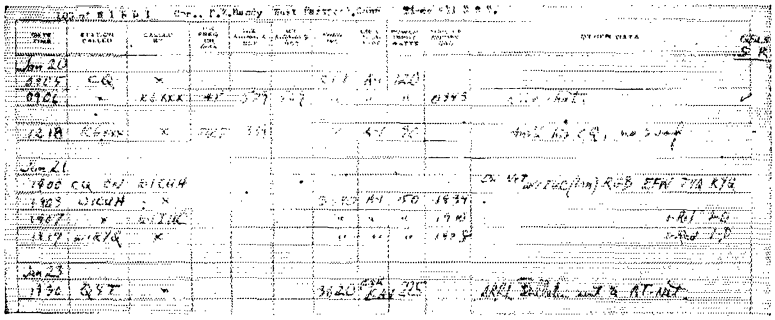
1907 x W1IUC 3.640 A-1 150 1910

The 1910 ending time is put in when I sign with W1IUC. As I enter the handling data on the traffic I always log the traffic count (with the station just worked) on the same line (1-rel; 1-orig). This expedites my count (for SCM report card) at the end of each month. After pausing several minutes during which other stations on the net are busy with traffic, as directed by the NCS, I'm told by W1CUH to call W1KYQ who has indicated one for my direction. This transaction is to take one for another local amateur. The situation requires a delivery copy, so the brief but complete record, showing the message count is entered:

1917 W1KYQ x 3.640 A-1 150 1928 1-R, 1-D

Just four lines record my work, although there may have been twenty stations in and out (but not working with me) in the course of the net operations. After ending with W1KYQ, I sat in until W1CUH dismissed me at 1934, which time was then entered opposite the NCS' call. Messages aren't ordinarily written into a log, but copies kept together for at least a year (the FCC-required time). In periods when I'm a vacation mobile I have used the Data column and opposite pages as a convenient spot to write messages with the assurance that in a bound log they wouldn't become lost. Copies of all postal cards I send FCC offices about more-than-48-hours-away-from-home mobile itineraries are kept on my opposite pages too. Each ARRL log has another feature I use that's not in the dime store notebooks — a numbers-list for consecutive numbering of traffic. This yellow CD Form 3 has on its other side the list of numbered-text messages, invaluable when I have to complete the delivery of ARL-texts or pick one out.

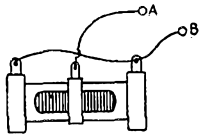
The League also has created a miniaturized version of the radio log. The Minilog provides a pocket sized and yet legal version for logging. I've used these some; they're kept just as described for the larger log. However, I personally much prefer the larger log for my mobile work, for I like the room for copious notes (my antenna loading data, to write in messages, etc.) The ARRL experience with the Minilog is that it fills a necessary place. It is equally in demand with its big brother and ideal for abbreviated notations. It goes in your pocket, or in the car pocket, instead of under the seat where I keep the big log version.



Quist Quiz

Another teaser sent in by W1HJL looks so simple you should get it right off the bat. Just be sure that the answer you get is the right one!

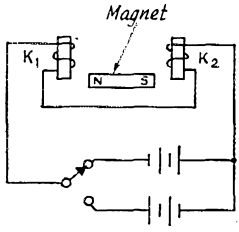
The question: The resistor shown in the diagram is the conventional slider-type wire-wound



adjustable resistor. The slider is in the center of the resistor. When connected as shown, what value of total resistance must be purchased to get 25 ohms between points A and B?

—•••—

The answers to last month's Quist Quiz consist of polarizing the relays by placing a magnet at the base of the relay cores and using batteries of different polarities, as shown in the sketch. The



system will work even with sensitive relays in which the magnetic path is almost completely closed, although only over a small current range.

FEEDBACK

The tuning capacitor, C_1, in W6LSB's 2-meter amplifier (Oct., 1956, p. 41) has 2½-inch diameter plates, not 1½-inch as stated under Fig. 1.

In the Transformerless Balanced Modulator (page 42, February) the value of C_1 should have been given as 0–25 $\mu\mu$f. and the capacitor should have been shown adjustable.

W6ARE points out that there seems to be something wrong with the circuit (Fig. 4) that appeared on page 59, in February. And he is right. The rectifier filament — either Pin 2 or 8 — should be connected to ground.

NEGATIVE FEEDBACK

In the "Monimatch," October, 1956, and in the "Monimatch Mark II," February, 1957, the resistor values R_1 and R_2 *are* correct.

25 Years Ago
this month

March 1932

. . . Featured in *QST* twenty-five years ago was a low-power single tube transmitter for the 160-meter band, described by George Grammer. The technical discussion was supplemented by a dissertation on the advantages of c.w. on 160, particularly for beginners.

. . . Another technical article described the construction of a one-tube superregenerative receivers in a cigar box, and still another discussed the elimination of interference caused by electrical equipment.

. . . Jim Lamb gave some info on the new phone regs and gave some technical hints on using the various new bands. This was followed by a K. B. Warner article on how to get a license for "unlimited" phone operation.

. . . Dellenbaugh and Quimby discussed the first filter choke and its effect on regulation and smoothing, while W9ERU gave forth with a very interesting story entitled "The Old Timer Hangs a New Sky-Wire". This latter article gave some good technical info in a style which was calculated not to scare the reader away.

. . . An interesting Stray was contributed by W1BTE, who suggested keeping a DX tally not by merely listing the number of different countries worked but by also summing up the total number of districts (or prefixes) worked. It was, at the time, a new approach.

. . . The League's QSL-card forwarding service was having growing pains. Handled at that time entirely by the Hq. staff, it had gotten so large that effective in April of 1932 we had to establish the policy of no longer handling SWL cards.

. . . In March of 1932 there were eleven licensed operators listed as being on the Hq. staff. Today, twenty-five years later, we find 28 listed.

Silent Keys

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

W1ARC, Horace K. Hentz, West Harwich, Mass.
W1GUK, Lloyd E. Hosmer, Groton, Conn.
W2LJ, Leonard J. Yuhl, Floral Park, L.I., N.Y.
W3AKF, Marvin W. Shellhamer, Tamaqua, Penna.
W3OTF, Glenn W. Michael, Red Lion, Penna.
W3TJY, Clair L. Swank, Jacobus, Penna.
W3UDQ, Frank B. Martin, Norristown, Penna.
W3UIF, William M. Mulgrew, Carlisle, Penna.
W4CXI, E. Lee Brigman, Kannapolis, N. C.
W4KCK, Pedro Rodriguez, Orlando, Fla.
W4TZD, Thomas M. Blackburn, Sr., Knoxville, Tenn.
W5GLP, Charles B. Kindred, San Antonio, Texas
W5JIE, Truman M. Covey, Brownwood, Texas
W5JTI, Tim Quinn, Jackson, Miss.
W6CNF, Paul C. Hanger, Beverly Hills, Calif.
W6EHB, Lewis B. Malette, Santa Monica, Calif.
W6ERU, Roy R. Wallace, Ventura, Calif.
W6RIA, LeRoy Knass, Los Angeles, Calif.
W6VTW, Alexander V. Baird, Pasadena, Calif.
WN7DMV, Fred E. Butt, Portland, Oregon
W7UYA, James H. Herron, Phoenix, Arizona
W8CVZ, Floyd J. Kinnaman, Fostoria, Ohio
W8SYJ, William A. Mewha, Wellsburg, West Va.
WØAKM, John C. Easton, Humboldt, Minn.

CONDUCTED BY EDWARD P. TILTON,* WIHDQ

What is a "contact?"

This question is almost as old as amateur radio, but we still have no absolute answer. If A calls B, and B replies and is heard by A, is that a QSO? *It might be considered as such, if we lose sight of* one fundamental fact. As amateurs we are presumed to be engaged in *communication*. This implies exchange of information, not just identification of one another.

Thus, a reasonable definition of a QSO, for amateur purposes, would seem to be an exchange of useful information. Otherwise, why communicate at all? Mutual exchange of information has become the basis for determining whether a contact has been made, and it has served this purpose well in all sorts of situations. It is the basis for awards issued by ARRL and all other amateur societies.

The minimum exchange for two-way work to be considered a contact has been fairly well standardized on a two-stage procedure: positive identification of calls at both ends, and the complete exchange of signal reports. The latter is about the shortest item of information that can be transmitted between two stations that will have any meaning at all. The form varies with various operating activities, but the basic idea of mutual exchange remains in all.

The reason we go into this here is that the question arises frequently in marginal forms of v.h.f. communication such as meteor-burst work. Here the additional point of total time involved enters the picture. Should there be a time limit for the completion of the exchange? Could you start this morning, get part of the information through, and complete the exchange tomorrow, or next week, for example? Is it reasonable to spread the exchange over a period of a couple of hours, when only the basic elements of a QSO are involved?

The answer to these questions is bound to be arbitrary, to some extent. We must have some sort of standard. Here is the one we have set up for marginal communication, to determine whether or not a QSO has taken place. We feel that it may well be applied by v.h.f. men in judging their own efforts and results.

First the basic minimum of identification and exchange is a must. You call. The other fellow answers. If you positively identify him, and establish that he was coming back to you, you send a signal report. (More on that later.) If he gets the signal report, he then sends you one. If you get it, you send "R." If he gets the single letter, he also sends "R," and the QSO is over, as far as the claim for a contact is concerned. There is no obligation to hear or send closing 73, or SK, or confirmation of either of these items. You send the SK, of course, as the indication for other

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

50 WAS Mc.

W0ZJB	48	W4QN	44	W8UZ	45
W0BJV	48	W4UCH	44	W8RFW	45
W0CJS	48	W4EQR	44	W8SQU	45
W5AJG	48	W4FLW	43	W8LPD	44
W9ZHL	48	W4UMF	43	W8HJR	43
W9OCA	48	W4OXC	41	W8YLS	41
W6OB	48	K4DJO	41	W8PCK	38
W0INI	48	W4MS	40		
W1HDQ	48	W4AZC	40	W9BRN	48
W5MJD	48	W4IKK	40	W9ZHB	48
W2IDZ	48	W4FNR	40	W9QUV	48
W1LLL	48	W4IUJ	38	W9VZP	47
W0DZM	48	W4AKX	36	W9RQM	47
W0HVW	48	W4AYV	36	W9ALU	47
W0WKB	48	W4GJO	35	W9QKM	47
W0SMJ	48	W4ZD	35	W9UIA	45
W0OGW	48	W4ZBQ	34	W9UNS	45
W7ERA	48			W9MHP	43
W3OJU	48	W5VY	48	W9MFH	42
		W5SFW	47	W9JEP	42
W1VNH	47	W5LFQ	47	W9JCI	41
W1CLS	47	W5GNQ	46		
W1CGY	46	W5ONS	45	W0ORE	48
W1LSN	46	W5ML	44	W0QIN	47
W1AEP	46	W5FSC	44	W0NFM	47
W1RFU	44	W5JLY	44	W0TKX	47
W1FOS	44	W5JME	43	W0KYF	47
W1KHL	42	W5VV	42	W0MVG	47
W1DJ	41	W5FAL	41	W0JOL	46
W1ELP	41	W5HEZ	41	W0YJF	44
W1SPX	36	W5BXA	41	W0URQ	44
W1UHE	35	W5HLD	40	W0JHS	43
W1SUZ	34	W5FXN	40	W0IPI	43
W1WAS	31	W5EXZ	38	W0CNM	42
W1FTF	29	W5HFF	33	W0FKY	42
		W5NSJ	32	W0PKD	41
W2MEU	47	W5ZVF	31	W0WNU	34
W2AMJ	46			W0YZZ	30
W2BYM	46	W6WNN	48	W0USQ	40
W2RLV	45	W6UXN	48	W0ZTW	36
W2FHJ	45	W6TMI	47	W0QVZ	36
W2RGV	44	K6EDX	46	W0VIK	35
K2JNS	42	W6ANN	45	K0BPM	35
K2AXQ	42	K6GTG	44	W0WNU	34
W2SHV	41	W6GCG	43	W0YZZ	30
W2GYV	40	W6NDP	43		
K2HPN	39	K6HYY	43	VE3AET	45
W2ORA	39	W6IWS	41	VE3AIB	35
W2QVH	38	W6CAN	40	VE1EF	35
K2HRB	37	W6ABN	39	VE1QZ	34
W2ZUW	37	W6BWG	39	VE1QY	32
K2ITQ	36	K6ERG	38	VE3DER	31
K2ITP	36	W6OJF	31	XE1GE	27
				VE1PQ	22
W3TIF	47	W7FFE	48	VE1WL	21
W3NKM	41	W7HEA	47	CO6WW	21
W3MQU	41	W7BQX	47	VE4HS	20
W3MXW	41	W7FDJ	46	CO2ZX	16
W3OTC	40	W7DYD	47	LU9MA	16
W3FPH	40	W7ACD	45	PZ1AE	15
W3RUE	41	W7JRG	44	JA1AUH	5
W3KMV	39	W7BOC	42		
W3LFC	37	W7JPA	42	**Calls in bold face** are holders of special 50-Mc. WAS certificates listed in order of award numbers. Others are based on unverified reports.	
W3TDF	35	W7FIV	41		
W3AMO	35	W7CAM	40		
W3UQJ	28	W7UFB	30		
W4EQM	47				
W4FHH	46	W8CMS	47		
W4LNG	45	W8OJN	46		
W4CPZ	45	W8NQD	45		

listeners that you're through, but you don't have to *exchange* SK's!

How the exchange is made can be arranged to suit your own operating preferences. If it is handled in random fashion it may be a very long drawn-out matter, in meteor-burst communication on 144 Mc., or even in ionospheric-scatter work on 50 Mc. Precise timing of transmissions at each end expedites the exchange no end. Using clocks checked carefully against WWV, you call the first minute, or whatever prearranged period you prefer. If your co-worker on the sked hears you, he calls for the next period. If you identify him calling you, you reply with the signal report. If you haven't identified him completely, you call again. Assuming that you did identify him, and sent the report next, you keep sending it every time it's your turn, until you hear him send a report. If you copy the report, you send the R. When you hear his R you've got your new state, ARRL section, or whatever.

What kind of signal report? Go through the meaningless RST, if you like, but we suggest the S-code for meteor-shower work. This means something, if used properly. S1: short bursts, with no copy. S2: bursts long enough to identify at least individual letters, and up to 5 seconds' duration. S3: bursts of 5 to 15 seconds. S4, fairly rare in meteor-burst work on 144 Mc.: 15 seconds to 2 minutes. S5: 2 minutes or more of solid copy. Lest the inexperienced be dismayed by this reporting system, let it be said that plenty of good meteor-burst contacts have been made with nothing better than S3 reports. A lot of information can be sent on c.w. in bursts of 5 to 10 seconds.

Note that R has no place in the signal reporting. It is reserved for the "R R R R R R R —" you're going to send to indicate that you have copied the necessary information.

A variation of this form is often used in ionospheric-scatter work on 50 Mc. Here the duration of bursts is longer, and they are usually superimposed on a very weak steady signal. So an RST is sent, with the R indicating the percentage of time the signal is heard. R1: up to 20 per cent. R2: 20 to 40 per cent. R3: 40 to 60 per cent. R4: 60 to 80 per cent. R5: over 80 per cent, or "in solid." The S part of the report is the maximum strength observed, on the usual S scale. The T is as in the conventional RST system.

Sounds complicated, but it isn't when you get the habit — and it is an *informative* report. So is the S system used in meteor work. Either kind of QSO certainly qualifies as such, in that it provides a useful exchange of information. Either means far more than the DX man's standard 579, given to a 14-Mc. rare one — when the latter is probably working six other people!

How long? So long as it is a continuous effort, only the endurance of the two participants matters. Many acceptable claims for new states worked on 144 Mc. have been made on the basis of work that took two hours or more. We've had no instances of anyone counting part of an exchange from one day and another part the next, but if that should come up we'd feel required to turn thumbs down!

The role of the tape recorder? Recording for demonstration later, and for posterity, is fine. We're all for it. But if you have to play back a recording to see if a contact has been made, you haven't made one. You must copy information, and know that you've copied it, before you can truthfully send the "R R R R R —" that will conclude the QSO.

Here and There

One day recently an impressive package was delivered to ARRL Headquarters through diplomatic channels, for forwarding to Bob Cooper, K6EDX, Fresno, Calif. Nestled in a beautiful plush case was a three-inch silver medal, and accompanying it a handsome scroll in Japanese, reproduced herewith. We quote from the covering letter:

"With the remarkable development of amateur radio equipment in recent years, two-way communication between Japanese amateur stations and overseas stations has greatly increased.

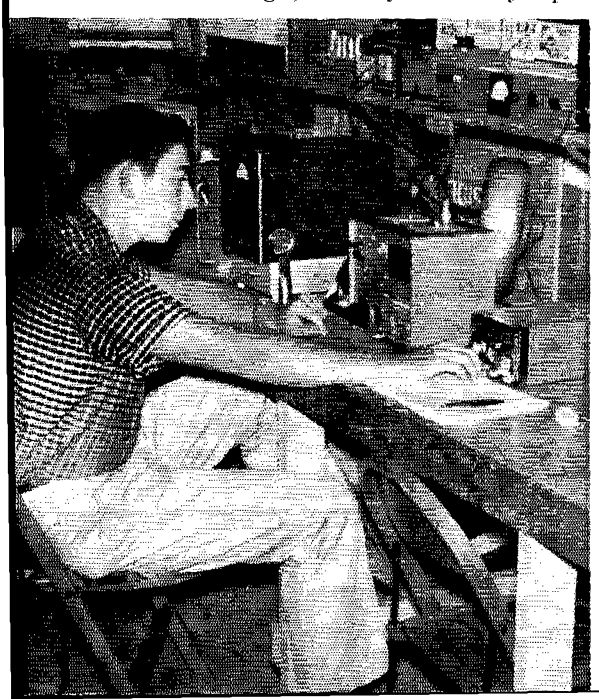
"The Asahi Shimbun Press wishes to join the Japanese Amateur Radio League in congratulating those amateur station operators who first made contact with Japanese amateur stations via 50-Mc. v.h.f.

"The Asahi Shimbun Press takes great pleasure in commending Mr. Robert W. Cooper, 4832 North Fruit Ave., Fresno 5, California, United States of America, K6EDX, for his achievement in making first contact from America on October 28th, 1956, with Mr. Masanobu Goto, 12-4 Takagicho, Aoyama Akasaka, Minato-ku, Tokyo, Japan, JA1AUH.

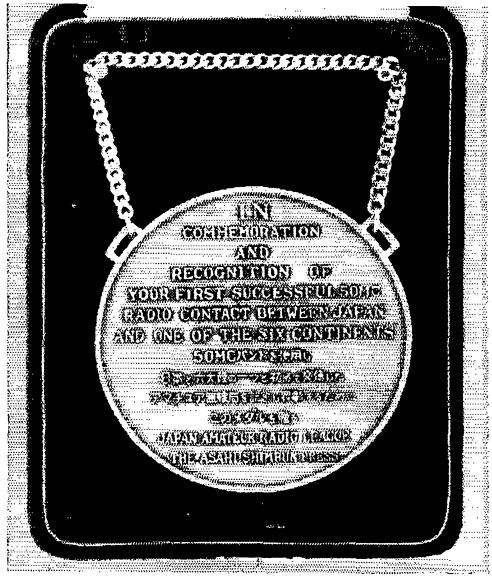
"The Asahi Shimbun Press deems it an honour to present Mr. Robert Cooper a medal in commemoration of his achievement.

Nagataka Murayama,
Chairman of the Board of Directors
The Asahi Shimbun, Tokyo, Japan."

♦



Bob Cooper, K6EDX, Fresno, Calif., who made the first 50-Mc. contact between North America and Japan, with JA1AUH, Tokyo. At the time of this picture, Bob was driving a home-built linear amplifier with a Communicator on 50 Mc. This has since been replaced by a kilowatt final stage, plate-modulated. Antennas are various stacked and long Yagis, mounted 85 feet above ground.



Beautiful silver medal awarded to K6EDX by The Asahi Shimbun Press and the Japanese Amateur Radio League, in honor of his history-making 50-Mc. QSO with JA1AUH. Scroll in Japanese details the event.


賞状

アマチュア無線局K6EDX
ポップ・クーパー殿

貴局は昭和三十二年十月二十八日五〇MC帯で
JA1AUH局と交信されました
この交信は世界アマチュア無線史上最初の
超短波による日本との交信であります
日本アマチュア無線連盟は貴局の
不滅の記録を賞します

昭和三十二年十一月四日

日本アマチュア無線連盟
理事長 梶井謙一

♦

A fine, friendly gesture, commemorating a significant event — the first v.h.f. communication between the continents of North America and Asia, as well as between our two countries.

The year 1956 ended in fine style for W3OJU, Washington, D. C. Dec. 31st brought Rick the long-awaited contact with Nevada. W7JLV, and he is now the proud holder of special 50-Mc. WAS Award No. 19, the first W3 to make the grade. Only W4 and W8 now have no representatives in the bold-face listings at the top of our 50-Mc. WAS box.

The first official reporting period of the ARRL—IGY Propagation Research Project (see September, 1956, *QST*) came to a close Jan. 15th. The pile of reports already in hand at this writing is most gratifying. And interesting, too, for what a mass of information they contain! They show positively that there never was a January quite like this one. Only on the 10th and 12th was no DX observed on 50 Mc. in the first 15 days. Both sporadic-*E* and F2 DX were worked on Jan. 1st, 3rd, 6th and 13th. F2 DX was worked, also, on the 2nd, 4th, 5th, 11th, and 14th, and sporadic-*E* on the 7th, 8th, 9th and 15th. There was a touch of aurora on the 9th, though it was caught by only a few observers.

Marginal forms of communication, including meteor bursts on 144 Mc., tropospheric and ionospheric scatter, back-scatter and transequatorial scatter on 50 Mc., and moon-bounce on 144 Mc., are represented. A quick scanning of the reports shows:

KL7VT, Summit Alaska, heard or worked on 50 Mc. as follows: by W8SSO, Wyandotte, Mich., 1/6, at 1619 EST; by W9JFP, Milwaukee, 1/3: by W8OJN, Akron, Ohio, 1/6, 1630 EST; and by W9ALU, Metamora, Ill., and W8CMS, Newton Falls, Ohio, 1/7, around 1640 EST. W6VDC, Redwood City, Calif. hearing K6GTG, Arlington, Cal., on the latter's early-morning scatter tests (see Feb. *QST*, page 72) on what appears to be meteor bursts, despite the relatively short distance, 350 miles. W4HJQ, Glendale, Ky., heard VP7BI, Bahamas, Jan. 1st. W4HHK heard W7UFB, Casper, Wyo., Jan. 3rd. VE1EF, near Halifax, N. S., heard and worked many western stations on days when even the W1s heard little or nothing. TG9JW, Guatemala, heard bursts from Panamanian station on 49.85 Mc., 1/12. Jack takes the honors for the first transequatorial scatter of the IGY project: reception of LUs the same day, around 1920 CST. LU9MA, Mendoza, Argentina, reports that the major sporadic-*E* season started about a month earlier this year, December 3rd, compared with January 1, 1956.

W2NLY, Metuchen, N. J., sums up results of his first 144-Mc. moon-bounce tests of 1957. Jim sent pulses 5 seconds apart for about 20 minutes, beginning at 2009 the 4th, 2106 on the 5th and 2300 on the 7th. He was able to hear his own echoes each test period, 12, 10 and 5 per test, in that order. They were some 3 db. over the noise level, with reception marred by heavy ignition interference. W3GKP, Spencerville, Md., had a *running* score on his reception of W4LTU, Orlando, Fla., via the meteor route. It shows a very high percentage of success, in catching at least a few bursts. The only aurora observation on 144 Mc. to date comes from W8IFX, Cincinnati, who caught W9GAB and W9UCH in a short one the 9th. (There was widespread aurora on Jan. 21st and 24th, but these dates are not in the reporting period discussed above.)

As the end of January approaches, indications are that the F2 DX on east-west paths is running out. European TV reception is falling off, and little or no transcontinental work has been reported. The BBC's Channel 2 sound on 48.25 Mc. continues to be received well daily, but the video of the same station, 51.75 Mc., seldom is heard and, when it comes through, it has been for only a few minutes. Not much evidence of high m.u.f. on north-south paths

has yet shown, but by another deadline we should have done some business in that department.

Reports from several sources say that CN2AO, Tangier (one-time EAR96), has heard W1FOS, W1CLS and W5AJG. He is said to be getting set for operation on 6. He, and other stations farther north, don't look like very good bets until next fall. Another in that direction, W8QOH/MM off West Africa, heard 50-Mc. sigs late in December. He'll try to work crossband from 28-Mc. c.w. if he hears other openings.

The "4-metre band" is being opened up in Great Britain and Ireland. The British have 70.2 to 70.4 Mc., while Eire has 70.575 to 70.775 Mc. Then the French are at 72 Mc. Anyone contemplating attempts at v.h.f. transatlantic QSO's should make his converter and antenna system capable of working from 70 to above 72 Mc. Should the m.u.f. continue to rise for another 9 months, a 50-70 QSO next fall is not too remote a possibility. EI2W is set for it already. The m.u.f. was reported as high as 63 Mc. across the North Atlantic in December. W4UMF, Falls Church, Va., heard European TV sound on 62 Mc., Jan. 7th.

W8CMS, Newton Falls, Ohio, wonders why we heard strong back-scatter daily from Europe, but little or none from other directions. The band was open to Alaska almost daily during the fall and early winter, as evidenced by the RTTY sigs just below the band edge, heard for several hours on the better days. No back-scatter from that direction was heard at these times. Claire also says that the strength of the back-scatter signals seems to be affected by the relative positions of the two stations with respect to path length to the scattering point. This also appears to apply in aurora work. Any confirmation of this from other observers?

Good news from Alaska — KL7VT really is on 50 Mc.! Earl made his first contacts Jan. 3rd, with W9JCI, W9JFP, W9NUC, K4KUY, W8TIN, and he heard W4EQR, K4EMB and W9CSI, between 1640 and 1738 CST. KL7BND heard WØJOL, W8CDQ, W8QCU and W9DSP, beginning at 1537 CST, and JA6A? at 1815 CST. KL7VT heard the band open on the 4th, beginning at 1100 his time (1600 EST), and worked W8QLB. Others were heard but limited noon-hour operating time prevented further contacts. K2IAX was worked on the 5th, and the second day of the V.H.F. SS brought contacts with Wisconsin, Minnesota, Ohio, Indiana, and Vermont. The last, with W1FTF, Barre, may be the first W1 – KL7 QSO on 50 Mc., though we've heard as yet unconfirmed reports of others.

KL7VT is at Summit. Others: KL7AH, Anchorage; KL7MS — AZI, Shuyak Island, near Kodiak; KL7BND, Big Delta (who is reported to have wasted much wind on 51.075 Mc.), and KL7AYZ, near Bethel. It appears that openings to Alaska come later than most of us have anticipated. Earl's earliest work has been at 1530 EST and most of it around 1600 to 1700 EST. Maybe we shouldn't rely too much on those RTTY signals; the latest they've been heard here is 1645 EST, and usually they're out before 1600.

W1FTF and W1MMN, two Vermont mainstays on 50 and 144 Mc., intend to QSL on all contacts where a card is desired. If you have worked either and have no confirmation, they will be glad to oblige.

When your conductor was in the West last summer, he had a look at what was on the way to becoming the world's largest 2-meter array. Built on 4 huge H frames, it carried 16 24-foot Yagis of W6QKI design (see January, 1956, *QST*). The frames were on hinged supports, to be moved around and tilted for various moon positions. Work had been going on then for several months, and the giant was still not complete. When it was finally ready for use, aiming problems for moon reflection were never quite solved — and then one morning in late October a sudden violent wind reduced "Project Jersey Bounce" to a mass of splintered lumber and twisted aluminum rod. We quote from a black-bordered obituary notice: "Funeral services were held at the home of K6EYN, in the San Fernando Valley. Mourners were requested to omit flowers, but to bring hammers, saws, wrecking bars and muscle. Pallbearers were K6EYN K6OUK K6IVO W6ZAT W6QKI W6QED W9QEP 6 W9QXP 6 and W2YPY 6. Pallbearer in absentia: W2NLY."

A new v.h.f. group, the Suncoast VHF Club, held its first meeting Dec. 27th, at the home of K4AVH, St. Petersburg, Fla. Net night is Thursday, 1930 EST, on 50.7 Mc. Hams of the Tampa-St. Petersburg area are welcome.

More club doings: The VHF Institute of New York is sponsoring a 220–420 night March 1st. All Technicians and would-be Technicians (also known as Novices of 11 months' tenure) are invited to attend. Meetings are held at the transmitter building of WEVD, 47–01 Maspeth Ave., Maspeth, L. I., N. Y. Hire local Indian guide, or come equipped for talking in on 2-meter mobile (listen for W2WCR, the club station) if you haven't been to meetings there before. Joking aside, the gang at the VHF Institute will make you feel right at home. Your conductor speaks from pleasant experience in this connection.

Candidate for meteor-scatter or tropospheric DX on 144 Mc.: W6ZEM-K6QFI. Syd runs high power on 144.0005 Mc. at Saugus, Calif., with 5-minute transmissions, automatically keyed, on the hour, from 0900 to 1600 PST daily.

(*Continued on page 148*)

2-METER STANDINGS

	U. S. States	Areas	Miles
W1REZ	24	7	1175
W1FZJ	21	6	1120
W1RFU	19	7	1150
W1HDQ	19	6	1020
W1KOS	19	6	1080
W1AJR	17	6	810
W1IZY	17	6	750
W1UIZ	17	5	680
W1AZK	17	6	850
W1BCN	16	5	650
W1KHL	16	5	540
W1AFO	15	5	810
W1MMN	14	6	800
W2ORI	27	8	1040
W2NLY	26	7	1050
W2AZL	23	8	1050
W2BLV	22	7	1020
W2DWJ	21	6	720
W2OPQ	20	6	970
W2AMJ	20	6	960
K2CEH	20	7	910
W2PAU	20	6	880
W2UTH	19	7	880
W2AZP	19	7	650
K2LXJ	19	6	925
W2CBB	19	6	740
W2KIR	19	6	—
K2IEJ	18	6	745
W2AOC	18	6	660
W2LHI	18	7	820
W2RXG	17	6	675
W2SHT	16	6	650
W2PCQ	16	5	650
W3BGT	28	8	740
W3RUE	25	8	950
W3GKP	23	6	800
W3FPH	21	8	—
W3TDF	21	6	—
W3KCA	21	7	—
W3LZD	20	7	—
W3KWI	19	7	740
W3NKM	19	8	660
W3IBH	19	7	650
W3YHI	19	6	800
W3BNC	18	7	750
W3LNA	16	7	720
W4HHK	29	9	1280
W4AO	23	7	950
W4HJQ	22	7	750
W4UMF	21	6	720
W4MKJ	20	8	725
W4JCJ	20	6	660
W4DWU	19	6	675
W4JFV	18	7	830
W4OLK	18	6	720
W4VLA	17	7	825
W4WNH	17	7	750
W4TLV	16	7	1000
W4CLY	15	5	720
W4ZBU	14	5	800
W4WCB	14	5	—
W4TCR	14	5	720
W4IKZ	13	6	720
W4SOP	13	5	680
W4LTU	13	6	1080
W4CPZ	12	5	650
W4UDQ	11	5	850
W4MDA	11	5	680
W4GIS	9	2	335
W5RCI	21	7	925
W5JTI	19	7	1000
W5HEH	15	7	830
W5AJG	15	5	1280
W5ABN	12	5	780
W5QNL	10	5	1400
W5CVW	10	5	1180
W5SWV	10	3	600
W5MWW	9	4	570
W5ML	9	3	700
W5NDE	8	3	520
W5PZ	8	3	500
W5FEK	8	2	580
W5VY	7	3	1200
W6NLZ	6	3	1000
W6WSQ	5	3	1280
W6DNG	5	3	600
W6AJF	5	2	640
W6RRZ	4	2	360
W6PJA	3	3	1390
W6ZL	3	2	1400
W6AJF	3	2	640
W6BAZ	3	2	400
W6MMU	3	2	388
W6ORS	3	2	365
W6LSB	2	2	360
W7VMP	6	4	1280
W7LEE	6	3	1020
W7LHL	4	2	1050
W7JU	4	2	353
W7JIP	3	2	850
W7YZU	3	2	240
W7JUO	2	2	140
W8WXV	28	8	1200
W8RMH	28	8	800
W8SRW	27	7	850
W8SFG	26	7	850
W8LPD	25	8	750
W8DX	25	8	720
W8LOF	24	8	700
W8ILC	23	8	770
W8SVI	22	8	725
W8JWV	22	8	710
W8BAX	21	8	685
W8PT	21	7	810
W8WRN	20	8	670
W8EPP	18	7	800
W8ZCV	17	7	970
W8RWW	17	7	630
W9KLR	30	8	950
W9FVJ	26	8	850
W9ZHL	25	8	760
W9EQC	25	8	820
W9GAB	24	7	1100
W9EHX	24	7	725
W9BPV	23	7	1000
W9WOK	22	8	860
W9UCH	22	8	750
W9UED	22	7	960
W9KPS	21	7	690
W9MUD	19	7	640
W9REM	19	6	—
W9LF	19	6	—
W9ALU	18	7	800
W9JGA	18	6	720
W9MBI	16	7	660
W9JYI	15	7	560
W9LEE	15	6	780
W9DSP	15	6	760
W9DDG	16	6	700
WØEMS	27	8	1175
WØHD	26	7	870
WØGUD	25	7	1065
WØUOP	18	6	—
WØONQ	17	6	1000
WØINI	17	5	830
WØUSQ	14	6	750
WØOAC	14	5	725
WØTJF	13	4	—
WØSMJ	12	5	775
WØZJB	11	4	650
VE3DIR	26	8	915
VE3AIB	25	8	910
VE3BQN	17	7	790
VE3DER	16	7	820
VE3BPB	13	6	715
VE2AOK	12	5	550
VE3AQG	11	7	800
VE1QY	11	4	900
VE7FJ	2	1	365

YL News and Views

CONDUCTED BY ELEANOR WILSON,* W1QON

DXCC YLs

Our YL DX Century Club story grows longer each year. During the past year eleven YLs joined the club, making the grand total thirty-three. Newest members are CR7LU, DL6VM, EA7EV, KZ5KA, ZP5EJ, W1s VFK, YYM, K6ENL, W6QOG, W7QGF, and WØCXC.

The last report (see Feb. '56 *QST*) showed that only four YLs had upped their totals from their previous year's standing. This year nine members surged ahead substantially. Using phone only EA2CQ rose by fifteen countries to 218, establishing Paula the European phone leader of both YLs and OMs. Long the top YL DXCCer, Lou Littlefield, ex W1MCW, now K4HEF, rose one notch to the grand high among YLs of 220 countries worked. Collecting twenty-seven new ones, LU4DMG, Maria, sailed past the 200 mark with a total of 205. Still considering the phone only class, the records show that CO2BK tallied up with twenty-six new ones, W9QLH with thirty-one, W2PBI with seven, and KZ5DG with twenty-six.

In the phone-c.w. class W6UHA retained top leadership with a total of 221, including twenty new ones. ZS6KK and KZ5DG climbed steadily with increases of thirty-nine and twenty-five, making their revised scores 148 and 130 respectively. Through an oversight VK3YL was not listed last year; Austine is hereby credited with 160 confirmed phone and c.w. W1YYM, Ellen, ARRL Assistant Communications Manager Phone, became the first YL (and the ninth amateur) of *QST* headquarters staff to attain membership in DXCC.

With numbers of YLs closing in on the mandatory one hundred confirmations requirement, our YL DXCC statistics should become increasingly more interesting.

Now girls (and men!) if you'll tear your eyes away from the pictures at the bottom of this page and turn to the next page you'll see the latest figures.

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

Left: Approaching the 200 mark with 186 countries confirmed on phone is CO2BK, Maria Teresa Gomez Garcia. *In* 1953 Maria worked *ninety countries during the first two months she was licensed. Along with her doctor husband,* CO2BL, Maria operates 10, 15, and 20 from her Habana, Cuba QTH. *Center:* Some time ago W6QOG made DXCC using her OM's call, W6MBD, and now Helen Leonard has untiringly produced a certificate in her own right for 131 countries on phone. Licensed in 1938 Helene is past officer of the YLRL and she recently served as president of the Los Angeles YLRC. *Right:* One of the eleven new YLs to make DXCC during the past year, Virginia King, W1VFK, has several times given valuable aid thru amateur radio contacts to persons in distress. The XYL of W1UIB, Ginny was first licensed as a technician in 1952 and enjoys operating 20 phone and c.w.

PHONE

W1MCW	220	W2PBI	120
EA2CQ	218	DL6VM	112
LU4DMG	205	W8BFQ	110
CO2BK	186	ZP5EJ	104
W9QLH	168	W1VFK	100
W6QOG	131	W2FZO	100
KZ5DG	127	OE5YL	100
EA7EV	124		

PHONE-C.W.

W6UHA	221	K6ENL	111
VK3YL	160	CR7LU	110
ZS6KK	148	W3WUH	108
W1FTJ	134	W1VFK	101
KZ5DG	130	W7QGF	101
W4ITR	123	W1RYJ	100
W6YZU	120	W1YYM	100
W5UCQ	116	WØCXC	100
W2NFR	115	G3ACC	100
ZS6WJ	112	KZ5KA	100

Coming YL Get-Togethers

Dayton Hamvention, Women's Program

The YL, XYL program of the 1957 Dayton Hamvention, sponsored by the Dayton Amateur Radio Association, to be held on April 6th at the Dayton Biltmore Hotel, Dayton, Ohio, includes registration, coffee hours, tour of exhibits, luncheon, YL Forum, and Banquet with OMs. At the ladies' luncheon Mrs. John McMillan of Cedarville, Ohio, will describe and display her ceramic collection. In response to enthusiasm for the program last year, a YL Forum is again planned for the afternoon. Forum members will be Mary Meyer, W9RUJ, well known W9 operator; Ruth Cowgill, W8ABM, "ex novice record breaker", who will reveal "How a Novice Can Do It"; Elizabeth Zandonini, W3CDQ, ex President of the YLRL and retiring President of the Washington Radio Club; and Ethel Smith, K4LBM, ex W3MSU, founder and first President of the YLRL. Ruby Rhude, W8MDK, will serve as Moderator. For further details, write W8MDK, Chairman of Women's Activities, 203 Pleasant Ave., Dayton 3, Ohio.

Midwest YL Convention

May 24th-26th, Flint, Michigan. W8ATB Chairman — details next month.

Women Radio Operators of New England

The club is sponsoring a YL-OM dinner dance on March 30th at the Colonial Club on Route 128 in Lynnfield, Mass. All interested please contact Mildred Doremus, W1SVN, 177 Essex Street, Lynnfield Center, Mass.

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Remember, please, notices of coming get-togethers, events, etc., must be received at least two months prior to the issue in which you would like your item mentioned. Notice of an affair scheduled for May should be received early in March.

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Midge Rommel, K6BUS, is shown modeling a Don Miguel original at a fashion show for the Women's Club of Playa del Rey, Calif. And she can handle a code key as smartly as she models this expensive ensemble. Licensed in 1953 Midge works 40, 20 and 2, with a decided preference for c.w. She has worked some seventy countries and has WAC and WAS. Currently Press Chairman for the Los Angeles YLRC, Midge unwittingly drew a bit of favorable publicity for amateur radio on a national scale recently. K4LIB, better known to non-hams as Arthur Godfrey, mentioned on his January 4th network broadcast that Midge was the first YL he ever worked on c.w.

Keeping Up With the Girls

CLUBS:

Washington YLRC: From OM W3NL, Editor of *The Auto Call*, publication of the Washington Mobile Radio Club: "The WAYLRC is one of the most active small groups I have ever seen. Their membership is small, but they seem to get more done than some clubs ten times the size. If all the hams in Washington had as much energy as these girls, I think we'd have more activity in Washington than now goes on in the country!"

Chicago YLRL: After considerable research President W9MXI compiled a seven-page brochure on TVI and distributed copies to club members for reference. Elsie Harper is the club's new Publicity Chairman; her address is 4037 West Eddy St., Chicago.

Women Ham Operators: The WHO is a new club for YLs in the Ft. Worth, Dallas-Texas area. Officers are Pres. W5WXY; V.P. K5CRH; Secy-Treas. K5BNH; Program Chairman and Civil Defense Advisor W5SYL.

(*Continued on page 164*)

♦

During a ceremony at Bolling Air Force Base recently Mary Sturkey, W4ETR, was presented with the Headquarters Command Military Affiliate Radio System Certificate of Merit in recognition of her service as Net Communications Manager of the Headquarters Command MARS. Mary is shown receiving the certificate from Major General Reuben C. Hood, Jr., Commander, USAF (left). The proud observer on the right is Mary's husband, Commander Charles Sturkey, USN, and W4DZA. Mary was first licensed as W2QEZ in 1951. In 1952 and '53 she was second operator at TA2EFA in Turkey, when her husband was attached to the American Military Mission for Aid to Turkey. She has been operating W4ETR from Falls Church, Virginia, since 1954.

1956 W/VE Contest Results

THANKS to the Montreal Amateur Radio Club, Yanks can get together with Canadians each fall in a friendly, private free-for-all. The VEs always turn out in droves. And for the Ws, there's nothing better than this SS-like funfest for picking up a stray QSL or two toward the elusive WAVE award. In this connection, W3LEZ/VE1's Prince Edward Island stint drew pile-ups worthy of a CR1Ø or ZD8, as narrated in January *QST*.

From VE2BB comes word that the contest of last September 29th and 30th brought 257 valid entries. Top dog in the Dominion was VE3DSU with 91,896 points, followed by VE3BXF 89,400, VE2DR 71,604, VE3QE 70,746, VE2YA 62,894, VE3DUS 61,640, W3LEZ/VE1 57,717, VE3VX 57,224, VE2BN 56,500, VE3BLU 46,092.

Meanwhile, back in the States the shining lights proved to be: W2SSC 29,371, W9NII 27,644, W3MSR 24,956, K2CPR 24,764, W2EQS 24,188, W9PZT 23,804, W1TYQ 23,036, W8AJW and K2KFP 22,269, K2OMT 22,077. —*P.S.*

E. Pennsylvania

W3AIZ	19,197
W3DQG	13,438
W3YTM	12,670
W3YUW	11,006
W3ARK	9599
W3RRI	7679
W3MDO	6399
W3BQA	6271
W3FKE	3677
W3EAN	2666
W3ZRQ	1408
W3YHX	600

Md.-Del.-D.C.

W3MSR	24,956
W3HVM	15,358
W3FYS	9670
W3BFW	6371
W3KLA	4543
W3RYV	2304
W3VRD	2261
W3TN	1834
W3VD	1408
W3YAG	683
W3UDO	256

S. New Jersey

K2CPR	24,764
K2OMT	22,077
W2ILN	12,542

W. New York

W2SSC	29,371
K2HVT	15,926
W2PGU	12,798
K2JAE	10,551
W2RUJ	9599
K2MLH	6484
W2QBB	4927
W2MWK	4199

W. Pennsylvania

W3ZKB	19,197
W3VKD	14,206
W3ZUG	5652
W3YOZ	3640
W3ZHQ	3008
W3KQD	683

Illinois

W9NII	27,644
W9PZT	23,804
W9LNQ	17,085
W9PNE	17,064
W9YYG	15,471
W9TKR	10,174
W9MAK	7849
W9FNX	5631
W9YRH	4095
W9KLD	2474
W9YDQ	1194
W9UJB	1023
K9BJV	256

Indiana

W9FGX	15,358
W9POB	8447
W9UKG	7366

Wisconsin

W9GWK	19,581
W9CHD	14,163
W9RKP	6783
W9GIL	320

North Dakota

KØCNC	5972

South Dakota

WØGWS	1991

Minnesota

WØWDW	13,481
WØPBI	10,921
WØRLI	8319
KØBIT	5688

Louisiana

W5JAW	8703
W5KC	7103
K5ARH	3200
W5EKF	1194

Mississippi

W5DQK	9886
W5WZ	512

Tennessee

K4CW8	8162
W4PHW	3839

Kentucky

W4KVX	19,581
W4OMW	2183

Michigan

W8PWQ	10,302
W8VPC	6484
W8UMP	6122
W8M8K	5972
W8PVI	5823
W8GEB	1664
W8CFA	1365
W8BEZ	511
KN8AME	21

Ohio

W8AJW	22,269
W8SMK	18,813
W8YPT	14,590
W8BDO	9897
W8QXW	5972
W8IBX	2730
W8YGR	1536
W8QLJ	171

E. New York

K2PIC	7679
K2DRN	1792
W2CJM	1194

N.Y.C.-L.I.

K2KYK	12,798
K2OPJ	8954
K2GTC	6484
K2GBH	6463
K2DEM	3306
W2CPA	2624
K2OWE	1088
K2OEG	341

N. New Jersey

W2EQS	24,188
K2KFP	22,269
W2GND	17,853
K2GLQ	12,115
K2JLQ	8436
K2MFF	4799
K2PLF	4351
W2ZVW	3072
W2BWW	2112
K2NGG	683
W2CVW	512
W2HL	313

Iowa

KØDON	3583

Kansas

WØGAX	11,326
KØBXF	8760
KØGZP	1386

Missouri

WØGBJ	10,693
KØDEX	8873
KØAR8	7849
WØQWS	7366
WØJAH	6122

Connecticut

W1TYQ	23,036
W1WY	17,064
W1ACR	12,617
W1ODW	9854
W1DDJ	7252

Maine

W1VEH	4693

E. Mass.

W1CCM	4213
W1BAD	3093
W1PLJ	1962
W1EJJ	832
W1BPA	768

W. Mass.

W1JYH	17,661
W1DZV	10,238
W1BPW	427

New Hampshire

W1FZ	12,798
W1ARR	4778
W1QGU	4629

Rhode Island

W1AWE	4778
W1VBR	1693

Oregon

W7JLU	10,174
W7TML	8127
W7AIJ	5631
W7LT	2949

Washington

W7WOG	9150
W7WPR	8959
W7ECX	4849

S.C.V.

W6RLP	4223
W6CLZ	1048

East Bay

W6JDO	1991

San Francisco

W6YC	4095
K6PBX	1920
W6JRH	1493

S.J.V.

K6OVJ	4095
K6HFA	896

North Carolina

K4ARP	12,286
W4GIM	4287
W4EJP	569

Virginia

W4RZE	15,933
W4WWN	12,670
W4JUJ	7039
W4W8F	6171
W4VRT	2730
W4WBC	1792
W4BPR	171

West Virginia

W8UMR	12,670

Colorado

WØSGG	5183

Alabama

W4WOG	10,558
W4RAL	3327

E. Florida

W4LVV	5631
K4KOD	2489
K4DRO	256

Georgia

W4BEY	18,909
W4BYJ	8190

Los Angeles

K6GUZ	9598
K6CEF	8447
K6DDO	4437
K6IYJ	4181
W6OKD	3072
W6MJP	171

Arizona

W7CJZ	8873

San Diego

K6EBH	7394
W6JVA	6719

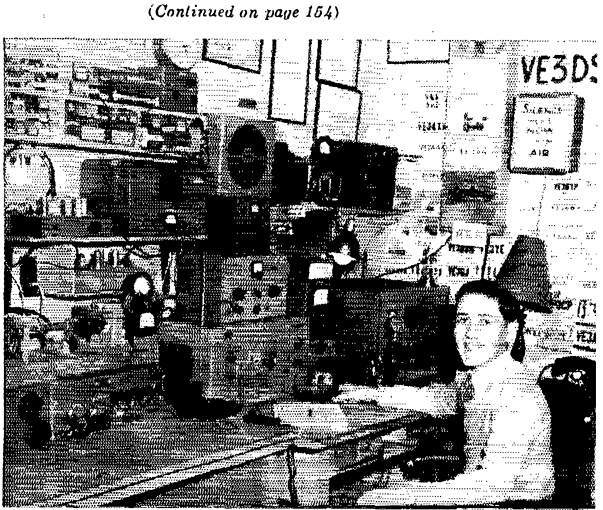
Santa Barbara

W6FYW	128

N. Texas

W5RDL	14,014
W5FTD	6655
W5JD	6527
W5AQE	3413

(*Continued on page 154*)



♦

Armed with a DX-100, an AT-1, Viking v.f.o., HRO-7, Monkey, v.h.f. converters, and 6- and 2-meter rigs of *Handbook* design, VE3DSU hammered home 91,896 points, the contest's number-one tally. Jack radiates with doublets, a 14-Mc. quad, twirlers for 28 and 50 Mc., and a 144-Mc. 24-element collinear.

Correspondence From Members-

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

14-MC. PETITION

6900th Security Wing
Box 10 — APO 757
New York, N. Y.

Editor, *QST:*

May I offer my congratulations to the ARRL Board of Directors for presenting to the Federal Communications Commission the two petitions referenced in the December, 1956 issue of *QST* in "Happenings of the Month." (p. 67)

I have long felt, as most other conscientious amateurs no doubt have, that the value of the Advanced and Extra Class licenses had only paper value.

If the FCC should grant these petitions, it will return some long-needed recognition to amateur proficiency.

I had hopes that the FCC would restrict phone operation in the 40-meter band to holders of valid Advanced and Extra Class licenses, when this subband was opened to phone operation.

I don't think I would be off base to request that the ARRL Board of Directors study this band also, to determine the feasibility of further recognition for amateur proficiency, and to furnish an incentive for those amateurs not holding an Advanced or Extra Class license to show proof of their own proficiency.

— *Dwight B. Olson, W9EAM DL4GF*

1175 Laurelwood Road
Mansfield, Ohio

Editor, *QST:*

. . . The idea of providing an incentive for advancement in the amateur ranks by restricting the use of certain frequencies to those who hold Advanced or Extra Class licenses is a good one. The fact that the Class A, or advanced, license is no longer available, however, automatically removes any possible incentive for that class of license. It is obviously unfair to those who would like to take the Class A examination but are not allowed to do so. The only fair way would be to cancel all Advanced Class licenses and let everyone start fresh, or to open the Advanced Class to anyone wishing to take the examination. . . .

— *E. C. Ryan, W8LRR*

MORE ON GODLEY

The Tarn
Great Notch, N. J.

Editor, *QST:*

Sumner Young and you may be interested in having one, Godley's, reaction to the December issue.

On reaching home from Washington last evening, I found a number of phone memos re the issue. Thus, much of the evening was spent chuckling in and around and about and through footnotes the while (or so it seemed) a bit more than half my years were shucked away. Thanks, both of you! And thanks for kind words which bring a feeling of humbleness, indeed.

But hear this! Those fine-print quotes, p. 56, col. 1, brought, anew, the chill of bone, chatter of teeth and shiver of excitement of 1:33 A.M., GMT, 12/8/21!!!

Somewhere, I have a bound copy of the original log; and, some time, when I break a leg (or something) perhaps I will be digging it out with a view toward a further footnote although, I am sure, it could scarcely add much to the fascinating job done by WØCO.

— *Paul F. Godley*

103 Iroquois Lane
Liverpool, N. Y.

Editor, *QST:*

Sumner B. Young's December-issue (p. 50) review of the first successful transatlantic tests in the late fall of 1921 inspires much nostalgia. I received my ham ticket 9AHH some time that year — age 14. I'd already become proficient at the code by listening with a galena detector for two years, and got my "two-step" amplifier with regenerative detector working for the first time on November 21, 1921. What a 200-meter drama unfolded within the next few days! . . .

Out our way — Eagle Grove, Iowa — it was the concensus that what Paul Godley really heard was not 1AAW but rather W. E. Schweitzer's rock-crushing synchronous spark 9AAW, Chicago, Ill. Godley expected to hear first and second district stations, and probably couldn't believe his ears when he heard a 9. One of the most consistently strong signals on the air that fall was 9AAW — excellent on galena crystal at 400 miles. Godley's Beverage antenna was aimed at Chicago, his receiver was extra sensitive for spark signals, and he heard "-AAW" from a 60-cycle synchronous spark transmitter in the ham band. It *wasn't* 1AAW. Who do you think it was? I think it was Schweitzer! . . .

— *Raymond H. Williamson*

SPEAK UP

5545 Howard Ave.
LaGrange, Ill.

Editor, *QST:*

While reading Lewis McCoy's article on his two-stage 6L6GB rig in January *QST*, it dawned on me that in almost every *QST* that I have read, he has given a great deal of help to the Novice on technical subjects, new rigs, etc. I am now waiting for my General ticket, as many are, and we would appreciate a nice, inexpensive plate modulator that might work with several of his rigs.

Mr. McCoy deserves a lot of credit. How 'bout it, Novices?

— *Donald Burns*

IT'S 30

1088 Cortland St.
Albany 3, N. Y.

Editor, *QST:*

To further comment on which is the correct procedure signal for "end of QSO," $\overline{SK}$ or $\overline{VA}$. It really makes little, if any, difference as it comes out the same — the figures 30 in land-line Morse. Almost all of the abbreviations as well as 73 and 88, etc., used in ham or commercial radio, have been borrowed from Morse practices.

The figures 30 have long been used by press Morse operators, as well as newspaper writers, to indicate the end of the story. Also, the time signals sent out each noon from the Naval Observatory end with 30. I might add, when a Morse telegrapher passes on to his reward, sometimes his associates send him a wreath with 30 on it; this significance is quite obvious.

— *O. L. Martratt, W2ITQ*

360 Oakwood St.
Park Forest, Ill.

Editor, *QST:*

Gad, what sharp ears! Mr. Cowles can tell the difference between $\overline{VA}$ and $\overline{SK}$!

— *Ralph C. Cole, W9LCG*

BREAK

RFD # 1 — Box 100
Gravette, Arkansas

Editor, *QST:*

I am over 14 years old and have had my license for several months. I read the article about Novice Accent (p. 59, Nov. *QST*), and I would like to know what the following means.

(*Continued on page 166*)

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How?

Gosh, how those rare ones are rolling up North American QSOs in this year's ARRL DX Test! Got your share of new ones? Good. A half dozen new countries means you've got to ship out a few QSLs fast. No hurry about the other 200 DX stations worked, you figure. They won't be holding their breaths for just another W/K card, anyway. So, in a few minutes your most urgent outbound QSLs will be ready for mailing, IRCs and all. Nice work.

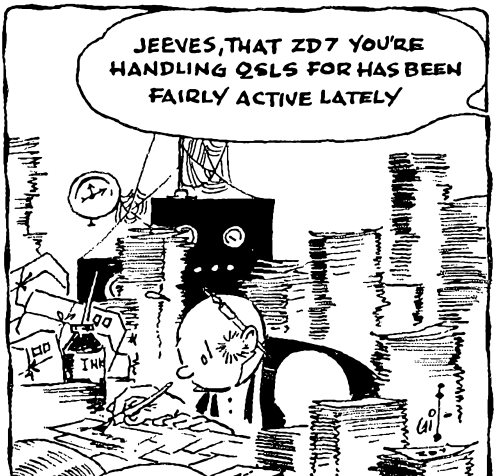
No, *you're* not rare DX. You're the hunter, not the hunted. Literally, you have no QSL problem. Nobody's about to deluge you with postal pleadings, bribes and acrimony. But what about the outnumbered hams on St. Pierre, St. Martin or Christmas Island? After a few days on the air and a few Yank kiloQSOs, what then? Every terse contact they've run off means another QSL to make out and ship, another QSL, QSL, QSL, QSLQSLQSL. Backlog! And Christmas Island goes QRT, no more ZC3 QSOs, just to dig out from QSL debts. He may not dare show his face on 20 again until he finds time to clear it up.

An extreme case? Well, there is increasing evidence that a major limiting factor in the workability of rare DX is the status of its collective QSL backlog, often more so than mere conditions or competition. QSL considerations become such a liability that not a few of the super-rare would just as soon stick to local 80-meter rag-chewing or lie doggo completely.

And financial angles are not the basic clinker. Because almost any pieces of paper will do for QSL purposes,[1] and because your ARRL QSL Bureau holds the postage factor to a minimum, expense matters are minor. The real killer: *sheer weight of paperwork.* One XW8, for example, currently claims to be faced with a 3000-QSL backlog. Sure, he shouldn't have let it get so far out of hand. But the gang demanded Laos QSOs, and QSL debts grow insidiously. If this XW8 now stays off the air and dedicates his spare time to licking the stack, how long will it take? Well, at the stiff pace of two certifications per minute and no coffee breaks, about 25 hours will do it — *solid* hours. At two such rough hours an evening he can dig out in about two weeks, including sorting, packaging and mailing. All done!

But no. The poor guy has only begun to fight. A certain number of outgoing QSLs somehow, somewhere, will go astray in the mails, and a larger percentage will meet with delay. (Rare countries often have even rarer postal facilities.) This will cause crossing repeat requests, repeat-repeats, etc.; requests which cannot be ignored simply because "all cards have been sent out 100 per cent." Furthermore, the laws of averages, QRM, QRN and QSB decree that a certain percentage of QSL claimants did not work the XW8. They merely think they did. Refuting these claims requires painstaking log search and additional special handling. Yes, no matter how thorough his efforts, years may pass before the XW8's QSL matters for this particular period of activity are entirely closed out. Rather terrifying, isn't it?

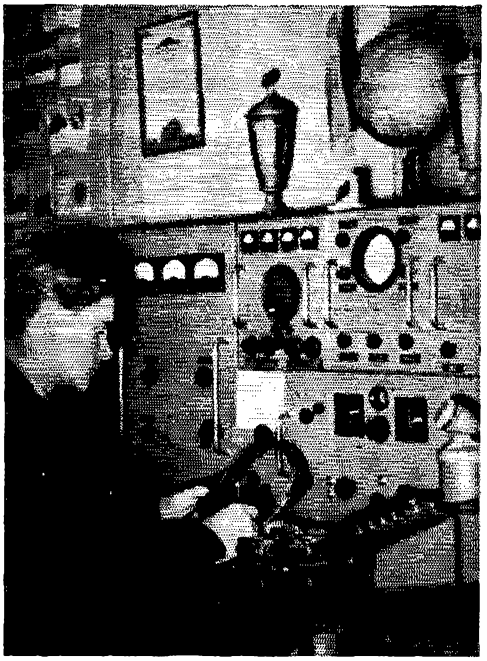
As we've stated before, primary QSO certification is absolutely essential so far as authoritative secondary certifications (DXCC, *et al.*) are concerned. We can't do without 'em. But what can we recommend to the rare DX station so he can rattle off a few thousand QSOs without winding up behind an 8-ball?[2] Put yourself in the position of a super-rare DX operator with limited time and funds. How would *you* beat this problem? How would you see to it that QSL chores don't keep you off the air? If you have a foolproof answer we certainly would like to breeze it around before this mounting backlog of QSL backlogs gets bigger than all of us.



*4822 West Berteau Avenue, Chicago 41, Ill.

[1] I.e., Cole's law: The quality of one's QSLs can vary inversely as the quality (rarity) of one's prefix. But, in deference to our hardworking QSL managers and W1WPO's ARRL DXCC Desk, there is a practical limit as to how nondescript a QSL should be. Let's at least urge postcard size.

[2] Delegating QSL tasks to Stateside agents, unsung heroes of DXCC, is one move. But these Samaritans too often bite off more than they can chew, and *they* deserve time to work DX, too. Pantagraph gimmicks to inscribe data on QSLs as the log is being kept? Valid stunts with ball-point pens and carbon paper? . . .



UR2KAA, multioperator-manned in Tallinn, has a rig line-up terminating in 813s, uses dipole antennae, and receives with 14- and 10-tube supers. Twenty phone and c.w. work is the station's specialty and QSLs are received direct or via the Moscow bureau. (*Photo via W3VKD*)

What:

Oh, we might declare the fifth week end of every month to be "QSL Days" during which all DX men stay QRT to clear up station paperwork. Or how about the eighth day of each week? But *who* could be expected to keep his nose to the stenographic grindstone within earshot of such following developments? . . .

160 c.w.'s 1956-'57 season is opined "Not quite so good as last year, but not bad," by W1BB. Stew reports recent transatlantic two-ways between W1s BB LYV PPN VDB, W3RGQ, W9PNE, plus others on our side, and Gs 2DDP 3GGN 3GKQ 3PU 5JU and GM2BUD "over there." . _ . _ . _ Other Yanks known to be active in 1.8-Mc. long-haul work: W1s EFN ERX GTO RLD TCR, W2s EQS GGL JPW PEO UKS, K2s JIO KWP, W3s CLI GZN HGP VJN WR, W5SOT, W7VS, W8s ANO BMJ RTO, W9s DKH NH TJP, W0s IFH NWX YPR and KØHEM. Additional DX stations in the running are G3s BEC CSZ DXJ ERN HKF IBT IHH IQM JBN JEL KEP KKO KOX KTJ LDE LEV LHQ, G4KS, G5RI, G6s BQ GM, G8NF, GD3UB, GW3HFG, DLs 1FF 2UY 2ZL, EL1C, HB9s IN CM, OH3NY, OK1s IZW KDO KVX KX, OK3KAS, PY2AJK and ZB1BJ. G3KOX uses a transistor layout, and G3DXJ is a former Hong Kong 160-meter addict, ex-VS6CQ . _ . _ . _ G3PU claims receipt of continental verification No. 6, qualifying him to join the select circle of those who have confirmed all continents on 160 . _ . _ . _ Spring is at hand in northern latitudes but 1.8-Mc. DX momentum carries through into the warm days. Though February 24th was the final scheduled test in this season's series (see p. 84, Dec. 1956 *QST*) don't pull that big 160-meter switch too soon!

20 c.w. supplies its usual superabundance to scores of the faithful, including *W1BPW:* FP8AP (14,060) 17 GMT, PJ2s AQ (60) 2, ME (50) 21 of Dutch St. Martin, VP2 2AH (50) 0 of the Windwards, 3YG (50) 2, 3V8BI (50) 22, is all set to replace his c.c. 50-watter with v.f.o. 100-watt outfit. *W1DBA:* CR4AH (60) 4, FF8BI (80) 20, HB4FP (50) 20 of the Swiss military, HP8AG (50) 20, PJ2AL (30) 23, SP1KAA (45) 4, TG9MR (70) 2, UAs 1KAK 3BJ, ØKBQ (40) 23, VQ5GJ (65) 23, ZB2Q (55) 2, ZD1AO (70) 0, FP8, Sint Maarten PJ2, is now at 87 worked. *W1ICP:* FK8AS (80), FQ8AF, VS2FF (20). *W2DGW:* FY7YE (45) 12, UAs 1KIA, 9KHA (75) 12, UB5UB (73) 13, UC2CB (50) 11, UR2AR (40) 11, VS6CG (15) 15, ZE5JA (20) 20. *W2HMJ:* KR6US (40) 1-2, LU4ZG (78) 3-4 in So. Orkneys, UAØs AA (52) 2, KFC (40) 6, KFG (75) 0, KGA (66) 0-1, KKB (25) 7, KQB (40) 6-7, UI8KAA (20) 4, UL7s AB (80) 13, DA (57) 4, KAA (48) 14, UPOL6 (48) 15 up on polar ice, VPs 3AD (54) 2, 8BS (42) 1-2 of So. Shetlands, VU2JK (40) 13, can't find one Russian who knows anything about UA1KTO/FJ. *W2TKG:* AP2RH (27) 11, 4S7MR (13) 11, first VK6, Dutch St. Martin. *K2DGT/6:* LU3ZS (57) 4 on Half Moon Isle. *K2KDW:* No. 99 via VQ2RG (20) 20. K2 *UOY:* LA1K 4. *W3DBT* (W3UUA reporting): CN8FD, CX3DZ, EL2L, HH2R, PJ2AI, VQ4KRL. ZB1H, 4X4BX, bearing down on DXCC for U. of Penna. ARC. *W4CXA:* ET2US, KAØIJ of Iwo, KJ6BP, KT1TW, OY1R, UA9DX, UC2AA, UD6AI, UF6KAF, VK1IJ, VSs 1GZ 6DI, VQ2GR, ZS3Q, 5A2FB, 9S4BW, LX UI8 UR2 VP8 Shetlands-style. Sint Maarten, all on 0.07 kw. for 130 worked but devising 4-205As final for good measure. *W4EJP:* CE3RE 1, KL7s. *W4GIM:* CN8BK, UR2AO, FP8. *W4LDD:* KV4BO (100) 2, PJ2CK (110) 1, UA1KAP (100) 2, VP7MN (30) 16, VR3B (30) 2, XE1XX (100) 2. *W4NBY:* VQ6LQ (60) 13, UI8, now 174/150. *K6NCT* (K2DGT at key): CEs 3CB 5DT, CX4CZ, EA9AP (7), SP2GS, UAs 1BN 3HI 4CF ØKFF (7), UB5KEP, UQ2AB (61), UR2KAA (50), YV5BX (60), ZK2AB (30) 4. *W6SUQ:* GD3FBS (4) 14, LU5ZS (52) 10, VK9AJ (98) 11 who is ex-VK1RW, ZDs 3AD (77) 17, 4CH (13) 16, ZS9R (67) 15. KS4 UQ2 UR2, plus MD5ADZ of transitory Suez career. *W6YY:* identifies activity by ET3AF (55), OX3LD (30), IS1FIC, SU1IM T7, UAØKSI and UPOL2 of Wrangel Island, UPOL4 (81), ZS7C (48). *K6HFA:* CX1DZ, HA2KTB (65) 6, HH3DL, JAs 1AA 6AK ØAA, KAs 2USA (15) 18, 7HH, Swedish military SL3AG, TF2WBG, UAØKCA (110) 3, UR2. *K6KYH:* KV4AA (80) 20-22, LU2ZS 2, UA1KBB (4) 4, VP7NZ 20. Windwards VP2. *W7DJU:* now 57/40 with JAs 1HP 1QN 8AA, KA9BK, OHs SMs, UAs 1KAU ØCD. *W7OEB:* OK2GY, UAs 3AF 4WA, UB5KAB, 4X4, now 96 in the bag. *W7PHO:* FR7ZC (47) 16, HS1WR (83) 16, KW6CM, TA1YI, UM8KAA (61) 4 at Frunze. *W7VRO:* FB8BD (30-71), 4X4GS (25), IT1. *W7YAQ:* TF3AB (30) 18, YU3OV (58) 7. KA SL3 UQ2. *W8FTD:* CN8MX, CR6AM, FA9IO, LZ1KDP. SP2AP, EL PJ2 TF VQ4, YUs 1DA 2OG 2QZ, many OKs. (all while at key of W3ABT). *W8IBX:* CT1s CB ID 22-24, CX5CO, KL7BQJ, OA3EE dubbed unknown by RCP, OK1MB 22, 9S4AZ (28) 22, now is "half-DXCC." *W8NGO:* worked others, stalked OHØNB (44). *W8NOH:* JA9AC (7) 4, UAs 1KAK 1OT 3KAM 9CC (27) 3-4, 9KDL (74) 3, UB5KMA (40) 3, UQ2AH (30) 4, XE1MJ, UL7, and UA9CC with 25 watts and Windom who says plenty of local QRM around Sverdlovsk. *W8YIN:* VP8BK (20), UAØKJA (42) 13-14, UD6DD (75) 3, UI8KBA (60) 0, UL7KBA (25) 13-14, UP2KBC (80) 20, AP2 UF6 UR2 Sint Maarten, now at 217 worked. *W9FNX:* HC1LE, JA1CJ, OA5AAT, now 65/49. *W9FTL:* OE8SH. *W9PNE:* LU2ZS (88) 4, UR2AR (58) 2, UB5KKA (65) 4, UC2KAB (70) 3. *W9UBI:* DM2ADL, LZ2KRS, UAs 1AM 1AR 1KFA 3FD 3KKB, UB5KIA, ZB2Q, 4X4GC. *WØEMY:* curious CR3AC. *WØQNI:* HB1RM. *KA2FEC:* KR6RY, UAØKFE. *IIER:* all Yank call areas but W1. JAØCA, KH6AUJ, VK3YL (XYL), ZLs 1JG 4IO. *UH8KAA:* W9RBI (5) 14.

20 phone, moving up fast on the outside, fed AP2Z (90) 3, CTs 2AH (145) 2, 3AN (130) 3, UAs 9KSA (75) 13, ØKUA (40) 3, VR6AC (143) 7 and choice VK9AJ (110) 15 to District Nine's top A3 man, W9RBI . _ . _ . _ S. Terry reports ET3RL (310) and BV1US (300) panicking the boys with s.s.b., Ws 2VH 8QNF and VE7EL nabbing the Ethiopian . _ . _ . _ W3ABT, with W8FTD up, hooked FP8AP, HHs 2R 2SH, ZB1H and 5A5TI . _ . _ . _ K4KVJ captured HHs 1HB 2JK 2Y, PJ2CK, SVØWJ, VPs 1AB 9CZ 9DA, 5As 2TZ 4TE and a YN number . _ . _ . _ Here and there on the 14-Mc. phone front, at *W1PNR:* KX6AF (240). *K2MQP:* VP9BN, YV5HN, ZE1JX. *W3VKD:* worked UR2KAA (235) whose English is smooth, hears AP2U (100) 11-12, VU2BK (100). *W6SUQ:* YN4CB. *W6YY:* mentions OX3CP (158). *K6KYH:* OA5G. *W8NGO:* VKØCJ of Macquarie Islands, 13, manned by ops Bill and Tom. *W8NOH:* HH3TJ (197) 23. *WØQGI:* HI8WL who QRTs for Stateside, SP8CK, now 118/101 on phone with trusty Iowa 2E26 final. *KA6ZS:* VSs 4JT 10, 6CY who goes home to G3JJK this month, is shooting for DXCC-A3 before knocking off for W6UWL this summer, now at 69 worked in first three months as KA5 . _ . _ . _ K6NCT, with K2DGT miking, caught up with KR6SO (130) and ZK1BS (170).

15 phone moves up faster on the inside but fine 28-Mc conditions have slowed the track. W1RIL, betting QSLs on BV1US (200), DU1GF (190), JAs 1QI 4BB, KA3WG, KR6GT, VSs 1GP (248), 2DQ (252) and distant VK6s AF BS over the long path, feels there are frequent excellent 21-Mc. openings going to waste for lack of propitious activity in the areas concerned . _ . _ . _ K2MQP cleaned up on CN8MB, EA8BO, EL2D, HH2s DB JL, HI8WL, OE5CK, OQ5BG, PJ2AO, TG9JM, VPs 2LU 3YG 5EM 6BG 6WR, VQ5EK, YN1s ARM HF. ZS3F, 5A5TD and numerous South Africans for 90 worked. "Guess I should get a night job so I can ham in the daytime!" . _ . _ . _ Don's neighbor K2PBH caught the same 5A5

and EL2 in addition to EA8BV, HZ1AB, KT1WX, LX1DC, TF2WBG, VP4LF and YN1BR . _ . _ . _ Just catching this month's deadline, 21-Mc. voice specialist W9WHM cornered nifties CR4AS (230), CT2AC (250), F9YP/FC (175), JZ0PC (240), LU3ZS (190), TF3KA (150), UA3EG (270), UQ2AN (180), VP8s BF (180), BP (180) now closed down, BQ (300), BR (250), BS (180), BT (180), BW (240), BY (190), CC (180), ZD8SC (240), VS1 and VS2, near-by colleague W9YSQ joining the kill on several . _ . _ . _ Quickly, now, at *W1PNR:* 114/100 at last, MP4BBF (253), CR4. *W4UWC:* also 100 worked on 15 phone, awaits last eight cards for DXCC, nailed CR5SP, KX6BU, CR4HZ1 LX. *W4YHD:* BV1. *W5WQX:* HH4MV (360), KW6CJ (370), OQ5HH (115), ZP5IB (210). *W6ITH:* s.s.b.ers CN8MM, YU1AD. *W6ZZ:* lost 13 lbs. on new salt-free diet but gained KG6FAE, KL7s BHE BRX BVE BYZ FAR FBB, K2RNE/KL7. *K6ICS:* CE31Y, HC1FN, VP6LT, HH HI. *K6OPI:* CE2IB, K4EMH/KG6, KM6AX, KR6LM, KW6CL, swapping Adventurer for Ranger soon. *W8NOH:* KS4AX (275) 21, ZP5KA (215) 17-18. *W9RBI:* 4S7s GE (150) 2-3, YL (200) 2, BV1. *WØEMY:* CR3AC (240) from "the island of Miguel, 900 miles east of Madagascar."

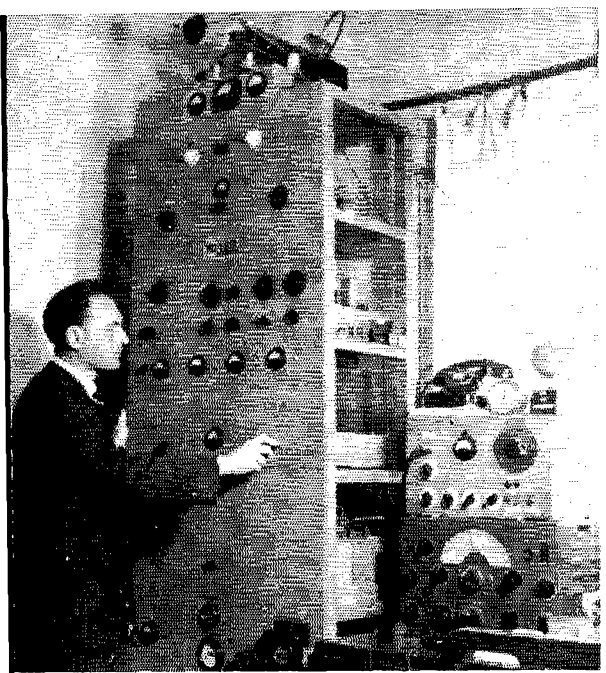
15 c.w. lost more ground to 28 Mc. among the General genre but deserves no passing up. Callphabetically, we find at *W1BPW:* PJ2AQ/P. *W1CTW:* EL1C, HE9LAA, SV0WR, UR2AM, reached No. 118 on 21-Mc. c.w., received WASM-qualifying SM1CBC QSL, awaits necessary cards to clinch DPF, will shortly hit 28 Mc. with new line-up. *W1FEA:* OY7ML, UC2KAB, VQ4RF, VS1DU, ZD8s 1DR 3A, ZC4CH. *K2UOY:* Euros. *W4YHD:* DU7SV, VS6CO, learns of XZ2OM 12-13. *K6BWZ:* HH2JB. *W6ZZ:* LA3TD, others. *K6IFA:* CE6AB, JAs 1ACB 1QI 1VX 3AF all 1-4, UAØGF (200) 4, VK9XK (50) 4 of Papua. *K6ICS:* TI2WR. *K6OPI:* CE3RE, JA3BN, VQ3TL, now at 62/25. *W7DJU:* Euros, WH6BVM, XE1s PJ Z. *W7YAQ:* CT1HQ (5) 0, JA3IQ (60) 4, SP6WF (60) 16, TF2WBG (60) 2, UAs 1KAC (84) 15, 3HI (70) 16. *W9PNX:* UB5WF 14. *W6ZZT:* FA8IH, HI8WL, LZ1KNB, SP3PL, UA1AU, UB5KIA, YU3EX, 9S4AX. *I1ER:* all Yank call areas, KH6AYG, KL7DIV, VKs 4HR 7KM, ZL1GX, and Oceania is no cinch from Europe on *any* band.

15 Novice news is noteworthy. Here's KN4JFE with 54 countries in the log including recent CR6CS, CX2AM, DU7SV, EL1P, UA3s CH FO, UB5KIA, WL7BWY and ZC4IP contacts. Rod is determined to make a full swipe at the 100-mark before General-time comes along . _ . _ . _ KN9DNR has all states, all continents and 41 ARRL DXCC countries accounted for, including JA1ANG, OD5LX, OY9LM, SP2AP, UA4FE, KZ5s and ZS6s . _ . _ . _ KN8BPX passed the 24-country mark, bagging F8AT, FA8RJ, JA8AI, KL7s AWR AZI, KV4BK, LA9IC, MP4KAC, OE6RP, VP6TR, ZE1JL and ZL3PM en route. One crystal six kc. in from the low edge does the job for Dave . _ . _ . _ Out west it's JAs 1ACB (105), 3BN (105), 6OK (165), KL7s EKH MZ, KP4ACF (135), VK5JW (105) and WH6CCL (180) for KN6SRM of Sonoma . _ . _ . _ Good gravy at KN4HQD: CE3s AX (102) 23, RE (120) 2, FA8CR (118) 21, KH6BLX, LU8EE (111) 2, OE6RS (107) 18, OK1JQ (105) 18, PY4AOS (104) 20, WH6BTX (110) 19, ZL1MT (115) 4 and 4S7GE (98-138) 3. Bill nabbed the 4S7 while stalking an OA4 — and after giving him up as a gottaway, back came Ceylon! . _ . _ . _ Down the line, at *WN1NZZ:* UA3EG, other Euros. *KN2ROR:* YV4AU (105) 18. *WN3GLZ:* 23 countries, OE1LM, SP5KAB, 3V8FA for last continent. *KN4IFB:* all continents and JA1AC, LU6DEC, ZS6AOU within 25-day span. *KN4JNI:* WL7BUS (120) 0. *KN4KHG:* ON4RN, other Euros. *KN4KXX:* cut his DX teeth on EA7AR, FA8. *KN5EZV* (now K5EZV): SP3PJ, ZS5VJ, all states and continents with DX-35 and S-85. *KN5GLI:* LU3ZS (150) 15-16 of Antarctica on DX-35 and SX-100 plus Gotham vertical. *KN8AME:* awaiting General, has all continents, DU, KR6AB, all states. *KN9DCF:* Euros, OA4AU 18 for 20th country . _ . _ . _ W4LDD cautions the WN/KN 21-Mc. gang to guard against radiation of stray 14- and 28-Mc. r.f. A 7-Mc. rock in the oscillator stage means that a certain amount of 14- and 28-Mc. power will appear in the final amplifier's output, soup which is inadvertently passed into and radiated by antenna systems. This transfer can be minimized to negligibility with simple precautionary measures — consult your ARRL *Handbook* and/or the nearest experienced ham, fellows.

40 c.w. maintains its nighttime popularity in view of 20's vexatious wee-hours behavior. The stay-up-lates are doing well, including *W1ORP:* LZ1KPC (23) 22, UB5LC (32) 22, UF6KAE (11) 3, but lost 118-ft.-high tower in New England ieer. *W2DGW:* FA9LW (7) 0, GD3IBQ (10) 0, LZ1KRU (15) 1, PJ2ME (38) 3, UA1KAP (20) 23, UB5KBR (6) 2, VP2s AH (4) 2, LU 3, VP5BL (35) 2. *W2ESO* (report by W1ORP): UC2KAB, UB5KBR, UO5AA (25) 3, UQ2AS (35) 4, UR2AO, heard UA9CM. *W2GXV:* DM2ADL, other Euros, heard one PK6AB (5). *W2IQT:* FG7XA, SP2s CJ KAE, VP6PL, YO2KAB, YUs. *W2JBL:* FA8RJ (22), OK1MB (1), UB5s UB (13), VP3YG (13), XE1KD (1) who turns out to be ex-W2KDS and George's boyhood radio pal, a Windwards VP2. *W2JOA:* OQ5CW (9), VP3 — say, these Twos really go for 40! *K2DGT/6:* JAs 2ES 3LK 8GK all around (20) and 15, UAØKJA (20) 17-18, VS2CR (8) 16 who heads for VE7 directly. *K2QDI:* HA1TU, VP6AF, XE2FL, YU1BFG. *K2QJR:* YU4EQR. *W3BVN:* heard pursuing 4S7MR (20) 23 by W1ORP. *W3DLI:* VE8OW who said the weather had just warmed up to a balmy 44-below, VP4LG (20) 6, XE1BM (12) 7, OK1 VP3 PYs Euros, is replacing faithful RC-459A with new 100-watter. *K5IGX:* gave Arkansas to happy VK2AQJ. *K6HFA:* CX5CO (5) 6, OK1FF (3) 5, YU3FS (20) 6, other Euros; also managed JA1AGU (95) 9 and VP7NS (202) 8 on phone. *K6NCT* (K2DGT opping): Euros. JA3BG (40), KL7FAR; then JAs 1AW 7GW and 9BY (s.s.b.) via 7-Mc. A3. *K6OIZ:* JAs 1AEA 1ANF 3TT 3VE 7BE all (3-70) and 14-16, some worked c.w.-to-phone, and KA8AB (22) 15 A1-to-A3. *W7DJU:* JAs 6AK 8AQ, hears KA2YA (15) plus untouchables HLØAB (25) and 3W8AA. *W7YAQ:* a regular pipeline to Japan, JA1s FOA NI, JA2s FG UR, JA6RR. K4AQL/KG6 (115) 8; voice JAs 1EF 2AQ 3RG (s.s.b.), 4HM 5BI and 6PH (10-58) came back to Bob's c.w. between 10 and 15 GMT. *W8EFW:* ponders one C3EE (80) 3-4 on 18 watts . _ . _ . _ Novicewise on 40 we note at *WN1LCX:* KV4BK, PY1BLZ, has 6L6 at 15 watts. *KN2STF:* WH6CEA, would like to work Europe on 40 but the SWBC barrage is the clinker in that direction. *KN8BPX:* XE2FL.

80 c.w. caught fire during the ARRL DX shebang, a development foreshadowed by a noticeable upsurge in transoceanic transpirations. W2DGW help set the pace with GD3UB (2) 1, LZ1KDP (4-22) 0-3, OEs 3RK (17) 3, 6MB (21) 3, UB5KIA (22) 1, VP2LU (5) 1, GI GM HB9 OZ PAØ SM and other-prefixed contacts. John feels that Ole Eighty rates more of a show in "How's" and we've assured him that our mailbag is *wide* open . _ . _ . _ K2KDW accumulated another flock of Europeans, DM2ACA (15) 7, portable HB1SC/Zug (27) 6, OKs 1KTI 2BEK 2KLI 3EE, numerous Gs DJ/DLs OZs SMs and VE5MF to clinch WAVE . _ . _ . _ West Coast 3.5-Mc. work is exemplified by PJ2AN (40) 3, VS1GX (9) 15, ZLs 2FT and 3JI (20) at K2DGT/6 . _ . _ . _ W1FEA captured an LZ1, OE3RK (30) 4, SM8YF/MM off Trinidad, a UB5, VK6EJ (10-12) 12, a VP2, ZC4IP (20) 5 for Asia and ZL1CI (15) 12 . _ . _ . _ Hither and yon, at *W1ORP:* OK1AEH, UB5 *W9MAK:* PJ2ME, OK SM. *W9PNE:* Euros. *W9YYG:* SM4APZ, OK VP2 . _ . _ . _ On the lowest Novice fre-

A fat QSL shipment from Gough Island in the South Atlantic included these snaps of ZD9AE, operated by ZS6AJY at the island's government meteorological station. ZD9AD radiated from this site during earlier explorations. One of the Tristan da Cunha group, Gough is so isolated and inaccessible that mail and supply visits by ship come few and far between. (*Photos via W6AM*)



The home-constructed transmitter being touched up by YO3RD involves 42 tubes, runs 800 watts c.w. or 400 watts phone, and features single-dial tuning with full break-in. Liviu's receiver is a Philips CR-101A and his antenna system a combination of long-wires.

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quencies WN1LCX nailed **KP4**CC; KN6RGO worked **WH6**CBX, **WL7**BYR; KN6SRZ raised the same WH6 and **WL7**BUS; and KN9GDQ ran into one DL4YN at high noon CST.

75 phone is a challenging DX field and W1HKK finds it profitable to the extent of DJs 1KL 1QW 2MM, DL9JQ, G3s HYU KKF LCW, **OK**1KTW, **OZ**2WO and **9S4**BY. Dana recommends W/K transmission around 3815 kc., reception at 3690-3700 kc. . . . . 1SWL tuners log 75-meter phones **LZ**1KDP, **OE**5CK, **SP**9KAD, **VP7NS** and **9S4**BE. Yanks heard well in England of late are Ws 2GBC 3CTE 3UOB 5GCC 4QBR 8LNQ 9HBC ØTES, Ks 2MPD and 4AEV.

10 c.w. enthusiasm flows, ebbs, and flows again. W7OEB kept busy with **BV1US** (120), **CR6**CZ (9), **FK8**AO (7), **KA2**DS (6), **KR6**QW (120), **PJ2**AV (100), **VK9**DB (120), **VS6**s AE (6), DE (7), a vast assortment of Europeans, plus **JA**s 1VX 3AB 3WS and 5DF . . . . . W8NOH savored **CN8**JW (110) 10, **LZ**1WD (89) 14, **4X4**IX (20) 15, **9S4**CM (82) 14, more Euros and a helping of VKs . . . . . At this shack and that, first *K2ENO:* a concentration of Gs and PAØs. *W4LDD:* more varied Europeans than one can shake a 2-meter vertical at, **FA8**JO (110) 21, **LA2**TF (50) 16, **OK**1KAI (50) 14, **ZS9**P (150) 19. *K5DZF:* **DM2**ACL, **HK5**JN, **SP6**DA, **UA3**KAN, **ZB1**BF, **VK5JT**, **ZL1**FC. *K6BHM:* **KR6**GT, **KW6**CM, **OX3**AY 15, **SP2**AP, **VP6**KM, on DX-100 and 3-el. spinner. *W7DJU:* **KB6**BC *W9FNX:* **OK1**s AEH MB VB. *W9FTL:* **CN2**BL, **OA8**B, **LA3**TR, **UA1**BE, **VP1**SD, now at 47th rung. *WØQGI:* **ST2**RD (70) for his 2E26's 178th! *WØGAQ:* **JA3**BN, **KG6**IG of the Volcanoes, **PJ2**ME. *I1ER:* all W/K call areas but No. 2, plus **VQ4**DT.

10 phone rides high again as we approach vernal equinox but its wintry drop-off was sharper than expected. W1EKU, though oft chased from his shack by arctic temperatures, comes through with **EL**1C, **JA4**AII, **KA2**s AD EB KS NY, **KG6**AGS, **WØBLV/KG6**, **KR6**s AF JJ, **KW6**CL, **OX3**LD, **SP5**AM, **SVØWL**, **UC2**KAB, **UQ2**AN, **VK4**XJ, **VP5**ML, **ZD6**RM, **ZL1**PA and **4X4**DR. **CT3**AI, LZ1WD and **ZD3**BFC slipped Vern's hook . . . . . W5EYH did well with **KA5**ZS, **KX6**AF, **OQ5**EC, **VP6**AM, **VR2**BC and **VQ2**DC on 100 watts . . . . . K6BHM drew a 7-hour all-continent sextet, plus **CR9**AK 2, **HH7**W/m 21, **HI8**WL, **KB6**BC, **OQ5**FO, **YN4**CB, **ZP5**s 1T JE 22, **5A**s 1TV 17, 2TZ 16, VR2, now at 77/38 . . . . . Miscellaneously, at *K2MQP:* **KA2**s, KG6, **VK1**GU, **YV5**AB. *K4BFM:* **CN8**s FN JW, **FA3**OA, **KL7**CC, **VP6**GN, YN ZSs. *W6ZZ:* **KL7**BFW on 27 Mc.

Where:

With the 23rd ARRL International DX Competition nearing its close this reminder is timely: While your ARRL QSL Bureau makes no distinction in services to League members and nonmembers, certain foreign bureaus have been known to hold nonsubscribers' incoming QSLs for coercive purposes. QSL via overseas bureaus *only* when instructed to do so by stations worked. One more thing: Your ARRL QSL Bureau is chartered only for the forwarding of cards incoming from DX points. In some circumstances overseas DX can arrange receipt of QSLs through the ARRL Bureau — YA1AM and the antarctic KC4 gang are examples — but such rare exceptions invariably are noted in this portion of "How's" . . . . . Though W2QHH did have dealings with operator Mac of SVØWN/Crete these did not include contract for the handling of QSL chores. SVØWN's *Call Book* QTH appears valid . . . . . "Recently discovered a discrepancy in the handling of our outgoing mail from Ecuador. Those who have not received QSLs as previously promised please notify HC2BH and new cards will be sent airmail as quickly as notified." George adds, "A man is only as good as his word — let's all QSL promptly as promised." . . . . . Ex-KV4BK, ever a 100-per QSLer, offers reshipment on any of his unreceived V. I. pasteboards. Reach Chas. through the W5RX address to follow . . . . . VP3YG tells W2JBL that VP3ZA is n.g., while EI5M reiterates that EI1s and EIØs have no basis in fact . . . . . "Can assure you that HB1s MX OP and TL all QSL 100 per cent," writes Jack of HB9TL and HB1TL/HE. HB9TL reaffirms that the Swiss-in-Liechtenstein /HE suffix is passé, and this summer he hopes to sign the new indicator as HB1TL/FL . . . . . W8VDJ tips off W1WPO that he possibly may be of some assistance landing deserved ZK1BS, JZØPS and JZØPA-MP4QAH confirmations, adding, "I am still trying to get QSLs replaced which I lost in a fire." This last underlines the fact that DXers with over 100 countries confirmed who haven't yet filed for DXCC certification are flirting with stark tragedy . . . . . W2WHB, thawing out in New York, advises that "All KG1AX QSLs will be sent out via bureaus." . . . . . Ex-ET3A-ET3R-ET9X will be at Asian DX points for several years and meanwhile offers to answer QSL inquiries regarding his past Ethiopian operation (see following). This gent probably will be signing exotic prefixes from the Far East and means to investigate possibilities of further pruning that nettlesome ITU-FCC ban list (p. 64, last month) . . . . . Pens harried YV5BZ: "I am still sending YVØ cards out. Please tell the boys to let me know if they have not received their QSLs." W1WPO learns Louis will step down as RCV secretary and QSL manager this month. "Have been doing this job for two and a half years and it takes all my radio time. My DX standing is low on account of this; hi!" . . . . . From SP5EG to SWL S. Terry: "ZA1KAD is unlicensed station. . . . ZAs 1UB 1UU and 2CF were heard for a short time, but up to now I have no sure information about ZA amateurs." Chris adds that SP5 QSLs can go via Warsaw Radio Club, P. O. Box 122, Warsaw 10, and that he can supply other SP QTHs if needed . . . . . FQ8AF, via W1ICP, makes apology for tardy QSLs, assuring all they'll not be forgotten . . . . . FW8AA tells W8GZ that cards for him should go direct . . . . . JA3MIC/MM says he "worked more stations than expected" and regrets that QSLing must await his next layover back in Japan . . . . . G3DNQ expected to have completed QSL work for MD5s ADZ AMO and DNQ by the end of January. Per Rule 7 these Suez verifications mean naught for DXCC but they're cute collectors' items nevertheless (see "Whence") . . . . . Ex-VR2CG (ZL3DX) had the printer run off a few hundred more Fiji-style pasteboards to clinch outstanding VR2CG verification matters . . . . . UA1KAE's antarctive QSL tasks reportedly are being tackled by a bunch of Moscow UA3s . . . . . W1s BIH EKU ICP RDV UED, W2s DGW HMJ JBL TKG, K2s DGT ENO, W6s OME SUQ YY, K6NCT, W7s FBD PHO, W8s GZ NGO NOH, W9s CET FNX FTL, WØQGI, KA5ZS. International Short Wave League, *Newark News* Radio Club, Northern California DX Club, Southern California DX Club, Willamette Valley DX Club, West Gulf DX Club, OVSV (Austria) and WIA (Australia) suggest:

CE7ZJ (via RCA)
CE8BS (via W6DOK)
CN8HM, USAF QSL Svc., Air Base Wing, Box A, APO 30, New York, N. Y.
CN8JO, USAF QSL Svc., Box 7388, APO 118, New York, N. Y.
CR5SP (via CR6AI)
CR6BR, Henrique Costa, Box 43, Luanda, Angola
ex-ET3A-ET3R-ET9X (via ARRL)
ET3AF, Gunnar Ensjo, Radio Amateur Club, P. O. Box 1636, Addis Ababa, Ethiopia
FB8CC, Box 587, Tananarive, Madagascar
FO8AD, R. D'Assignies, 105 Rue Tepano Jaussen, Papeete, Tahiti
FW8AA, Charles Lebailly, Wallis Island via Noumea, New Caledonia

HB1TL/HE (to HB9TL)
HH2DB, D. Bush, c/o U. S. Embassy, USOM, Port-au-Prince, Haiti
HH2R, P. O. Box 428, Port-au-Prince, Haiti
ex-HL1AA-J8AAA-DL4LU (to W4HVU)
I1BT, B. Bertoldo, Postbox 250, Turin, Italy
JA3MC/MM, N. Sasaki, c/o Matsuoka S.S. Co., 70 Kyomachi, Ikutaku, Kobe, Japan
ex-KG1AX (to W2WHB)
KR6SF, Lt. D. W. Lambrecht, 7th TDS, APO 239, San Francisco, Calif.
ex-KV4BK, Chas. Morenus, W5RX, Albany, La.
KW6CM, c/o CAA, Wake Island
LA9s LF/P and LG/P (see "Whence")
LZ1KDP, Vasca Terziev, Gurko 64, Sofia, Bulgaria
LZ1WD, Box 540, Sofia, Bulgaria
MD5s ADZ AMO and DNQ (via RSGB)
OA5AAT, A. Contresas, Box 84, Trujillo, Peru
OH1SS/Ø, Box 107, Turku, Finland
OH3PB, J. Winberg, Box 179, Tampere, Finland
OHØNB (via OH2NB)
OK2KBA, F. Fencl, Tr. Kpt. Jarose 35, Brno, Czechoslovakia
PJ2AV, Box 269, St. Nicolas, Aruba, N. A.
SP3DG, Box 400, Poznan, Poland
TA1YI, Box 120, Tekla, Turkey
TF2WBM, APO 81, New York, N. Y.
UA3KAN (via Box N-88, Moscow)
UAØKFC (via Box N-88, Moscow)
UAØKOE, Ulan Ude, Buryat-Mongol. U. S. S. R.
UP2KBC, S. Uzdavinys, Str. Tvirtoves Nr. 6, Kaunas, Lithuanian S. S. R.
VK1AWI, H. Oldham, c/o Bureau of Minerals, 485 Burke St., Melbourne, Victoria, Australia
ex-VK4KC (to VK9KC)
VKØCJ, 187 Collins St., Melbourne, Victoria, Australia
VP2AH (via VP9BM)
VP2JC, Dr. J. S. Cramer, Cayon St., St. Kitts, Leewards, B. W. I.
ex-VR2CG (to ZL3DX)
ex-VS6CW (to GW3IVS)
W1YYQ/KL7, P. O. Box 24, Galena, Alaska
W5TET/KS4, Swan Island via Tampa, Fla.
WB6BE, B. J. Zvolanek, Island Mgr. Qtrs., Canton Island
WG6AGU, Wm. C. Marble, jr., No. 24 Camp Wetik, Guam, Marianas Islands
ex-ZB1EB (to G3IJU)
ex-ZC4GF, R. Edginton, G3AGF, 71 Rothley Rd., Mountsorrel, Leics., England
ZD4CH, G. W. Briffa, Hq. Gold Coast Military Forces, Accra, Gold Coast
ZL3DX, W. McGee, 112 Hei Hei Rd., Hornby, Christchurch, N. Z.
ZK2AB, Box 41, Niue via New Zealand
5A4TE, A/2c A. Vernesoni, 7272nd OPS Sqdn., Box 160, APO 231, New York, N. Y.
5A5TE, 431st Fighter Sqdn., Box 64, APO 231, New York, N. Y.

Whence:

Asia — W8s NOH YIN, K2DGT and S. Terry pool Russian-Asia items: UR2AK is accompanying UP2AS's Tannu Tuva DXcursion this summer. Permanent T. T. UAØs KTB KTI and KTU are occasionally workable, mainly on 7 Mc., and UAØKTT is readying for 15- and 20-meter action at Kyzyl. . . . So near and yet so far — UAØOM's Buryat-Mongol QTH is within easy walking distance of Mongolia-proper. . . . UAØKFC keeps Sakhalin on the air with 200 watts and a 16-tube superhet. . . . UL7DA is hot after Mont., Nev. and Utah for elusive WAS . . . . . W6ITH calls attention to press items indicating a speed-up in construction of that British naval base in the Maldives. One *really* rare one coming up! . . . . . From AC5PN: "Left Bhutan in October, 1956, to come down to India to collect equipments. I will be on the air again by February with a new BC-610." . . . . . Regarding JARL's tough WAJA certification, W7DJU's research reveals that of the necessary 46 Japanese prefectures Aomori and Yamagata have no 20-, 15- and 10-meter hams. Gunma and Saga each have but one (JAs 1BO and 6MZ) and all others boast at least two apiece. So forty meters is your best bet for working those rare WAJA prefectures, 7 Mc. being open to second-class JA licensees, most of whom use phone, and some s.s.b. techniques to boot. JA4AF supplies this WAJA prefecture key by call areas: (JA1) Tokyo, Kanagaw,a Saitama, Chiba, Gunma, Yamanashi, Tochigi, Ibaragi; (JA2) Aichi, Gifu, Shizuoka, Mie; (JA3) Osaka, Kyoto, Hyogo, Shiga, Nara, Wakayama; (JA4) Hiroshima, Okayama, Tottori, Shimane, Yamaguchi; (JA5) Tokushima, Kagawa, Ehime, Kochi; (JA6) Fukuoka, Miyazaki, Oita, Nagasaki, Kagoshima, Kumamoto, Saga; (JA7) Aomori, Yamagata, Akita, Miyagi, Iwate, Fukushima; (JA8) Hokkaido; (JA9) Fukui, Ishikawa, Toyama; (JAØ) Niigata, Nagano. According to JA4AF about 90 per cent of all Japanese amateurs are 2nd-classers, permitted use of 100 watts on 80, 40 and v.h.f. bands. In addition to 20-, 15- and 10-meter privileges, 1st-class JA ticketholders can run powers up to 500 watts . . . . . JA3MC/MM runs 30 watts to good DX advantage aboard the *Shosei Maru*, a Mitsui Line motorship which really gets around . . . . . OD5BV, service manager for RCA in Beirut, visited the South Jersey Radio Assn. K2AA gang and the home office this winter. Stan tells W2OGZ that only a half dozen of Lebanon's 35 hams are active DXwise . . . . . W8YIN notes that CR9AH forsakes DX bands for six-meter tests when F_2 prospects appear favorable.

Africa — A newsworthy DXpedition to Suez is described by one of the participants, G3DNQ: "Three calls were used on 14-Mc. c.w. only, from Port Said between December 11th and 19th, inclusive — MD5ADZ (G3ADZ), MD5AMO (G3AMO) and MD5DNQ (G3DNQ). Only one station was established, operated during off-duty periods in turn by the above hams, all members of the Army Wireless Reserve Squadron, Royal Signals. . . . The station was established to give as many hams as possible another (and last?) chance of snagging MD5s. The aim therefore was simply the maximum number of QSOs. Nevertheless 62 countries were worked." Their installation ran 70 watts to a 6AG7-807 c.o.-p.a. job, received with an AR-88, and radiated via a half-mile length of assault cable. Of 302 contacts logged, 109 Yanks were worked (54 Sixes), 24 G stations, and 169 others. Don, who runs 100 watts of c.w. on 3.5 through 28 Mc. back home, postscripts, "All three of us were very impressed by the 'appropriate' operating and courtesy of U. S. amateurs." . . . . . EL2L, Monrovia, Liberia, was delighted by a QSO with W6GMC, Monrovia, California . . . . . K2ENO learns that DL6DS, an ionospheric researcher, will lug a 75A-4 and KWS-1 to African points on an IGY outing this summer . . . . . REF staffman F9IL desires information on the Diego Garcia VU7BX reported active in the spring of 1954 . . . . . Touch of local color from ZS9R through W6SUQ: "Francistown, with approximately 250 European inhabitants, has seven out of the ten amateurs in Bechuanaland Protectorate. I myself am 25, single, and I pilot a Dakota based here." . . . . . As threatened, FB8BR advises W7PHO of his departure for France where Hub hopes to land an F call at once . . . . . The directional CQ has generated provocative copy since ham radio's birth. Here's one angle encountered by W2JBL: FA8RJ was attracting plenty of Californians in response to his 40-meter CQ-W6s one night but could pull through nary a one. W2JBL sought to advise him that the Sixes really were taking the hook, but George drew only wrath for the effort. Which, we suppose, goes to prove that the road to a DX station's black list may be paved with the best of intentions . . . . . VK3RJ notes that I5AAW at Bender Beila, some 600 miles northeast of Mogadiscio, clips a lot of VKs with his BC-610 and BC-312 . . . . . African notes via WGDXC: SG2DF claims that his unusual Sudan label derives from RAF connections but mentions no clearance from Sweden. . . . FB8BC assisted mightily in FB8BI's Juan de Nova licensing and the latter is arranging improved transmitting facilities despite scarcity of components. Jan already has put in five years on the island and really anticipates his annual 6-week leaves. Besides managing island commerce FB8BI performs official meteorological duties . . . . . SCDXC has it that FB8BB hopes to visit the Comoros "sometime."

Oceania — Via W1WPO from ex-VR2CG, now ZL3DX: "I have departed Fiji for good after about five-and-one-half years of operation. Have just shifted into a new home and have my new s.s.b. all-band rig almost ready for operation. Next thing will be an antenna farm — afraid I won't have the room I had in the Fijis!" . . . . . According to W2HMJ, former VR3A exchanges his VK3AFB moniker for VK2ANB but soon . . . . . Sporting a refurbished sender, CR1ØAA tells WGDXC informants that he has interested a Portuguese Timor neighbor in the charms of amateur radio. Schedules on 160 next? . . . . . At this writing W6ITH reports raft *Tahiti Nui* over a thousand miles at sea still bobbing eastward toward Chile. Watch for FO8AP/MM on 20 . . . . . W2HMJ raised one VS4DO in "Brunei" and then an AC4SS in "Tibets," most probably the same nut. Those engaging in such neurotic nonsense might at least check the spelling of areas in which they imagine themselves to be.

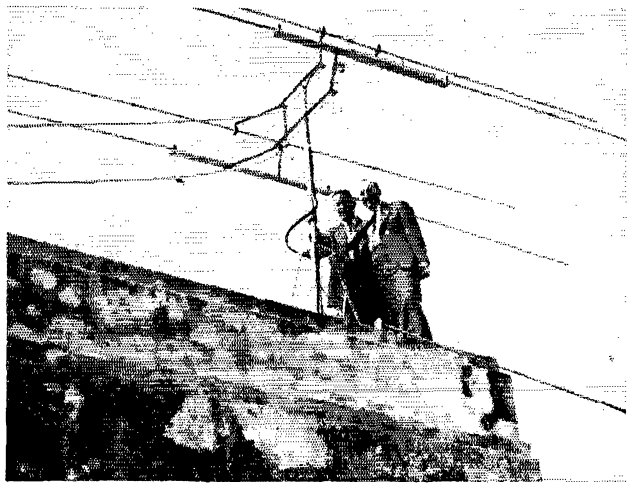
Europe — Move fast for this one: From 1200 GMT March 2nd to 2400 March 3rd, the c.w. session of the *1957* REF French DX Contest will hold sway on DX bands and DXers world wide are invited to a smorgasbord of Fs, FAs, FBs, FCs, etc. The exchange will be the usual RST001, RST002, and so forth. French and French Union stations will identify themselves with tricky call appendages such as F8DU/15/IF (15th REF section, Ile de France province), FA8BG/OR (REF Oran section) and FQ8AG/MC (Moyen Congo DUF country) according to their DPF or DUF status. Your logs, usable for DPF/DUF credits in lieu of QSLs, should go to *REF, P. O. Box 42-01, Paris R. P., France*. The phone portion takes place on the 13th and 14th of next month, same hours, with RS substituted for the RST in the exchange . - . - . - Traffic Manager ON4MC also advises that UBA, in collaboration with REF, will run a Belgian contest, times, dates and exchange to coincide with the above. ON4s will tack a letter or number onto their calls to indicate Provinces, of which there are nine in all. Send your logs to André Maigre, ON4MC, 32 rue Joseph Wauters, Charleroi, Belgium . - . - . - Courtesy HB9PM via W1ZDP:

Homeland winner of the 1956 USKA Helvetia-22 DX Test is HB1EU, closely pursued by HB1NL and HB9QR. Non-Swiss European highs were turned in by DJ1BZ, DL7CW, SP5FM, F8OP, SP5AR, DL4ZC and OK3EA in that order, while the top ten U. S. A. scorers be Ws 4KVX 3GHS 1JYH 1OJR 3GHD 3ZAL 1TX 1LHZ 3LEZ and 2QKJ, in descending fashion. Other leaders continentwise are FA9UJ, JA6AD, PY7AN and ZL1AH . . . . . Ex-HA4H-HAF3BI-EWBI-HA5X-HA4RS-HA5PB writes to say that he and his family reached refuge from the cauldron of Hungary. "I am sorry that I can't write to my many friends but please QSP my best wishes to all." Ex-HA4H is understandably pessimistic about the fate of many HAs he left behind . . . . . W4CXA, best known to the old DX school as W2BMIX, conferred personally with such DX folk as HB9GA, OH3NL, OK1WI, SP1BZ and YO3AA while attending recent CCIR talks in Warsaw in company of Ws 2GTZ 3AG 3AP and ØIIN. "Went down to Poznan with WØIIN one week end and visited SP3PL and family. While there had the distinct pleasure of working my own powerful 70-watter with W3KDP at the key." Prose reports other interesting visits to SPs 5KAB and 9KAD, Warsaw and Krakow club stations. "The SP boys . . . want very much to receive the *Handbook*, *QST*, *et al.*, which are practically impossible for them to get unless someone over here sends them as gifts. In order for the material to get to them, it should be sent via registered mail. A subscription to *QST* would do more for them than anyone realizes." . . . . . Evanston, Ill., SWL S. Terry adds to the Polish ham picture through info from SP5EG, frequent operator at SP5KAB on 80, 40, 20 and 15 meters. "There are about 180 amateur SP stations and about 20 club stations. . . . This year there will be new classification: Class III-C, 50 watts c.w. only, 80 and 40 meters; Class II-B, 300 watts, c.w.-phone, all bands; and Class I-A, 1000 watts, c.w.-phone, all bands." . . . . . DL1CR, ringleader of 1956 DL/LX shenanigans, intends similar DXpeditionary doings this year. "Which European countries are the most wanted? Will you be so kind as to send us a list? Do not hesitate to start with HV and ZA, but please continue a bit further down the line — hi!" Our list began with HV and ZA, of course . . . . . W8NGO tips us off to OH2NB's Alands activity as OH0NB, running 50 watts on 14 Mc. with a long-wire antenna. In case you haven't heard, those islands (OHØ) now are a full-fledged entity on the ARRL DXCC Countries List . . . . . OVSV's *OEM* lists the top Austrian free-style DXers as OEs 1ER 1BH and 5JK with 234/224, 211/189 and 206/180 scores, respectively. OEs 5JK 2SP and 5CK check in with respective phone highs of 162/130, 136/103 and 119/87 . . . . . Liechtenstein oddments from HB9TL (HB1TL/HE): 1956 was the mountain principality's sesquicentennial year of independence and HB9s MX OP and YL helped in the celebration with 3000-odd HE contacts. . . . HB1MX/HE appears to be the first Liechtenstein DXCC qualifier with a 126/115 DXpeditionary record. . . . HB9s TL and QR scored 276 QSOs, 163 with W/Ks, and 49 countries as HB1TL/HE last August, working 14 and 21 Mc. over a two-day period . . . . . Fresh challenges for certificate-chasers: (1) WAGM (Worked All GM) sponsored by the Aberdeen (Scotland) Amateur Radio Society, an award based on confirmed contacts with fifteen GM3s and one each of GM2, GM4, GM5, GM6 and GM8. The 20 QSOs must date after October 1, 1946, and ten IRCs must accompany each application. Write GM3BCL for full details. (2) DDXC, pushed by VR2A of Holland, calls for QSL proof of contact with twenty-five PAØs, one PZ1 and "two contacts with different districts of the Netherlands West Indies (Aruba, Bonaire, Curacao, Sint Maarten)." Five IRCs will cover each application but check with PA0QF for clarifying particulars. This one is the result of research by W1VG . . . . . NRRL (Norway) pooh-poohs LAs 9LF/P and 9LG/P.

Hereabouts — Reminiscing by W4HVU: "Operated J8AAA and HL1AA in Korea back in '47 and '48 when contact with the States could only go through amateur radio. (Commercial facilities were installed in mid-1948.) For the short time I was operating in Korea it was truly a ham's paradise." Guy especially commends Ws 6SAH 8ANN 8GIZ 9RBI and 9RUK for traffic services rendered during that hectic period. W4HVU also remarks on the fine 15-meter signal now put forth by Army colleague KZ5JS, same stemming from a ground-level cube quad . . . . . SCDXC records that W2ATE (ex-W1ATE), DX contester of the first water, also is sold on cubical quads for 14-, 21- and 28-Mc. work. And out west W6YMD screeched at VK9AJ for hours to no avail until he lowered his beam from 100 feet to the 60-foot level. Don't tell *him* "the higher, the better"! . . . . . Well-known DXer W6OUN, 162/125, takes over editorial duties for SCDXC's *Bulletin* . . . . . W5RX, late of KV4BK, detests overprotective fathers of young Novices. We concur that the youngsters should be permitted to work their DX on their own hook, free from parental proddings and "guidance" . . . . . Next month Canadian call signs will shuffle slightly. Two-letter VO1 calls will take over in Newfoundland and similar VO2 labels in Labrador . . . . . Via W6OME we learn that W5TET/KS4's current Swan schedule calls for 14,015-kc. c.w. nightly around 1-2 GMT with occasional phone thrown in . . . . . W4UWA declares that the 1957 Novice really has himself a deal, plenty of DX and a wide selection of commercial gear available. "Back when I was a Novice we had only 80, 11 and 2 meters, 11 being useless because of sunspot low. I had a 6AG7 oscillator and one crystal on 3748 kc. with a random-length wire antenna." AL's XYL is KN4JNI . . . . . W3VKD is working this year's ARRL Test W6AM-style, joining eight or nine fellow Threes in multioperating his effective Indiana, Penna., layout . . . . . You can't afford to miss a one! W7DJU now has W7GYR set up in his Bellingham, Wash., office, just the thing for keeping an ear on 15 and 10 during lunch hours. Dale agrees that we could do with much, much less of this clever QSO-breaching "W—— QRX" routine. This me-first boorishness is rotten operating at its ripest, DX hoggery at its smelliest. The fact that some DX stations are suckers for it will never justify such "procedure" in the eyes of decent DX men who lay off their keys till QSO's end and then take their chances with the rest of us . . . . . VE7QQ has evidence that some nitwit is misusing his call on ten phone; he doesn't touch the stuff . . . . . DX traffic men welcome Costa Rica and Nicaragua into third-party QTC ranks. Canada, Chile, Cuba, Ecuador, Liberia, Panama and Peru are other foreign points with which one can score BPL . . . . . WGDXC informs that W5ASG clobbered over 200 countries in the twelvemonth beginning February 7, 1956. Also that K2CJN, boating once again in the Caribbean, anticipated visiting nearly a dozen DXCC countries by mid-February.

Ten Years Ago In "How's DX?" — The question is put by a new interlocutor in your March 1947, *QST*, W1CH, one long prominent in DX circles, steps in to swing for W1DX so By can devote proper time to the organ's techni-

(*Continued on page 156*)



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In far-off Macao CR9AH (left) and one of America's most prominent ham ambassadors of good will, W2APF, check pseudo-Brewster matters under John's 10-over-15. W2APF must be close to peripatetic DXCC after his most recent flurry of world-wide ama-touring.

Happenings of the Month

DOCKET 11866

The Federal Communications Commission is engaged in an extensive study of all frequency allocations above 890 Mc., under the label of Docket 11866. The objective is to resolve differences between the common carrier folks (such as the telephone company) on one hand and the private users on the other; the outcome will undoubtedly also help to shape U. S. policy toward that region of the spectrum at the forthcoming international radio conference. In the initial stages amateur bands have not been affected, but the League nevertheless filed the following statement on January 15:

APPEARANCE OF AMERICAN RADIO RELAY LEAGUE, INC.

Pursuant to paragraph VIII of the Preliminary Notice of Hearing in the above entitled Docket, the American Radio Relay League, Inc., enters its notice of appearance. At the present time the League is not able to make comments or give a brief outline of summary of any evidence which it might submit because the issues suggested by the Commission do not seem to affect the amateur directly. However, if the comments filed in this Docket by other parties do reveal any proposals to limit or in any way restrict amateur privileges beyond those now provided for by international regulations and the Commission's Rules, the League will submit appropriate evidence.

MORROW'S TENTH

The nineteenth member of the present Hq. staff to accumulate ten years ARRL service — Advertising Manager L. A. Morrow, W1VG — was presented his credentials as a member of the Ten-Year Club at a dinner meeting on January 7, 1957. Coming to the staff in 1947 as Assistant Advertising Manager, "Pete" Morrow moved into the top position in 1951. In these past six years, revenue from advertising in *QST* (and other ARRL publications) has been rising steadily. The result affects all League members — primarily in the form of larger issues of *QST*, which are averaging nearly 50% bigger than six years ago. While this growth may to some extent be attributed to an expanding economy, we know that much of it results from the outstanding, aggressive job W1VG has done, without in any manner compromising the high standards of *QST*'s advertising acceptance.

Pete started hamming in the early days of amateur radio — actually not longer ago than he likes to remember, however, because a favorite pastime is challenging the boss, W1BUD, on who recalls, from personal experience, more details of brand names as well as technical and operating characteristics of some of the very earliest ham gear. His preferred mode of operation, c.w.; favorite band, 20; favorite activity, chasing DX (current score 180); favorite hobby-within-a-hobby, self-imposed operating challenges such as two-letter-call WAS.

WORLD CONFERENCE PREPARATION

Under the sponsorship of the Department of State, two meetings of the radio interests of the United States have already been held in Washington to commence planning for the 1959 International Telecommunications Conference. Both were attended by General Manager A. L. Budlong, W1BUD, and Assistant General Manager

Four hundred and ten years of service to the radio amateur! That's the figure representing the total years of service at ARRL Hq. by members of the Ten-Year Club of the Hq. staff. Shown below, from left to right, seated: Ed Tilton, W1HDQ; Marion Bayrer; Charlotte Clark; Dave Houghton; "Pete" Morrow, W1VG; A. L. Budlong, W1BUD; and Ed Handy, W1BDI. Standing: Joe Moskey, W1JMY; George Hart, W1NJM; Lillian Salter, W1ZJE; Ed Collins; Don Mix, W1TS; Sam Cowles; Byron Goodman, W1DX; John Huntoon, W1LVQ; George Grammer, W1DF; and Vern Chambers, W1JEQ. Not present at the time the photo was taken were Alice Scanlan and Cecilia Hatch.

John Huntoon, W1LVQ, on behalf of the amateur radio service. The work so far has been directed toward setting up various committees to handle specialized phases of U. S. policy, such as frequency allocations, technical considerations, organizational matters, etc. During the next three years these committees — and their subcommittees set up for even more detailed problems — will be meeting regularly in Washington. As in the case of such preparatory work for all previous conferences in the history of radio regulation, the League will continue to have representatives present to participate in the work of any committees dealing with matters affecting our interests.

WHAT BANDS AVAILABLE?

Below is a summary of the U. S. amateur bands on which operation is permitted *as of February 1st.* Changes will, as usual, be announced by W1AW bulletins. Figures are megacycles. AØ means an unmodulated carrier; A1 means c.w. telegraphy; A2 is m.c.w.; A3 is a.m. phone (n.f.m. may also be used in such bands); A4 is facsimile; A5 is television; F1 is frequency-shift keying; and f.m. means frequency modulation, phone (including n.f.m.) or telegraphy.

3.500-4.000 — A1	14.200-14.300 — A3
3.500-3.800 — F1	14.300-14.350 — F1
3.800-4.000 — A3	21.000-21.450 — A1
7.000-7.300 — A1	21.000-21.250 — F1
7.000-7.200 — F1	21.250-21.450 — A3
7.200-7.300 — A3	28.000-29.700 — A1
14.000-14.350 — A1	28.500-29.700 — A3
14.000-14.200 — F1	29.000-29.700 — f.m.

50-54	A1, A2, A3, A4
51-54	AØ
52.5-54	f.m.
144-148	AØ, A1, A2, A4, A3, f.m.
220-225	AØ, A1, A2, A4, A3, f.m.
420-450 [1]	AØ, A1, A2, A3, A4, A5, f.m.
1,215-1,300	AØ, A1, A2, A3, A4, A5, f.m.
2,300- 2,450	AØ, A1, A2, A3, A4, A5, f.m.
3,300- 3,500	AØ, A1, A2, A3, A4, A5, f.m.
5,650- 5,925	AØ, A1, A2, A3, A4, A5, f.m.
10,000-10,500	AØ, A1, A2, A3, A4, A5, f.m.
21,000-22,000	AØ, A1, A2, A3, A4, A5, f.m.
All above 30,000	AØ, A1, A2, A3, A4, A5, f.m.

[1] Plate input power must not exceed 50 watts.

Also, shared use of 26.96-27.23 Mc. with AØ, A1, A2, A3, A4, f.m. In addition, A1 and A3 (but not n.f.m.)on portions of 1.800-2.000, as follows:

Area	Bands, kc	Input power Day	Night
Minn., Iowa, Wis., Mich., Pa., Md., Del., and states to the north including District of Columbia	1800-1825 1875-1900	500	200
N. D., S. D., Nebr., Colo., N. Mex., and states to the west including Hawaiian Islands.	1900-1925 1975-2000	500*	200*
Okla., Kans., Mo., Ark., Ill., Ind., Ky., Tenn., Ohio, W. Va., Va., N. C., S. C., Tex. (West of 99° W *or* North of 32° N)	1800-1825 1875-1900	200	50
Tex. (East of 99° W *and* South of 32° N), La., Miss., Ala., Ga., Fla., Puerto Rico, Virgin Islands, Alas. Guam, and other Territories and Possessions of the U. S. not listed above.	None	No Operation	No Operation

* Except in State of Washington where daytime power limited to 200 watts and nighttime power to 50 watts.

Novice licensees may use the following frequencies, transmitters to be crystal-controlled with a maximum power input of 75 watts.

3.700-3.750 A1	21.100-21.250 A1
7.150-7.200 A1	145-147 A1, A2, A3, f.m.

Technician licensees are permitted all amateur privileges in 50-54 Mc. and in the bands 220 Mc. and above.

WWV-WWVH SCHEDULES

For the benefit of amateurs and other interested groups, the National Bureau of Standards maintains a service of technical radio broadcasts over WWV, Beltsville, Md., and WWVH, Maui, Territory of Hawaii.

The services from WWV include (1) standard radio frequencies of 2.5, 5, 10, 15, 20 and 25 Mc., (2) time announcements at 5-minute intervals by voice and International Morse code, (3) standard time intervals of 1 second, and 1, 3 and 5 minutes, (4) standard audio frequencies of 440 cycles (the standard musical pitch A above middle C) and 600 cycles, (5) radio propagation disturbance warnings by International Morse code consisting of the letters W, U or N, together with digits from 1 through 9, indicating present North Atlantic path conditions and conditions to be anticipated. (See ARRL *Handbook* for details on interpretation of forecast symbols.)

The audio frequencies are interrupted at precisely two minutes before the hour and are resumed precisely on the hour and each five minutes thereafter. Code announcements are in Universal Time using the 24-hour system beginning with 0000 at midnight; voice announcements are in EST. The audio frequencies are transmitted alternately: The 600-cycle tone starts precisely on the hour and every 10 minutes thereafter, continuing for 3 minutes; the 440-cycle tone starts precisely five minutes after the hour and every 10 minutes thereafter, continuing for 3 minutes. The fourth minute of each 5-minute period is silent, and voice announcements are made during the fifth minute. The one-second intervals are heard as a clock-like tick; the tick at the beginning of the last second of each minute is omitted.

(*See page 76 this issue*)

Trial Under Fire

BY FRANK H. TOOKER*

IT WAS the zero hour The whole world waited in tense expectancy. From one end of the line to the other there was silence — an occasional whisper now and then from one who did not realize what was about to happen perhaps, or another too torn and battle-scarred from a previous fray to care very much — but apart from these there was grim, ominous silence.

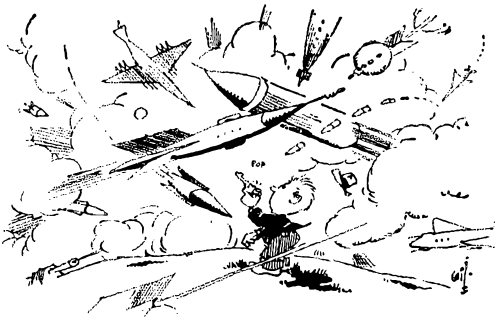
Then, suddenly, the word was given. Who had given it, or from where, no one seemed to know. It appeared to come from everywhere at once.

The mighty guns at each end of the line opened fire with a tremendous salvo. Their thunderous blasts shook the very ether and struck fear into the hearts of the more timid. One after another and with ever increasing speed their targets went down under the fury and the unerring precision of their murderous firepower.

This was it. Trial under fire, and every man for himself — and Heaven help those who could not hold their own. Our hero knew that. From his yet relatively-safe position, he could see all that was going on about him. He could stay here and be unhurt. He need not venture forth. He was poorly armed. He had but a cap pistol compared to the heavy weapons whose mighty ceaseless roar now began to deafen his ears. But he could not stay. Something deep inside, the urge to join the battle, the rising crescendo of roars and screams of what had already become a life or death sturggle, drove him forth.

Unarmored and practically defenseless, he threw himself again and again against the merciless horde, only to be thrown down, trampled, and unnoticed, as the heavily armored throng thundered in confusion and wild abandon over and about him.

The battle was in full heat now. The big guns seemed to be everywhere. There was no hope, no escape, no niche or cranny into which their awful blasts could not enter to bring down their targets. Their thunderous roar penetrated deeper



and deeper into his brain, threatening to drive him mad. His head throbbed with pain — and with anguish that he should be so weak, so defenseless, so utterly unfelt and unnoticed in this titanic struggle that engulfed his entire planet.

Then, suddenly, as quickly as it had begun, it was finished. The mighty guns were silenced. The roars and screams of battle died away. Our hero, with a weak and trembling hand, reached out and turned off his ten-watter. THE DX CONTEST WAS OVER!

*P. O. Box T, Lakehurst, N. J.

Strays

Psychology is wonderful! W3ZUG put a new beam for 20 meters and rotated it merrily for two weeks while he worked a bunch of DX. Upon deciding to switch over to 40 meters, he discovered that he had been using a 40-meter dipole all the time, instead of the much-vaunted beam!

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At the right you see the metal sign erected on U. S. Highway 6, Ohio Highway 2, at the west end of Avon Lake (part of Greater Cleveland) as a project of the West Park Radiops, with the actual construction done by the Mr. and Mrs. team of W8OPX and W8SBB. The frequency is regularly monitored, and visiting mobileers are able to establish local contact without difficulty. — *Elyria Chronicle-Telegram photo.*

Hints and Kinks For the Experimenter

USING 6-VOLT VIBRATOR TRANSFORMERS WITH 12-VOLT AUTOMOTIVE SYSTEMS

NOW THAT the 12-volt automotive electrical system has become almost standard equipment, many 6-volt vibrator transformers have become surplus. The following describes a means of using these transformers with 12-volt installations.

It should be understood that the 6-volt transformer has a primary that is actually a 12-volt center-tapped winding. Normally, 6 volts is connected to the tap and the outside ends of the winding are grounded alternately (by the vibrator) to excite first one half and then the opposite half with a pulse of 6 volts d.c. Now, if 12 volts is connected across the entire winding (no connection to the center tap) and the polarity reversed every half cycle, we have essentially the same thing as before. This method of operating the transformer is made possible by the use of the recently designed split reed vibrator.

The split reed vibrator is a nonsynchronous type and has a 6-volt driving coil so that universal 6/12-volt units can be built using the same transformer. A series resistor can be used to drop the battery voltage or the coil can be placed in the series-parallel filament ladder so as to provide the required 6 volts. In the average ham installation, the use of a series dropping resistor seems to be the practical solution and a value of 27 ohms (2 watts) will be about the correct value. Fig. 1 is the diagram of the primary circuit of a supply using one of the split reed vibrators.

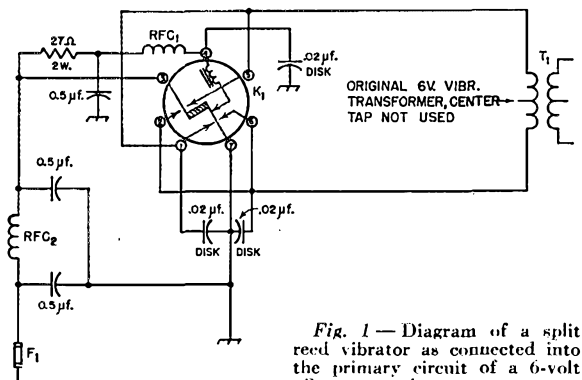


Fig. 1 — Diagram of a split reed vibrator as connected into the primary circuit of a 6-volt vibrator supply.

F_1 — Fuse rated to suit current drain.
K_1 — Split reed vibrator; see text.
RFC_1 — 7-μh. r.f. choke (Ohmite Z-50).
RFC_2 — Approximately 14 μh.; 55 turns No. 12 wire, close-wound on 1-inch diam. form. (Mallory type RF583 has higher inductance and may therefore be more effective.)

Notice that the vibrator has a 7-pin base. As a result, it probably will be necessary to substitute a 7-prong socket for the one already in the supply. Mallory, Cornell-Dubilier and Oak are some of the concerns that manufacture vibrators that will work in the circuit. The one used in this particular instance is the Oak type V6853. This unit has a reed frequency of 100 cycles and is rated for a maximum current of 8 amperes.

The only apparent disadvantage seems to be that this circuit requires more hash suppression than does the conventional type. However, a good ground for the metal vibrator case and some experimentation with the values of bypass capacitance at the vibrator socket will make this circuit as quiet as any.

— *Laurence B. David, W4YEJ/W4WIS*

Editor's Note: We wish to thank K4HEZ for submitting vibrator information quite similar to that presented above. K4HEZ also reminds us (1) that a tube or a metallic rectifier must be added during the installation of a split reed vibrator if the supply undergoing modification is of the synchronous type, (2) that the Motorola type 48C830082 vibrator is well suited to the job.

21-MC. S.S.B. OPERATION WITH THE "W2EWL SPECIAL"

THE 14-MC. VERSION of the "W2EWL Special" can be used for 21-Mc. work after making a simple and inexpensive modification to the rig. This excellent s.s.b. job performs just as well after modification as it did at 14 Mc. The following explains the conversion made here at W5DYK.

The Type 1626 used originally as the v.f.o. tube (V_{10}, Fig. 1, page 18, *QST*, March, 1956) was replaced with a Type 12SN7GT. One half of the dual triode is used as the oscillator tube without any other changes in the oscillator circuit. The second section of the 12SN7GT is wired and used as a frequency doubler. Tuning the oscillator to 6225 kc. gives output from the doubler at 12.45 Mc. The latter mixes with the 9-Mc. s.s.b. signal for output at the high end of the 21-Mc. phone band.

The doubler stage is completely conventional and those interested in making the change will find a suitable circuit in *The Radio Amateur's Handbook*. The plate circuit of the doubler may be slug-tuned.

— *Howard D. Woertendyke, W5DYK*

WARNING — A.C.-D.C. RECEIVERS AND CONELRAD MONITORS

As is the case with almost any piece of a.c.-d.c. equipment, there is always the possibility of *shock* hazard when you start adding outboard leads and devices to an a.c.-d.c. broadcast receiver. Therefore, before installing a Conelrad alarm such as described by W3BFO (*QST*, Jan., 1957, p. 49) it is a good idea to check and rewire if necessary, the output-transformer and speaker wiring of the set. Make sure that the transformer-to-speaker wiring is clear of the chassis. Then, if random insertion of the line plug or failure of the isolating capacitor places the chassis *above* ground, the a.c. line voltage to the receiver will not be transferred to external leads, exposed terminals or alarm-circuit components.

— *Kermit A. Stobb, W9YMZ*

CLEANING VIBRATOR CONTACTS

An article published in *Bell System Practices* (American Tel. & Tel. Co.) contains information on cleaning of vibrator contacts that should interest amateurs who use these units in mobile and portable gear. The purpose of the procedure is to free the contacts of the film that develops after the vibrators have been through a period of inactivity. This film can accumulate on the contacts of new vibrators as well as on those which have seen service. The film can generally be broken down and the vibrator rendered operative by the contact cleaning described below.

Connect 115 volts a.c., a 40-watt lamp and the vibrator in series in accordance with Fig. 2.

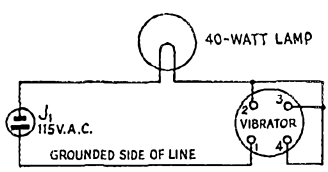


Fig. 2 — Diagram of the vibrator-contact cleaning circuit submitted by W7OUS. J_1 should preferably be a polarized type connector.

If a polarized plug is used it is preferable that the identified blade (the wide blade of a parallel-blade type) be connected directly to the vibrator socket and the other blade to the lamp socket. Vibrator connections are:

Pin No.	*Internal Connection*
1	Reed and one end of winding
2	Pull interrupter contact
3	Inertia interrupter contact
4	Free end of winding.

Apply 117 volts a.c. to the vibrator through the 40-watt lamp for one minute. The a.c. will drive the vibrator to good amplitude regardless of the condition of the contact surfaces. The mechanical beating and the voltage applied to the contacts (limited by the 40-watt lamp) will generally break down any film in one minute of operation. The vibrator may be left in this test circuit for as long as 15 minutes without damage.

Safety precautions should be observed at all times.

— *LeRoy S. Parris, W7OUS*

TUNED R.F. PICK-UP CIRCUIT FOR OSCILLOSCOPES

This is an idea that should interest those who use an oscilloscope for making modulation checks. The stunt is that of using a simple multiband tuner as the r.f. pickup for the scope. Use of the system requires no *direct* connection to the audio or r.f. stages of the transmitter undergoing test, and provides ready adjustment of the input to the oscilloscope to compensate for changes caused by band changing, power input differences, etc.

A short r.f. probe or antenna is used with the multiband tank as shown in Fig. 3. This probe or antenna may have to be inserted an inch or two into the transmitter housing if the power is low and the rig well shielded. Output from the tuner is connected directly to the vertical plates

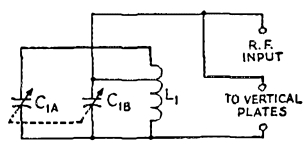


Fig. 3 — Circuit used by W7KLE for feeding r.f. to the vertical plates of an oscilloscope.
C_1 — Receiving-type dual variable, 140-$\mu\mu$f. per section.
L_1 — Approximately 13.5 μh.: 25 turns No. 20 tinned, 1⅜-inch diam., 1 9/16 inches long, tapped at 9 turns from end connected to C_{1A}.

of the scope. *Warning — High Voltage* is applied to the vertical plates, so make the connections with the scope turned *off*.

The tuner was made from junk-box parts and covers all frequencies in the 3.5- through 28-Mc. range. When using the circuit, the height of the r.f. envelope on the scope tube may be controlled by adjustment of the position or the length of the pickup antenna, or by tuning C_1 either to exact frequency or slightly off resonance.

As is the case with other multiband tanks, this one will tune 3.5 and 14 Mc. with C_1 set well toward maximum capacitance. Resonance at 7 and 28 Mc. will occur with C_1 adjusted toward minimum capacitance, and 21 Mc. will show up with about one third of the total capacitance in use.

— *Floyd X. Passmore, W7KLE*

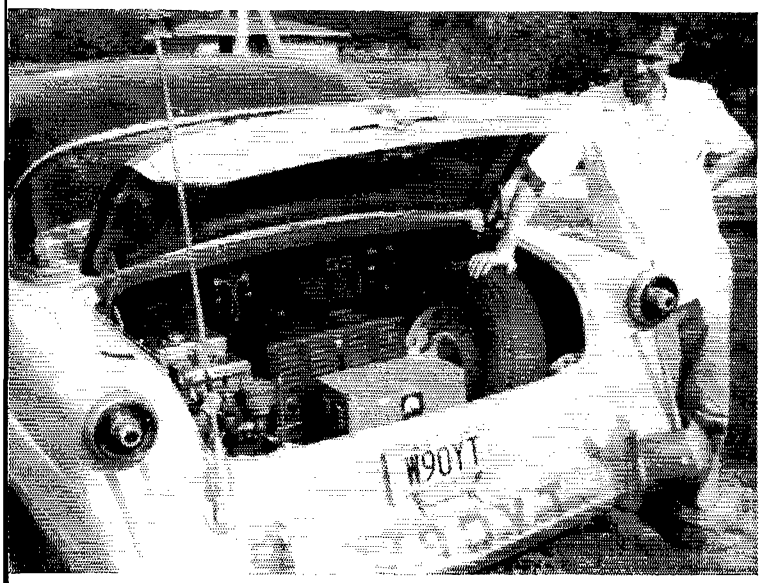
"WATERSPOUT" ANTENNAS

Although the "beer-can antenna" certainly caused a lot of flurry, I can't for the life of me see why anyone would want to patiently solder together a long string of tin cans, keeping them in perfect alignment, and then have only soldered joints to depend on for mechanical strength.

If you really want a cheap and rugged vertical, why not use 10-foot sections of waterspout as

(*Continued on page 160*)

Strays



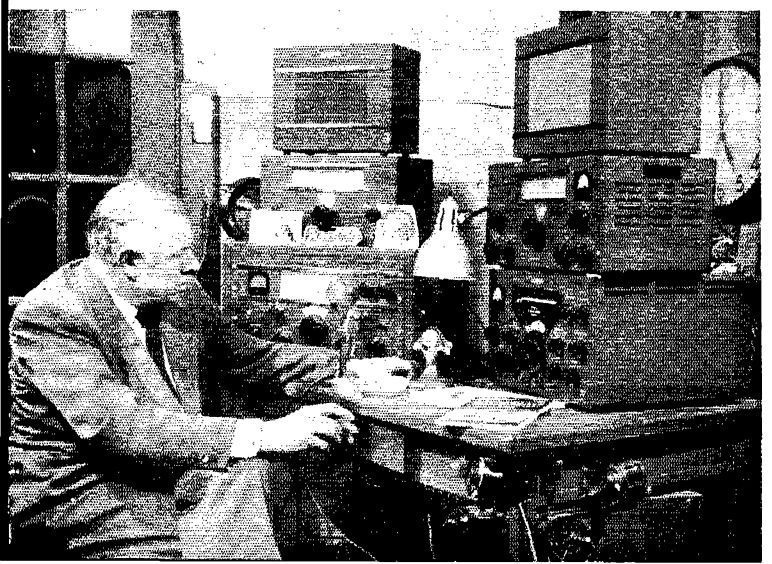
This trunkful of equipment can be entirely controlled from the driver's seat, including stopping and starting the 1 kw. gas generator. One transmitter operates at 40 watts input, the other at 400 watts. When running the gas generator, the trunk lid is held open by means of a brace and spring — the resulting one-foot space allows adequate ventilation. Helper springs were added to the car to compensate for the extra weight.

W1BCR Receives High Navy Honor

Elsewhere in this issue you will find a story on "Operation Deep Freeze" and details of the mutual cooperation between the U. S. Navy and amateurs. A further evidence of the esteem in which U. S. amateurs are held by the Navy comes with the recent announcement that the Navy's highest civilian honor has been awarded to C. Newton Kraus, W1BCR, of Warren, R. I. W1BCR was notified by Thomas Gates, Acting Secretary of the Navy, that he had been awarded the Navy Distinguished Public Service Award for his outstanding contribution to the Naval Establishment in the fields of Public Information and Morale. Broken down into ham language, this means that W1BCR has received this honor because of his work in relaying traffic back and forth between Navy personnel in the Antarctic and their families and friends here in the States.

As we go to press, we are told that ceremonies in connection with the award will be held at Davisville, R. I., on February 12th. Rear Admiral H. C. Bruton, W4HH, the Director of Naval Communications, will be on hand to make the presentation.

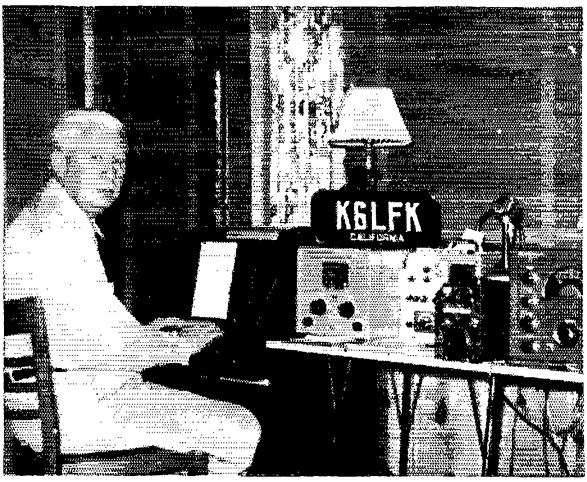
It is understood that very recently other radio amateurs have been recommended to the Navy Department for special recognition for efforts similar to those of W1BCR.



C. Newton Kraus
W1BCR
Recipient of
Navy Distinguished Public
Service Award

QST for

RTTY ANNIVERSARY



Mort Swingler, K6LFK, submitted his photographic entry, along with dozens of others, in the nationwide contest among RTTYers celebrating the tenth anniversary of the establishment of the national Amateur Radioteletype organization and the very first f.s.k. and a.f.s.k. amateur radio teleprinter communication. Like all contest-minded radio amateurs, Mort had participated for the fun of the competition and really did not believe he stood a chance to win an award or even honorable mention. You may well fancy his state of mind when he read the letter containing the announcement that he had been awarded first prize by the contest committee. Several useful pieces of teletypewriter gear were won by K6LFK, including a perforated-tape synchronous-motored distributor, and, a spanking-brand-new Model 26-A has been shipped to him from the Society's headquarters at 38-06 61st Street, Woodside, N. Y.

Despite his long association with electrical and electronic equipment with the Bell system, Mort is not an old-timer in amateur radio, although he kept abreast of ham activities. Mort was bitten by the teletype bug less than two years ago but in the intervening time he has managed to accumulate a very respectable collection of gear.

K6LFK uses a telephone company "TWX" teletypewriter with a home-brewed terminal unit to convert the received machine-keyed audio signals into the d.c. pulses required by the telegraph printer. Contest-winner Mort is a voracious reader of literature on printing telegraphy, all the way back to the first article on the subject which appeared in *QST* in February of 1948. He has mulled over many possible additions to his radioteletype station, such as auto-start, permitting reception of printed messages from fellow RTTYers when he is not at home: automatic reperforation in tape of message traffic and all the extra gizmos the radioteletype gang have been dreaming up.

Strays

There will be an RTTY dinner during the IRE show in March. Those interested should contact W2EBZ.

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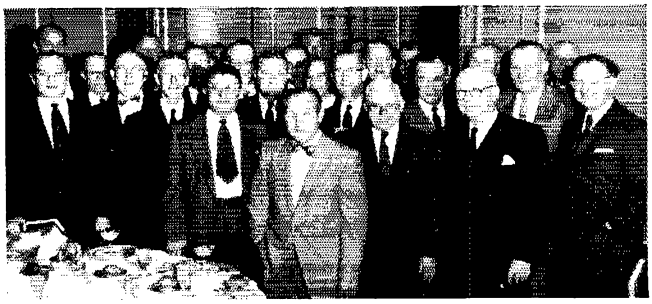
If a gremlin ever takes off with your 2-meter Gonset antenna, don't despair — just try using a wire clothes hanger. That's what K2KEW did and he got such favorable signal reports that he passes this on to you. Just straighten out the curled end of the hanger, place it into the Gonset receptacle and load up! Of course, for real DX add three elements horizontally.



Three well-known names in ham radio. Left to right, Bill Halligan, W9AC, of Hallicrafters; Fred Schnell, W9UZ; and Jack Doyle, W9GPI, ARRL Central Division Director.

Fred Schnell, W9UZ, former Traffic Manager of ARRL, is about to retire to the sunny south after many years in the Chicago area. A farewell party, sponsored by Bill Halligan, W9AC, of Hallicrafters, was attended by W9s AIO, AC, EZN, GPI, HPJ, JGL, GLT, LLX, MO, MD, NRU, SG, SPM, PXW, TRD, SZY, OGA, VO, YIX, WN, ZYB, K9AEC and W1BUD, all of whom are pictured above.

Strays

Do you have a set of expired call-letter license plates stashed away in the corner somewhere? W6NBM made use of his. He placed 'em back-to-back — after removing the date and year — and mounted them on top of his mailbox.

—•••—

The same date, time, and frequency — but one year later W4GSP worked K4DWF.

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Referring to the mobile installation pictured on page 19 of Oct. 1956 *QST*, W4DFE informs us that the XYL and YL share the back seat with said luggage!

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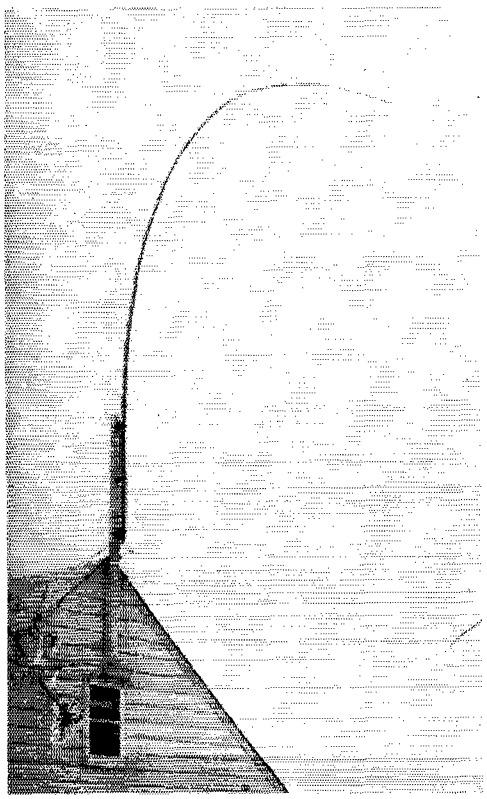
Recently, W6NZD's car stalled in a flooded intersection in the San Fernando Valley. W6TAG drove up, saw the trouble and started pushing; but visibility was bad for him. Both being mobile NZD directed TAG through puddles for more than a mile until they reached a service station. Viva la ham radio!

—•••—



Here's what the ice did to W1VG's 40-meter ground-plane antenna during one of our better New England days. But after the sun came out the antenna returned to normal.

A.R.R.L. QSL BUREAU

The function of the ARRL QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions, and Canada of those QSL cards which arrive from amateur stations in other parts of the world. 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 4¼ 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 — D. W. Waterman, W1IPQ, 99 Flat Rock Rd., Easton, Conn.

W2, K2 — E. F. Huberman, W2JIL, Box 746, GPO Brooklyn 1, New York.

W3, K3 — Jesse Bieberman, W3KT, P.O. Box 400, Bala-Cynwyd, Penna.

W4, K4 — Thomas M. Moss, W4HYW, Box 644, Municipal Airport Branch, Atlanta, Ga.

W5, K5 — Robert Stark, W5OLG, P.O. Box 261, Grapevine, Texas.

W6, K6 — Horace R. Greer, W6TI, 414 Fairmount St., Oakland, Calif.

W7, K7 — Joseph P. Vogt, W7ASG, 5399 Karen Ave., Salem, Ore.

W8, K8 — Walter E. Musgrave, W8NGW, 1245 E. 187th St., Cleveland 10, Ohio.

W9, K9 — John F. Schneider, W9CFT, 311 W. Ross Ave., Wausau, Wisc.

WØ, KØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minn.

VE1 — L. J. Fader, VE1FQ, 125 Henry St., Halifax, N. S.

VE2 — Harry J. Mabson, VE2APH, 122 Regent Ave., Beaconsfield West, Que.

VE3 — Leslie A. Whetham, VE3QE, 32 Sylvia Crescent, Hamilton, Ont.

VE4 — Len Cuff, VE4LC, 286 Rutland St., St. James, Man.

VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Sask.

VE6 — W. R. Savage, VE6EO, 883 10th St. N., North Lethbridge, Alta.

VE7 — H. R. Hough, VE7HR, 2316 Trent St., Victoria, B. C.

VE8 — W. L. Geary, VE8AW, Box 534, Whitehorse, Y. T.

VO — Ernest Ash, VO1A, P.O. Box 8, St. John's, Newfoundland.

KP4 — E. W. Mayer, KP4KD, Box 1061, San Juan, P. R.

KH6 — Andy H. Fuchikami, KH6BA, 2543 Namauu Dr., Honolulu, T. H.

KL7 — KL7CP, 310 — 10th Ave., Anchorage, Alaska.

KZ5 — Catherine Howe, KZ5KA, Box 407, Balboa, C. Z.

MEMBERSHIP CHANGES OF ADDRESS

Four weeks' notice is required to effect change of address. When notifying, please give old as well as new address. Advise promptly so that you will receive every issue of *QST* without interruption.

Operating News

F. E. HANDY, W1BDI, Communications Mgr.
GEORGE HART, W1NJM, Natl. Emerg. Coordinator
PHIL SIMMONS, W1ZDP, Asst. Comm. Mgr., C.W.
ROBERT L. WHITE, W1WPO, DXCC Awards
LILLIAN M. SALTER, W1ZJE, Administrative Aide
ELLEN WHITE, W1YYM, Asst. Comm. Mgr., Phone

Use of a Stand-by Receiver on NCE Frequencies. To be alerted on emergency calls — and for general traffic moving, both for non-net and network members, phone or c.w., the National Calling and Emergency Frequencies (3550, 3875, 7100, 7250, etc.) should be constantly used by all amateurs.

The NCE frequencies can serve you best if you keep a receiver tuned there. Do this whenever in your station. ARRL endorses such use of these frequencies by all amateurs. Netters doubly benefit; it's a chance to get traffic to put into the net, also an opportunity to be in on emergency alerts right from the start. Every amateur benefits both from greater ability to move traffic between once-each-day periods of net operation, and from having a smooth way to ease a message into the hands of traffic specialists and their organized channels. Each section net, as a unit in the National Traffic System, is a highway connecting to all the states.

Assume your receiver is on and tuned to an NCE frequency. How do we contact other stations? We tune the transmitter temporarily to this frequency. (1) We make calls only, directional or indicating the states and traffic, on the NCEF's. (2) When ready to take or give traffic or note an emergency condition, keep a receiver going there for others' calls. (3) Move *off this frequency* for working; limit NCEF use to the call and making contact.

To show how this technique works we might mention that W7OE worked 14 different stations in a single week end, taking 28 calls on 3550 kc., for Washington netters following the system. All traffic was handled on 3575, after calls on 3550. The evening section net remains an ideal way to move traffic reliably and in organized fashion around the country. Net members by monitoring these frequencies can pick up traffic "business" and channelize it through all section nets!

March DX Test Opportunity. DXers who were in the February Test will find the March dates a chance to extend scores and to nail down more new countries, we hope. The January *QST* announcement of our 23rd ARRL International DX Competition gives full details for those just starting the test in March. The dates: March 8–10 (phone), March 22–24 (c.w.).

Make QSLs Complete, Please. In confirming those QSOs for the DX Test and for WAS be *sure* to include the band, mode, date, your state and the signal report. Otherwise they may fail to help the recipient qualify for the growing number of club and national awards. A QSL card is your missionary in the other fellow's shack. Let the card include details on your setup, and ample personal details in the fraternal spirit, too. Slogans on QSLs give some of them added meaning. There's "foto for foto," "will QSP any time," "QSL — QSP always" all in the true spirit of amateur brotherhood and our traditions.

A.R.R.L. ACTIVITIES CALENDAR

Mar. 7th: CP Qualifying Run — W6OWP
Mar. 8th-10th: DX Competition (phone)
Mar. 18th: CP Qualifying Run — W1AW
Mar. 22nd-24th: DX Competition (c.w.)
Apr. 3rd: CP Qualifying Run — W6OWP
Apr. 13th-14th: CD QSO Party (c.w.)
Apr. 16th: CP Qualifying Run — W1AW
Apr. 20th-21st: CD QSO Party (phone)
May 2nd: CP Qualifying Run — W6OWP
May 15th: CP Qualifying Run — W1AW
June 5th: CP Qualifying Run — W6OWP
June 8th-9th: V.H.F. QSO Party
June 20th: CP Qualifying Run — W1AW
June 22nd-23rd: ARRL Field Day
July 3rd: CP Qualifying Run — W6OWP
July 19th: CP Qualifying Run — W1AW
July 20th-21st: CD QSO Party (c.w.)
July 27th-28th: CD QSO Party (phone)
Aug. 7th: CP Qualifying Run — W6OWP
Aug. 19th: CP Qualifying Run — W1AW

OTHER CONTESTS

The following lists date, name of contest, sponsor, and page reference of *QST* issue in which rules appear.

Mar. 2nd-3rd: 1957 French Contest (c.w.) REF (p. 67, March, How's DX).

Mar. 16th-17th: 8th New Hampshire QSO Party, Concord Brasspounders, (p. 116, March, Station Activities).

Mar. 16th-17th: 2nd Delaware QSO Party, Delaware Amateur Radio Club (p. 84, March, Station Activities).

Apr. 6th-7th: 6th Vermont QSO Party, Tri-County Amateur Radio Club, next month's issue (Station Activities).

Apr. 6th-7th: European WAE DX Contest (2nd c.w. week end), DARC (p. 86, December 1956, How's DX).

Apr. 13th-14th: 1957 French Contest (phone), REF (p. 67, March, How's DX).

Apr. 13th-14th: Ohio Intrastate QSO Party, Ohio Council of Amateur Radio Clubs, next month's issue (Station Activities).

Your Plans for Field Day. Field Day general chairmen retaining their notes of trials and tribulations in the last FD, also clubs that held post-mortems immediately after the last June activity are ahead of the game. It's time now to formulate new FD Plans.

The fourth week end, June 22nd and 23rd, has been designated for the 1957 ARRL FD. One or two fellows going out together undoubtedly will choose the one-transmitter category to give their emergency gear a workout and have some fun. Clubs may enter the FD in any number of simultaneously-operated transmitter setups. The number chosen is often that thought to be capable of producing most points and providing a fair workout for the greatest number of operators and equipments available.

Club FD organization often starts many months in advance. Committees investigate and report on locations, antennas, equipment, operating plans and commissary problems. The club as a whole passes on major policy, whether to have separate v.h.f. or Novice band setups, the location and transmitter class, etc. Primarily Field Day is an emergency equipment test, but operator experience heavily weighs results. Besides the last minute briefing of the teams for different bands on their equipment, more and more clubs schedule blackboard sessions on message form and message handling, and some run club on-the-air contests to put a premium on operator judgment.

For the coming Field Day, a staff review of all ideas sent in produced but two rule changes. One was an editorial adjustment setting 150 watts as the intermediate power-multiplier level. A second provides that there is a 27-hour period, from starting time, 4 P.M. EST (or 1 P.M. PST) Saturday, in which you can operate *any consecutive* 24 hours. This lets both coasts on the air at the same time and gives time for a late setup after a half day's work Saturday where necessary. The full text of the FD rules will appear in June *QST*. Get the convenient logging forms for this radio emergency test. They will be sent gratis, on request, after mid-May. Start your FD Plans now.

SCMs Offer OO Appointment. ARRL Official Observers are those generally unsung heroes, diligent in mailing the cooperative postal card notices concerning individual station signal deficiencies. In theory if we had 100% coverage it could help us all keep free of FCC troubles. Qualified amateurs, acceptable to SCMs for OO work, receive forms and policy guidance material. Besides Novice harmonic detection, OOs engage in general c.w. signal observing, phone observations, and off-frequency measurement. SCMs constantly want experienced members to help along this useful work. The post is not one for newcomers, but only for General Class licensees or higher with considerable experience in using their receiving-observing equipment. Their observing must disregard image-reception and take receiver overload and propagation effects into account.

ARRL will be pleased to send information on the Official Observer duties and policy in answer to radiogram or other inquiry from amateurs interested in this SCM post throughout the USA and Canada.

Nothing pleases an OO more than to be of assistance to his fellow amateur. In addition to praise from the ARRL Board of Directors, there has been FCC recognition. Through the Official Observer programs our amateur service helps keep itself a self-monitoring and well behaved service. If you can be active in the observation and notice-mailing program and are qualified by experience for Observer duties, drop us or your SCM (address on page 6) your inquiry for more details. *F. E. H.*

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc.)

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

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

The following are the National Calling and Emergency Frequencies for Canada: *c.w.* — 3535, 7050, 14,060; *phone* — 3765, 14,160, 28,250 kc.

NATIONAL RTTY CALLING AND WORKING FREQUENCIES

3620 kc. 7140 kc.

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made on March 18th at 2130 EST. Identical texts will be sent simultaneously by automatic transmitters on 1885, 3555, 7080, 14,100, 21,010, 50,900 and 145,600 kc. The next qualifying run *from W6OWP only* will be transmitted on March 7th at 2100 PST on 3590 and 7128 kc.

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

Code-practice transmissions are made from W1AW each evening at 2130 EST. Approximately 10 minutes' practice is given at each speed. References 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 fist, hook up your own key and buzzer and attempt to send in unison with W1AW.

Date	Subject of Practice Text from January *QST*
Mar. 1st:	*What's Wrong with . . . Receivers*, p. 11
Mar. 5th:	*Sixth Call for Annual Novice Round-up*, p. 18
Mar. 11th:	*The "Happy Accident" Ground Plane*, p. 22
Mar. 14th:	*How To Make a Folding Workbench*, p. 24
Mar. 19th:	*6L6GBs in a 2-Stage Novice Rig*, p. 30
Mar. 22nd:	*A High-Power 50-Mc. Transmitter*, p. 37
Mar. 25th:	*W3LEZ/VE1*, p. 44
Mar. 28th:	*September V.H.F Party — Final Results*, p. 52

You AREC members should be, and probably are, just as much interested in having a good, active EC as is the SEC or SCM. In some cases, maybe more so. We have just concluded some correspondence on this subject which brings to mind a point we have made before but which not many people seem to agree with. Let's try it on you.

The question is this: is an inactive EC better, just as good as, or worse than none at all? Let's face it, we do have some inactive ones. Once in a while a new SCM or SEC wants to "clean house," kick out all inactive ECs and start from scratch. It sounds like a very commendable procedure, but we think it has its drawbacks, the principal one being that there is usually no one to replace the ousted officials. In this case, the question resolves itself into having an inactive EC or none at all.

As any SEC can tell you, there are two steps to appointing an EC. The first is to find someone who will take the appointment, and the second is to get him to do something. Once the first step is accomplished, it wouldn't seem expedient to decapitate it because of inability to accomplish the second — *unless* a qualified man exists who can and will take over. All ECs, whether active or inactive, get frequent reminders from headquarters that they are ECs, in the form of bulletins or prospective AREC members that are referred to them by headquarters or the SCM or SEC — reminders that they should be doing something. There is always the hope that their consciences will eventually get the best of them. If no EC exists, even on paper, and none is in prospect, there is no hope. We think, in this respect, that a "paper" EC is better than none at all.

But we're not implicitly urging SCMs and SECs to appoint any old amateur to an EC position, just so that an appointee can be said to exist. What we are suggesting is that they should scratch around for a replacement before summarily cancelling an existing appointment; and to cancel that appointment only if a suitable replacement can be found.

The AREC member at large also has a responsibility in this respect, in two ways. First, inactivity on the part of an EC may be due to apathy on the part of the AREC members under him; an EC cannot build an AREC out of nothing. Second, AREC members should keep a critical eye on the status of EC activity and be ready to recommend a replacement if one is needed; this includes being ready to take the job yourself, if need be. Don't let's sit around and wait for things to be done for us. It needs doing and is worth doing, so let's get busy and see that it is done.

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We now have further details on amateur activity during the snowstorm emergency which occurred on November 23rd, stolen from the Western Pennsylvania SCM's report. W3KLD, Erie County RO, alerted the net during the state of emergency. W3MMJ operated portable from the c.d. communications center, relieved by W3BRB and W3BFB. Net control was shared by *W3s* LKJ MED and NRL. East of town, links were maintained by *W3s* TLA YLR and LSS, and west of town by *W3s* YWL YWM and FIQ. W3TMK operated mobile at the airport until relieved by the club communication truck, which operated as W3GV/m. W3POS handled traffic on six meters and messages from stranded motorists were handled cross country on 75 meters by W3OIH and W3BUY. Following the emergency, Mayor Gardner of Erie offered the highest praise for the assistance given by amateurs.

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In an auto accident which occurred near Factoryville, Pa., on December 10th, and in which one man was killed and one injured, W3FKJ/m was the first car on the scene. Immediately perceiving the need for an ambulance he contacted his wife (W3GVB) at home, who promptly summoned an ambulance and wrecker to the scene.

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On the Indiana Fone Net on Dec. 21st a plea for a watermelon was made by W9CDW, for a lady given only two weeks to live. The plea was repeated by NCS W9KOY, and fourteen minutes later a melon was located by K9AUI, operating W9AB. Twenty minutes later K9AUI was on his way with the melon from South Bend to Mentone, a distance of about 40 miles through bad rain and fog.

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Amateurs along California's north coast participated in "Operation Quiver," a simulated earthquake exercise on November 8. An emergency two-meter control station was set up at the Santa Clara County communications center in San Jose, the circuit including stations representing San Jose Red Cross, and the cities of San Jose, Los Gatos, Mountain View and Palo Alto. W6CER was the call used at the control station, and W6UW at San Jose Red Cross,

Being physically handicapped does not keep Gordon Moinichen, W6MUJ, from operating mobile. This unique mobile unit is powered by 24 volts of batteries and uses ARC-5 receivers and transmitters on 75 and 40 meters. He also uses a Gonset Communicator for local and c.d. work, and is two-meter coordinator for the Chula Vista area. Yes, the rig really gets out: W6IFRI, EC for Chula Vista, says he has worked him mobile-to-mobile from Arizona and Northern California with good success.

each operated by local volunteer amateurs. The latter group also operated on 3885 kc. Millbrae EC W6WIS reported operation of that City's control station (W6PMN) operated on emergency power on both two and six meters, along with five other stations who were also on emergency power. In Palo Alto, EC W6NMV says the operation went off without a hitch; they had three mobiles in the field and fixed stations at the police department, corporation yard, and city hall, and Red Cross.

SCM W6YHM, who participated from the Santa Clara County control station (W6CER), states that from the amateur standpoint the operation appeared to go fairly smoothly, "although they certainly could have been improved upon" in the matter of operator ability and training, station setup facilities and network and message-handling procedures.

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Several members of the Hoosier Lakes Radio Club (Warsaw, Ind.), along with several other Northern Indiana amateurs, furnished communications for the South Bend chapter of the Sports Car Club of America during a rally held on November 18th. One mobile was used at each of the check points and four base stations were used as relays. Communications were 100% effective, times entered at the final check point within minutes after each car passed check points along the route. Frequency used was 147.30 Mc. This was the first time that the SCCA has used two-way communication, and they were very well pleased with the result. Part of the equipment was furnished by the Kosciusko County Civil Defense unit and part by the South Bend C.D. unit. Fourteen amateurs participated, the longest distance communicated being about 20 miles. — *W9CDW*.

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The AREC of Cuyahoga County, Ohio, in cooperation with the West Park Radiops, handled communications for

the Cleveland Press Christmas parade on Nov. 25th. Two mobiles and two hand-carried units assisted assembly before the parade started, and during the parade five mobiles were used, with parade officials in each car. The lead car was an amateur mobile which paced the parade in accordance with information sent up from mobiles following. Telephone contact through a fixed amateur station was provided for, in case of the necessity for calling police or ambulances. Net control was handled by the last mobile until the end of the parade route, after which the leading mobile took over until the parade was ended. Fourteen amateurs participated in six mobiles and one fixed station. — *W8AEU, EC Cuyahoga County, Ohio.*

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On Nov. 30th the Oak Ridge (Tenn.) Amateur Radio Communications Corps, under the direction of Radio Officer W4CXY, assisted radio station WOKE in making extensive measurements of the WOKE directional array. Mobile units relayed results to the base station, operated by W4RRV, and the alternate control station, operated by W4CXY. Mobile units were also stationed at Clinton and near Oliver Springs to take measurements and relay to base. A total of six amateurs participated in the exercise. — *W4CXY.*

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On Dec. 5th the top c.d. officials for the city of Palo Alto (*Calif.*) called a surprise *simulated emergency* test. It was secret and key men were then called to the City Hall and given the conditions of the test (Police Dept., Fire Dept., Utilities and Medical). These men, in turn, branched out word by land line through their pre-organized departments aud each person was required to check in at his predesignated station. We had fixed stations at each location and times of reporting and conditions of readiness were forwarded from these stations to City Hall net control. Drill lasted two hours and it was a hot one. — *W6NMV, EC Palo Alto, Calif.*

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We had November reports from 21 SECs, representing 5573 AREC members. This beats the November 1955 record all hollow, when we had only 12 reports on file. One newcomer, the SEC for Southern New Jersey, put in an appearance, bringing to 35 the number of sections heard from in 1956. Other reports were received from the SECs of Ontario, Georgia, E. Florida, Alabama, San Joaquin Valley, W. N.Y., Tennessee, Washington, Colorado, N. Carolina, New Mexico, Montana, N. Y. C.-L. I., Santa Clara Valley, Oregon, E. Penna., Connecticut, Wisconsin, Md.-Del.D. C. and Nebraska. A good month for reporting, gang!

RACES News

Both FCDA and ARRL get frequent requests from amateurs wanting to know whom to contact to get information on how to get organized for RACES. Usually, we refer such inquiries to the local radio officer, if known, or to the local EC, if no RO or his identity is not known to us — or both, if both known. Quite a few amateurs seem to have the impression that signing up in RACES is like signing up in the AREC — you just get a form from headquarters, fill it in, give it to some particular person, and you're in. Not so. In the first place, you can't sign up in RACES unless RACES exists, and it can't exist unless your civil defense has organized it locally. Usually, this is up to local amateurs — that is, theirs is usually the responsibility for initiative. Without it, c.d. directors are likely to rely on telephones or existing radio services such as police, fire, taxicabs, etc., not even being aware that such a service as RACES exists, or that amateurs are good for anything in particular.

One man who can always be relied upon to steer you right in your RACES ambitions is your state RACES radio officer. Forty-two states, two territories, three FCDA regions and the District of Columbia now have RACES plans approved by FCDA, a very few of these still pending at FCC. Many state civil defense offices have printed forms which outline the particulars needed to tie the community into the state organization, and other information useful for local organization. So if you are interested in RACES, write your state radio officer, care of your state civil defense office (usually at the state capital), or at his callbook address. The calls listed herewith are the ROs' personal calls if we know them.

State	*Radio Officer*	*Call*
Alabama	Lawrence J. Smyth	W4SX
Alaska	James R. Heay	KL7TI
Arizona	Richard L. Wilhelm	W7MWQ
Arkansas	George Jewett	W5TIE
California	J. H. Grubbs	W6VYE
Colorado	Quentin Fuller	WØWIR
Connecticut	Pete DeBruyn	W1LKF
Delaware	Roy Belair	W3IYE
Florida	Arthur Melvin	W4UHY
Georgia	A. J. Farr	W4TJS
Idaho	William Dean Mayes	W7MKS
Illinois	Jack Stanton	W9PSP
Indiana	William O. Nelson, Jr.	W9ZKX
Iowa	Duane Farris	
Kansas	Kenneth Lee	WØKXB
Louisiana	E. B. Hazelwood	W5IUG
Maine	Donald Dean	W1BYK
Maryand	Karl Volkmar	W3JE
Massachusetts	Ray Boardman	W1BL
Michigan	Francis Gary	W8GJH
Minnesota	Arthur Lane	WØDKN
Missouri	Walter Gorg, Jr.	KØCTG
Montana	B. K. Rush	W7GFT
Nebraska	Francis B. Johnson	WØJDJ
Nevada	George B. Criteser	W7ZT
New Hampshire	William E. Goldthwaite	W1BXU
New Jersey	Lloyd H. Manamon	W2VQR
New Mexico	Francis Gormley	W5KWR
New York	Vincent T. Kenney	W2BGO
North Carolina	Col. W. H. Jacobs	W4CVQ
Ohio	George Young	W8ZQX
Oklahoma	Claude Gardner	W5AGM
Oregon	Leo A. White	
Pennsylvania	Robert Blackburn	W3MPO
Rhode Island	Richard Cordin	W1NZR
South Dakota	Myron Jones	WØOXC
Tennessee	Harry Carroll	W4DDF
Vermont	Valentine C. Morehouse	
Virginia	William E. Sampson, Jr.	W4NAD
West Virginia	John Davies	W8HZA
Washington	Eugene Dodge	W7BTV
Wisconsin	Theo. Kennedy	W9UFX
Wyoming	John T. Roberts	
Region 4	Don Blashfield	W8YAN
Region 5	Clarence Phillips	W5BVB
Region 6	Gene Stewart	WØWBC
Washington, D. C.	Walter C. Lockhart	W3PWB
Hawaii	Samuel H. Lewbel	KH6AED

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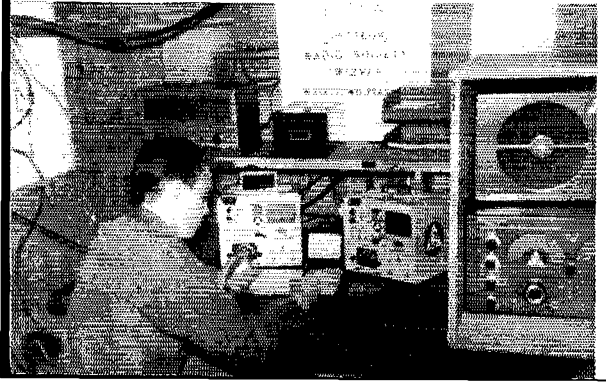
Erie County (N. Y.) Civil Defense has 297 certified amateur radio operators who have conducted drills on the first and third Thursday of each month for the past three years. The present Erie County network consists of 88



The Pequossette Radio Society's station, W1ZVI, has had its RACES authorization for three years, and has participated in all RACES tests and drills, national and local, during that time. At left is W1HUB at the Society's 2 and 6 meter operating position.

fixed stations on 6 and 2 meters. All fixed stations can be operated on emergency power as required. The county has provided equipment costing approximately $110,000 for use in RACES. We believe we have one of the finest RACES organizations anywhere in the United States today. — *W2PPY, RO Erie County, N. Y.*

TRAFFIC TOPICS

Last month we entered here a tirade against sloppy phone practices in traffic handling. This month it's c.w.'s turn. Did you think we were just proving the oft-expressed allegation that the League was anti-phone? Not so. The c.w. operator can do just as good a job of lousing up a message — and for nearly the same reason. Where so many phone operators cannot speak the English language properly, just as high a percentage of c.w. operators cannot speak the Continental Morse Code language properly.

We think there are several reasons for this, but they all boil down to a basic reason — sloppiness. Lack of spacing between words is a very common failing, even among some of the best c.w. operators. There is absolutely no excuse for this. Any operator can lift his key long enough to leave a space between words or groups, if he can send at all. Failure to indicate proper spacing can cause confusion in message checks, mistakes in addresses (some of them even confirmed by the sending operator!) and louse up signatures. Spacing is just as important in words, where many of us send P for AN, L for AI, F for IN, and any number of combinations. Usually the context makes the intent clear, but not always by a long shot. We have but to be a little careful to get away from these sloppy habits.

Beginners are too prone, today, to graduate too quickly to semi-automatic (bug) or electronic keys, thinking that this is easier than learning on the old pump-handle. What they don't know is that you have to be mentally imbued with what perfect sending sounds like before you can imitate it. You have to learn to crawl before you can walk, and to walk before you can run. Beginners on semi-automatic keys are terrible, on electronic keys hideous, without first starting out slowly on a straight key. No one who cannot send well on a bug can send any better on an electronic key; in fact, it's usually worse. Those who can do a good bug-sending job often goof up pitifully when they tackle the electronic key until they have mastered it, and even then their sending is really not better; it is just divorced of a personality. Not all of us have the muscular coordination and reflexes necessary to produce perfect sending; in fact, very few of us have. But we all can put in spaces, with a little practice, at the proper places and proper lengths, and this is just as much a factor in good sending as character formation. In transmitting traffic this is particularly important, because this is intelligence which must be relayed to an addressee.

It is natural to look for any easier way to do things, but good sending, like good talking, comes from the brain, not from the fist. If your brain produces it correctly, then it's up to your fist to do its best to reproduce it correctly. Let's face it, fellows, there is no easy way. Traffic garbling is just as much a result of poor sending as it is poor receiving ability, failure to confirm or get fills, inability to read your own writing, QRM, QRN, QSB or all the rest of it. And we could so easily eliminate most of this if we'd just be a little bit more careful in our sending.

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for December traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W2KEB	103	2443	1505	611	4662
W3WIQ	249	1673	1720	118	3760
W3CUL	256	1641	1501	193	3591
W7BA	24	1345	1293	46	2708
WØBDR	56	1223	1145	11	2435
W7PGY	68	1167	1035	128	2398
W9JYO	479	869	763	50	2161
W3ZSX	421	784	693	46	1944
WØSCA	16	953	937	1	1907
WØPZO	1	810	779	18	1608
W4NTR	30	783	767	16	1596
WØLCX	133	720	699	21	1573
WØCPI	15	750	675	75	1515
W2KFV	2	773	553	114	1442
W9DO	77	625	666	36	1404
W3PZW	18	662	632	30	1342
WØLGG	50	657	577	22	1306
W9NZZ	307	492	0	484	1283
W9MAK	72	595	473	70	1210
W7FRU	6	597	551	42	1196
W6GYH	889	100	143	6	1138
W7VAZ	17	561	511	48	1137
W6DDE	4	548	466	82	1100
W9EQO	7	531	529	10	1077
W9CXY	8	535	523	9	1075
W8UPH	42	514	379	115	1050
W1LDE	21	486	447	27	981
W8ELW	13	477	456	15	961
W9YYG	95	430	315	96	936
W9EHZ	80	377	336	65	858
W7APF	3	425	419	1	848
W5DTA/5	16	407	378	45	846
W4COU	37	402	311	38	788
WØBLI	7	389	373	4	773
WØCZ	43	346	323	22	734
W3UE	20	345	348	9	722
W5DRZ	111	305	261	38	715
K2IYP	20	316	289	44	669
W4PL	3	336	294	31	664
W1EPE	6	328	274	52	660
K6MON	3	319	250	64	636
W7TLC	57	281	217	74	629
KØBCQ	1	312	307	5	625
W4OGG	6	311	280	26	623
WØGAR	9	299	296	12	616
W9JOZ	19	297	287	10	613
W6BPT	4	294	274	20	592
K2AMP	71	246	236	9	562
WØSCT	34	266	251	4	555
W9KJJ	24	247	243	37	551
W2BXP	11	299	221	16	547
WØBJP	8	266	264	2	540
K5AOV	48	243	236	3	530
W2JOA	307	163	33	26	529
WØGXQ	21	259	205	36	521
W3RV	82	217	213	4	516
W9TT	11	267	173	60	511
W4FPC	12	42	418	37	509
WØOMM	18	236	179	75	508
W2YRW	10	230	195	70	505
W4PJU	12	246	194	52	504
Late Reports:					
W2KEB (Nov.)	57	1665	836	656	3214
W2KFV (Nov.)	7	556	388	253	1204

More-Than-One-Operator Stations

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
KH6AJF	260	402	503	402	1567
KH6QU	62	702	60	80	904
K5FFB	127	228	473	9	837
K7FAE	258	154	349	63	824
K3WBJ	294	262	221	41	818
K7WAT	18	384	359	23	784
K7FEA	165	305	252	3	725
KØFFI	53	240	262	3	558
K5WDB	62	233	217	16	528

BPL for 100 or more *originations-plus-deliveries;*

KH6BQS	290	W2NOC	127	W8DAE	109
K2WAO	281	W5CF	127	WØMHS	109
W6BHG	238	W9KTX	125	K2PHF	107
W1DLS	183	WØKJZ	122	K4AIS	106
K5AEX	154	WØJHY	121	W9WTY	106
WØZWL	147	WØKLG	119	W1YBH	105
WØLQC	146	W3PQT	118	W9BKJ	105
W3BNR	144	W9SVL	118	K2EDH	101
VE3DPO	144	W2JGV	117	K2EQP	101
W8HNP	139	W6GQY	117	W7AHV	101
W9DGA	139	K2BWQ	115	W4DDY	100
WØNIY	138	W8GFE	114	K4EFV	100
W6CMN	135	W3FCI	110	Late Report:	
KP6AK	131	W4HON	109	W3CVE	186
W3AFF	128				

More-Than-One-Operator Stations

W1NBD	214	K8NAW	100	W3YDX	125

Late Report: K6FCY 117

BPL medallions (see Aug. 1954 *QST*, p. 64) have been awarded to the following amateurs since last month's listing: W1LDE, W2YRW, W6BHG, WØKJZ.

The BPL is open to all amateurs in the United States, Canada, Cuba, and U. S. possessions who report to their SCM a message total of 500 or more, or 100 or more originations-plus-deliveries for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt, in standard ARRL form.

Miscellaneous net reports of December activities: Transcontinental Phone Net reports traffic totals as follows: First Call Area, 1723; Second Call Area, 2016; combined Fourth, Ninth and Tenth Call Areas, 757; total, 4496. The Interstate Side Band Net handled 690 messages in 31 sessions, averaging 42 stations and 90 minutes per session; the net covers from 15 to 20 states. The North Texas-Oklahoma Net conducted 31 sessions, had 1120 check-ins and handled 418 messages. The Early Bird Transcontinental Net handled 1271 messages. The Eastern States Net garnered 985 pieces of traffic with 60 stations participating.

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National Traffic System: Unk Sam's mails (and your reporter as well) are being kept pretty busy these days, with arguments pro and con the various proposed changes in the NTS setup on the books. The thing that impresses us most is that so many of the correspondents seem to feel that if changes are made as a result of all this discussion, all NTS nets forthwith will be *required* to make them, whether it's convenient, practical or not. If this is the way NTS operates, most of its nets would long ago have been kicked out of the system.

Let's get it straight. The National Traffic System Plan is a master plan to effect systematic flow of traffic between and among section nets. It calls for section, regional and area net meetings at certain times and in a certain order. It also has a Transcontinental Corps setup which designates certain stations (by letters, to be filled by different specific stations with alternates each night of the week) to perform certain functions at certain times. The Plan in itself is the ideal at which we are aiming. The practical operation of the plan is usually some distance from the ideal. Some NTS adherents say that the 2200 section net should be abandoned as an ideal because it has not been successfully implemented. Some say that we should have a session of the regional nets before the section nets meet to begin the evening. Others say that it is impractical to aim at specific times, that all that is necessary is proper chronology of net meetings. When these proposals are to change the basic setup accordingly, we have to pose them and get opinions, then make the changes if they seem indicated.

The procedure is then *not* to cram the changes down everybody's throat. We'd like all NTS nets to fill the prescribed schedules, and we'll continue to urge that they do so, but we don't demand anything. NTS is not an autocracy. The best you can do is the best you can do. Any changes in the setup are changes in the ideal system we are aiming at, mostly for the purpose of eliminating impracticalities.

December reports:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation*
1RN	49	503	0.66	10.2	84.3%
2RN	52	563	0.84	10.8	94.9%
3RN	39	373	0.73	9.6	75.2%
RN5	62	1961	1.36	31.6	77.2%
RN6	41	552	0.75	13.5	58.7%
RN7	45	268	0.42	6.0	34.5%
8RN	38	232	....	6.1	84.2%
9RN	61	1562	1.09	25.6	90.6%
TEN	93	2705	....	29.0	69.6%
ECN	20	144	0.67	7.1	83.3%[1]
EAN	24	1252	1.97	52.1	96.5%
CAN	31	2035	1.60	65.6	100%
PAN	31	1468	1.61	47.4	100%
Sections	655[2]	6460			
TCC (Eastern)	34[3]	303			
TCC (Central)	..	2429			
TCC (Pacific)	127[3]	1342			
Totals	1241	24152	EAN	16.2	CAN/PAN
Record	1241	24152	2.63	23.5	100%
Late reports:					
8RN (Nov.)	40	140	....	3.5	88.3%

[1] Regional net representation based on one session per night. Others are based on two or more sessions.

[2] Section nets reporting: OSN (Ont.); PQN (Que.); CN & CPN (Conn.); AENB, AENP & AENT (Ala.); TLCN (Iowa); Iowa 75 Phone; WVN (W. Va.); KPN & KYN (Ky.); SCN (Calif.); GSN (Ga.); S. Dak. 40M Noon; S. Dak. 75 Meter; QKS, QKS SS & QKN (Kans.); ILN (Ill.); TN/TENN (Tenn.); Tenn. 160; MSN (Minn.); OLZ & SSZ (Okla.); FN (Fla.); WSN (Wash.); Colo. SS.

[3] TCC schedules reported, not counted as net sessions.

W2ZRC says that the 1845 session of 2RN is working fine. 3RN also started a session at 1845 and is having good success. Both of these nets have discontinued the session at 2130. W6PLG has received his RN6 certificate, and K6DYX has been appointed assistant RN6 Manager. VE7ASR has resigned as RN7 Manager and W7WAH has taken over temporarily. K9BBO has earned his 9RN certificate. WØKJZ wants to know if she is fired, now that her "year is up." What do you think? W9DO is very pleased with the work of the CAN boys.

Transcontinental Corps: Central Area Roster: WØSCA, WØBDR, WØLGG, WØDQL, WØKJZ, W9DO, W9CXY. *Pacific Area Roster: W6s* BPT ADB YHM GJP VZT RFW IPW EOT REF ZRJ, *K6s* DYX GZ EHT ORT, *W7s* FRU GMC APF UJL, *WØs* ENA KQD DML.

Here's an old timer that many will remember as the SCM of Eastern Florida in 1955–56, Art Benzee, W4FE. Art originally hails from Buffalo, N. Y., and got his first ticket in 1915 as 8MM and later as 8FE. Still an Eastern Florida EC appointee, you will hear him most on 10 and 75 meters.

W1AW OPERATING SCHEDULE

(*All times given are Eastern Standard Time*)

A printed local map showing how to get to W1AW from main highways or from the Hq. office will be sent to amateurs advising their intention to visit the station. Also, master schedules showing complete W1AW operation in EST, CST or PST will be sent to anyone on request.

Operating-Visiting Hours:
Monday through Friday: 1500–0300 (following day).
Saturday: 1900–0230 (Sunday).
Sunday: 1500–2230.

Exception: W1AW will be closed from 0300 April 19th to 1900 April 20th in observance of Good Friday.

General Operation: Use the chart on page 77, Nov. 1956 *QST* for determining times during which W1AW engages in general operation on various frequencies, phone and c.w. Note that since the schedule is organized in EST, certain morning operating periods may fall on the evening of the previous days in western time zones. W1AW will participate in all official ARRL operating activities, using scheduled general operating periods for this purpose if necessary.

Official ARRL Bulletin Schedule: Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules:

Frequencies (kc.):
C.w.: 1885, 3555, 7080, 14,100, 21,010, 50,900, 145,600.
Phone: 1885, 3945, 7255, 14,280, 21,330, 50,900, 145,600.
Frequencies may vary slightly from round figures given; they are to assist in finding the W1AW signal, not for exact calibration purposes.

Times:
Sunday through Friday: 2000 by c.w., 2100 by phone.
Monday through Saturday: 2330 by phone, 2400 by c.w.

Code Proficiency Program: Practice transmissions are made on the above listed c.w. frequencies, starting at 2130 daily. Speeds are 15, 20, 25, 30 and 35 w.p.m. on Monday, Wednesday and Friday, and 5, 7½, 10 and 13 w.p.m. on Sunday, Tuesday, Thursday and Saturday. Approximately ten minutes of practice is given at each speed. *Exceptions:* On March 18th and April 16th W1AW will transmit ARRL Code Proficiency Qualifying Runs instead of the regular code practice.

SUPPLEMENT TO NET DIRECTORY

The following list of nets will supplement and correct the listings on page 79, Nov. 1956 *QST*, and page 74, Jan. 1957 *QST*. Please inform us of any errors or omissions so that they can be included in the final May *QST* installment. An asterisk (*) indicates correction from previous listing; otherwise, the listing is of a net not previously listed. Most of these nets are not included in the cross-indexed master ARRL Net Directory and should be added thereto. All nets registered through January 17, 1957, are included.

Note: ARRL lists of nets are for *information only*. They do not carry any official significance. Nets are registered as closely as possible in accordance with information given by the registrant.

Name of Net	*Freq.*	*Time*		*Days*
Belmont County Emergency Net (Ohio)	29,600	2100	EST	Mon.
Bryan County Okla. A.R.E.C. Net	7210	1400	CST	Sun.
Calif. Civil Defense Net (CCDN)	3501 7090	1930	PST	Mon.
Central Illinois Emergency Net (CIN)*	1815	0830	CST	Sun.
Chattanooga Amateur Radio Emergency Net*	29,600	2100	EST	Sun.
Chattanooga Area 6 Meter Net	50,400	2100	EST	Tue.
Conn. Nutmeg Net (CN)*	3640	1845 2200	EST EST	Mon.-Sat.
Egyptian-St. Louis Net	29,640 53,640	0800 1700	CST CST	Daily Daily
Evergreen Emergency Net "AREC"	7175 51,000	1930 1830	PST PST	Tue. Tue.
First Regional Net (1RN)*	3605	1930 2130	EST EST	Mon.-Sat.
Framingham (Mass.) Radio Club Emergency Net	28,700	2045	EST	Wed.
Framingham Radio Club Two Meter Net (Mass.)	145,350	1930	EST	Wed.
Iowa Tall Corn Net (TLCN)*	3560	1830	CST	Mon.-Sat.
Kansas 75 Meter Phone Net (KPN)*	3920	1230 0800 0630 1830	CST CST CST CST	Tue., Fri. Sun. Wed. Thu.
Kansas Slow Speed Net (QKS SS)*	3610	1830	CST	Sat., Sun.
Mercer County (Pa.) General Discussion Net	29,520	0930	EST	Sun.
Missouri State Civil Defense Net	3993	0900	CST	Sun.
North Alabama 6-Meter Emergency Net (AENO)*	50,550	1915	CST	Mon., Wed., Fri.
North Carolina Net (NCN)*	3700	1900	EST	Mon.-Sat.
North Texas Emergency Net (NTEN)	3930	0800	CST	Sun.
North Texas-Oklahoma Net (NTO)*	3960	1730	CST	Daily
Ohio Emergency Phone Net*	3860	1800	EST	Thu.
Ohio Phone Net	3860	1700	EST	Mon.-Fri.
Orlando Amateur Radio Club CD Net	29,520	2000	EST	Tue.
Second Regional Net (2RN)*	3690	1845 1945	EST EST	Mon.-Sat.
South Carolina Fone Net	3930	1930	EST	Mon.-Fri.
Tenth Regional Net (TEN)*	3545	1700 1945 2130	CST CST CST	Mon.-Sat. Daily
Third Regional Net (3RN)*	3590	1845 1945	EST EST	Mon.-Fri.
Tuscaloosa County AREC Net (AENL) (Ala.)	3925	1430	CST	Sun.
West Park Radiops Emerg. Net (Ohio)	29,520	2200	EST	Mon.
Western Pennsylvania Mobileers Net	29,360	2000	EST	Wed.

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Station Activities

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

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, Clarence Snyder, W3PYF—SEC: NNT. RM: YAZ. PAM: TEJ. EPA nets: 3610 and 3850 kc. The flood of holiday traffic gave a good workout to all the nets in the section. CUL continues to lead the traffic-handlers with a total this month of 3591. ZSX is second with 1944. QLZ is active again on EPA after an absence of a year and is sporting a new trap antenna. The Frankfort Radio Club held a joint meeting with the Potomac Valley Radio Club in Washington on Jan. 27th. UQV, FCC R. I. for the area, was speaker at a recent meeting of the North Penn ARC. DHJ is now vice-president of both the North Penn and Phil-Mont Clubs. The mobile communications trailer of the Phil-Mont Radio Club is now operating and available for emergency service. YAZ reports that there is good cooperation between EPA and 3RN through UE. AN has reorganized again. New officers of the TARC are ZRQ, pres.; RZV, vice-pres.; FJJ, treas.; J. Latenzi, secy.; J. Blihar, act. mgr.; and Dr. Joseph J. Flannagan, chaplain. KJJ is working DX on 80-meter c.w. QLI is active again on all bands from his new QTH at Ardsley. PDJ is now QRA at Springtown after completing three years in the Army counter intelligence. RFI now is at Penn. State. RCE has a full kw. and a beam on 20 meters. New officers of the Pottstown ARA are Dr. Ray Wallick, pres.; HOG, vice-pres.; ZVY, secy.; YDY, treas.; and FXX, act. mgr. ZVY reports the club meets the 1st and 3rd Tue. at the Hill School Science Library. New officers of the Carbon Amateur Radio Club are AMC, pres.; WJY, vice-pres.; AIW, secy.-treas.; and COW, act. mgr. The 807 Society of Central High School in Philadelphia has purchased equipment and is getting a station license. EMD reports that activity will be on 80 and 40 meters. Members of the Tamaqua ARC are making a club project of helping a muscular dystrophy victim in their area to get his license. JRO has headed to WØ-Land after returning from a tour of duty in Saudi Arabia, where he operated HZ1AB. AFF, BNR, CFI and YDX join the E. Pa. BPL group this month. BNR is a new OBS for 2 meters. UQJ has a new six-element wide-spaced 50-Mc. beam. SST, OCI, OWW and AJD are on 430 Mc. in the York Area. BFB is chairman of the Delaware Valley Area of QCWA. He invites old-timers to contact him for membership. Traffic: W3CUL 3591, ZSX 1944, TEJ 303, BNR 280, YDX 241, EMD 222, AFF 198, BFF 180, ZRQ 160, FCI 146, NF 120, PYF 68, BBM 65, AXA 61, CSP 25, NQB 25, SMC 20, PDJ 16, QLZ 14, PVY 13, CNO 10, BUR 9, DJL 4, ADE 2, BES 2, YUW 2.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—SCM, John W. Gore, W3PRL—The Delaware Kent Co. Amateur Radio Club graduated 5 members from its Novice classes. EEN, SPL, WKG and ZZY are busy working up a 6-meter net in Dover, Del. ZEU has a Johnson Valiant to go with his 75A-4 and 90-ft. tower. CVE soon will start c.w. code practice on AREC PG drills. YTW reports that the Baltimore Polytechnic Institute Amateur Radio Club, CDI, has just completed its 300-watt 813 transmitter and is using it on phone and c.w. from 10-80 meters. The club also has a new Gotham three-element beam. DNW is getting a Ranger and has secured a rotor for his 10-meter beam. BUD has been keeping FB schedules with VQ2 and TF2 stations. CRB is getting exceptional results with 33 watts on 80- and 40-meter c.w. with a 66-ft. Marconi antenna. WV reports a short chance to rest at Young Radio Central because of PZW and 5RVI/3 being home. PZW is collecting parts for a single 4-400A band-switching kw. to work DX. UE reports that the 3RN Net now operates on 1845 and 1945 EST, the 2130 session having been cancelled. JZY still is working DX but reported tough going over the holidays. EOV reports the Conelrad unit is in operation. Although many stations do have Conelrad units in operation, it should be brought to the attention of all that it became a definite requirement as of Jan. 2, 1957. RV reports that he is back on the air and now has a Viking Valiant and an HRO-60. QIG reports that ZBG has been nominated the DX King of Colesville, following his performance during a DX outbreak on 40 meters the night of Dec. 15-16. The report also includes a notation that ZQ is keeping a regular schedule with KC4USA, and that QIG is working out FB on 15 meters with a ground-plane antenna and presently is building a modulator for his hard-working 807 final. The report further stated that the Weather Bureau hams have a rendezvous at 2130 Wed. on 7056 kc. At its meeting on Dec. 14th the RCARA presented a movie, "Voices Under the Sea." The BARC at its meeting Dec. 3rd heard 1VLH, of ARRL Headquarters, who presented an overall picture of the IGY program and the assistance that radio amateurs could give to contribute to the program. PRL discussed "TVI, Its Causes and Cures," at the CARC on Dec. 10th. HWZ has completed the "poor man's signal slicer" described in Dec. *QST*. We understand that JZY also will add one of these slicers to his station. SZW is progressing slowly but thoroughly on his new 1-kw. final. IPO, who has been checking in on the Cracker Barrel Net quite regularly on 28,600 kc., reports experimentation with some degree of success in using his 10-meter beam for 15 as well as some of the lower frequencies. SG has reported FB results on 10

(Continued on page 86)

SECOND DELAWARE QSO PARTY

The Delaware Amateur Radio Club of Wilmington announces the 2nd Delaware QSO Party and invites all amateurs to participate. Delaware hams are urged to work as many out-of-state stations as possible, so that those interested can earn credit toward WAS and the W-DEL certificate. Here are the details:

(1) Time: 6 P.M. EST, March 16th to midnight EST, March 17th.

(2) No time limit and no power restrictions.

(3) Scoring: *Delaware stations:* 1 point per contact and multiply total by the number of states, U. S. Possessions, Canadian provinces and foreign countries worked during the contest period. *Outside stations:* 5 points for each Delaware station worked and multiply total by the number of counties in Delaware worked during the contest period.

(4) Credit for contacts with the same station on another band will be given.

(5) A certificate will be awarded to the highest-scoring station in each state, U. S. Possession, Canadian province and foreign country, and to the highest-scoring station in each Delaware county. In addition, a W-DEL certificate will be sent to any station working all 3 Delaware counties. Party logs showing required data will be accepted in lieu of QSLs. (Only QSOs made after May 1, 1956, count for W-DEL.)

(6) Watch 3700, 3905, 7030, 7275, 14,100, 14,250, 21,100, 21,400, 28,100 and 29,520 kc. and the v.h.f. bands for contest stations.

(7) General Call: "CQ DEL." Delaware c.w. stations should identify themselves by signing *de DEL (call) K*. Phones say, "Delaware calling."

(8) Contact information required: Delaware stations send number of QSO, RST or RS and county. All others sent number of QSO, RST or RS report, and state, possession, province or country.

(9) Logs and scores must be postmarked not later than April 1, 1957, and should be sent to the Delaware Amateur Radio Club, c/o C. D. Justis, W3EEB, 315 First Ave., Newport, Delaware.

MODERN DESIGN

EVERY OLD TIMER can remember the days when amateur radio was largely a "do-it-yourself" project. Some pieces of equipment could be purchased ready made but practically any skilled amateur could turn out better gear at home, and there were almost as many different types of equipment in use as there were amateurs.

THOSE DAYS ARE GONE forever. With the ever increasing complexity of modern equipment, and particularly since the wide adoption of single side band operation, the average amateur can no longer hope to produce at home the kind of gear he needs to compete in today's crowded bands. Even if he has the technical know-how (which many do have), the necessary tools and laboratory equipment are beyond the reach of all except the fortunate few.

THE JOB OF DESIGNING and producing today's amateur gear has become a cooperative effort requiring the most modern facilities and the best engineering talent available. At Hallicrafters there are over 350 engineers, a large percentage of them active amateurs engaged in trying out promising new ideas, developing circuits, and designing new gear. It probably would be a shock to most of us to find out how few of these promising ideas actually stand the test of laboratory investigation, development, and design. And even more shocking to learn how few ever finally appear as new models.

LAST YEAR, for example, we had one of these pages ready to print. It described a very ingenious new way to generate single side band signals which had been developed in Hallicrafters' laboratory. Extensive development work had been completed but then one of our engineers who had been working along a similar line came up with a much better and easier way to do the same job. There was only one thing to do — discard the months of effort already invested and concentrate on the better way. Today this better way is fully developed and operating in the HT-32 exciter/transmitter.

IT STANDS TO REASON that a group of trained engineers who are also enthusiastic hams, provided with the finest of laboratory instruments and anything they may desire in the way of tools and materials, will always come up with equipment that is far superior to anything the individual experimenter could produce. Perhaps you would like to see how it is done. Visitors are welcome at W9CGC, our club station, located at the main Hallicrafters plant in Chicago. You may find us in the middle of investigating new and better ways of doing some familiar task or you may get a look at a new communications receiver or transmitter in the final stages of development. We cannot promise what you will see, but we can guarantee that it will be interesting. Come and see us.

73

CY READ, W9AA

Bill Halligan Jr. W. J. Halligan W9AC for hallicrafters

and 11 meters with his 50 watts from a converted BC-457. The Washington Mobile Radio Club has initiated an excellent program for the coming year. This club meets the third Wed. of each month and also has an on-the-air meeting the first Wed. of each month on 29.520 Mc. at 8 P.M. The WRC visited the studios of WRC-TV in the Sheraton Park Hotel on Dec. 21st. A tour of the complete installation was held, with HN as M.C. After the tour, the group journeyed to the "Hot Shoppe" for a Christmas party. At the regular December meeting, ECP gave a talk on Conelrad regulations and presented diagrams of circuits which might be used. He demonstrated the Conolette which appeared in *QST*. At the Dec. 7th meeting the Hammond Atlas was won by WN3CDN. The WAYLARCs, of Washington, held a business and social evening on Dec. 14th at the Naval Gun Factory Officer's Club. Traffic: (Dec.) W3PZW 1342, K3WBJ 818, W3UE 722, RV 516, ZGN 264, UCR 146, PQT 139, TN 65, BUD 62, PRL 58, COK 50, PQ 48, W5RVI/3 43, W3WV 36, DNW 34, EOV 31, SPL 28, JZY 9, YTW 4, CRB 3. (Nov.) W3CVE 283, TN 77, PQT 28.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—SEC: YRW. PAM: ZI. Appointment of the month: K2MBD, Magnolia, as ORS. K2WAO and YRW have made BPL for the fourth consecutive month. K2WAO is now operating 2 meters in addition to his 75-meter skeds. RG has added VP2AH to his list of transistor DX. K2JGU, Glassboro, has a new home-brew trap coil antenna that works FB. LS, Pleasantville, continues to report many new out-of-band discrepancies. K2PTJ, SJRA secy., and his XYL, KN2-THX, are now regular traffic-handlers on the Delaware Valley Traffic Net. The SJRA's Christmas Party was a big success with many OMs, XYLs and YLs attending. Achievement Awards were presented to K2HHO, K2MIO, JAV and TBD. Burlington County Radio Club officers for 1957 are K2BG, pres.; K2HOB, vice-pres.; K2DAP, secy.; and EVR, treas. The Collingswood High School Radio Club elected the following officers; K2MIU, pres.; K2MIS, vice-pres.; K2MZO, secy.-treas.; and Tom Parr, corr. secy. BUI has a tri-band beam that works FB. CAG is now KØEXT. K2KTS has a new beam and is looking for DX. He also needs Vermont for WAS. The Maple Shade C.D. Headquarters station, signing KHW/2, is holding regular drills with a fine staff of local operators assisting. AREC and RACES activities are increasing, with many applications being received by the ECs and Radio Officers. ZX has made DXCC on phone. SDB contributes "DX Activities" to the SJRA Club paper, *Harmonics*. NJN (80-meter traffic net) manager MLW has turned the net supervision over to BRC. This section's members are BZJ, K2DSL, K2EFA, K2EWR, GIW, HDW, K2MBD, RG, ZI and K2BG. K2QOL passed his General Class exam and has a 100-watter all set to go. BAY is now operating 2-meter mobile. Reports are solicited from clubs not reporting. Traffic: W2NRW 505, K2WAO 390, W2RG 268, K2EWR 265, W2HDW 194, K2JGU 122, W2BZJ 94, ZI 85, K2PTJ 66, KN2THX 23, K2DSL 12, HPV 5.

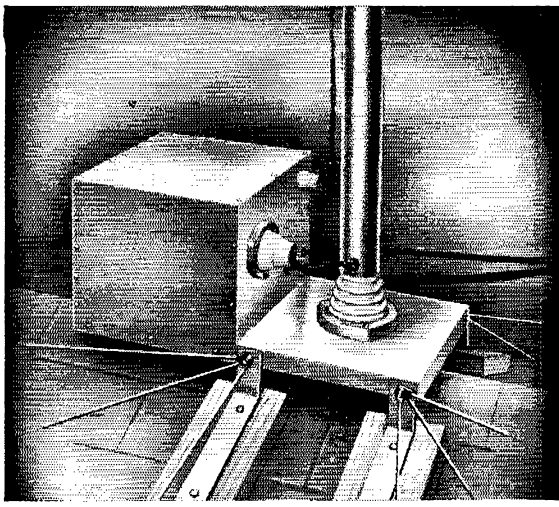
WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: UTH/FRL. RMs: RUF and ZRC. PAMs: TEP and NAI. NYS C.W. meets on 3615 kc. at 1800, ESS on 3590 kc. at 1800, NYS Phone on 3925 kc. at 1800, TAR on 3570 kc. at 1700, NYS C.D. on 3509.5 and 3993 kc. at 0900 Sun., TCPN 2nd call area on 3970 kc. at 1900, SRPN on 3980 kc. at 1000, LSN on 3970 kc. at 1600. EMW made a 1-hr. 20-min. WAC on 20 meters one afternoon. K2BUI got his WAS certificate in just six weeks; he is now working on 80-meter WAS. K2KTK was heard 200 miles away while running 12 millawatts with a "TR" transmitter. K2CEH is building a pair of 826s for 6 meters and a 4x150 modulated with 811s for 220 Mc. The NYSPE&T elected COB net mgr., BKC asst. mgr., and K2IYP secy. K2PVN lost his 2-meter long Yagi and is going to put it back at the 60-ft. level. The Niagara RC Christmas Party was a huge success with more than 30 in attendance. QNA is on 220 Mc. with a 5-over-5 antenna. HNN is on s.s.b. with a new Pacemaker. K2HRB now has 38 states on 6 meters. UTH has made several cross-band contacts on 6 and 10 meters with Gs, EI, and GDs. K2ITN still is looking for fellows interested in 10,000 Mc. TCC is building a 500-watt linear. K2JAE jumped from 3000 points last year to 53,000 points this year in the Sweepstakes. YNZ loaned the Sherburne H.S.RC two code machines, and five General Class tickets are on the way. Club station ZIX has a Harvey Wells transmitter and a BC-348 receiver. K2JZT is getting a Valiant. Sidney ARC elected UPT, pres.; KN2TEE, vice-pres. and treas.; and K2RTN secy. and act. mgr. The Otsego ARC elected VGM, pres.; K2QBL, vice-pres.; SHZ, secy. and K2-DLB, treas. VGM made WAS. SHZ has worked 204 countries with 180 confirmed. He's checking a 10-meter vertical for results at present. The RAWNY held a v.h.f. meeting with LXE as speaker. Erie County has established a c.d. calling frequency of 145.410 Mc. The RAGS had a talk by CRR on Double Sideband Modulation. K2CBQ has chalked up his 62nd country with his low-power 40-meter indoor antenna c.w. rig. OAA is on s.s.b. with a new Pacemaker. ZOL advises all hams to monitor net frequencies when working around the shack in order to be ready to help out if a message comes your way. The following have received net certificates for the NYS Phone Net: KDJ, PVI, and K2s GAT, ITN, JSW, LCT, MDO, PPO and PJU. K2EE has the shortest call in Two-Land. Walt has taught c.w. since 1914. Traffic: (Dec.) K2IYP 669, W2ZRC 335, K2KIR 325, W2OE 151, K2KNV 130, W2COB 72, RQF 66, BKC 61, K2DSR 44, W2DEX 34, FEB 34, K2BUI 25, DG 16, PJU 15. (Nov.) K2KDJ 46, W2BKC 40, RQF 24, EMW 23, K2KTK 22, W2BLO 11. (Oct.) K2KDJ 9.

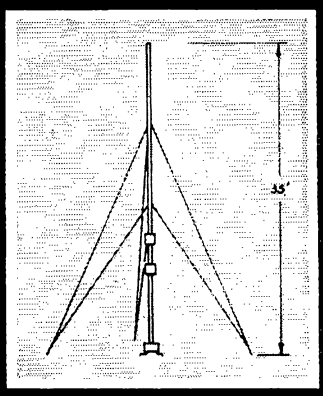
WESTERN PENNSYLVANIA—SCM, R. M. Heck, W3NCD—Asst. SCM: Anthony J. Mroczka, 3UHN. SEC: GEG. RMs: NRE and NUG. PAM: AER. The Indiana Radio Club reports that ADK, who was in an auto accident in mid-December in which he received severe injuries and had his car and mobile outfit demolished, is operating from his home with a complete Collins rig all bands. The Allegheny Kiski ARC reports its regular meetings are well attended. UJP, chief reporter of the Breeze Shooters Net, reports that winners of the latest ground-wave contest were ZWI, PII, KWH, BEX, PON, ECQ and W8s YGW and SPR. FSF has a DX-100. ABW now has a 'scope. QYF retired as director. STB has a new VFO. EUL is continuing vital TVI research. UJP proposes an award for those checking in most regularly. The Washington County ARC elected IDO, pres.; KHY, vice-pres.; WN3GYZ, secy.; Merwin Beall, treas.; UEM, act. mgr. The club is starting the new year with a new constitution and by-laws. New member William Ritchie, USC, is getting back on the air. UEN is recovering from a bad ankle. GTU is now General Class. The Cumberland Valley ARC at a recent meeting discussed Conelrad and designated three stations for monitoring purposes. The starting of code and theory classes and future club program planning was discussed. The Cumberland Valley Amateur Emergency Net, 10 P.M. Sun. on 29.4 Mc., has an enrollment of sixteen members. Eight mobiles now are in service. The Horseshoe Radio Club of Altoona will celebrate its 20th anniversary in March. To all who are working for the WAPC (Worked All Pennsylvania Counties) certificate, the HRC is planning to hold its annual Field Day set-up from a farm in Forest County. The club plans to work Field Day on 40-meter phone and c.w. and promises 100 per cent QSL. KQD and DKH are putting out the club paper, *Hamateur News*. The HRC is printing up gold certificates to be presented to those who work 25 or more HRC members. ZUG and KQD have new three-element beams up and working. DKH, CHN and ZVA have same ready to go up and YOZ has one ordered. ZVA has finished a new kw., new beam and Collins 32V4 and is ready to roll. BTX, who is 12, has his WAC with a Command rig. ZUF has a new Ford station wagon and is putting in his mobile gear. VKD, from Indiana, will show slides of his Caribbean trip at the next club meeting. BZN needs Vermont for WAS. The Radio Association of Erie completed plans for its annual banquet. YKE, serving in the Armed Forces, surprised the Lake Erie Net while visiting LKJ. ZWK has a new beam on 10 meters. RAE nominated FIQ for the Edison Award, for his commendable work in the recent snow emergency. LKJ got a 75A-3 for Christmas. STK and KNQ announce completion of the code and theory class. JOQ and JTF are holding up their end of 6-meter activity. A new Novice, JQV, is FIQ's XYL. Traffic: W3WIQ 3760, BZR 143, YUL 136, KUN 99, UHN 57, LSS 40, YA 39, KNQ 10, YOZ 3.

CENTRAL DIVISION

ILLINOIS—SCM, George T. Schreiber, W9YIX—SEC: HOA. RM: STZ. Asst. RM: MAK. PAM: UQT. Cook County EC: HPG. Section nets: ILN, 3515 kc. Mon. through Fri.; IEN, 3940 kc. When applying for your AREC card, please do NOT send your application to the SCM. If you don't know who your EC is, drop us a card and we will advise. The Joliet Amateur Radio Society dedicated its club and transmitter house recently and entertained more than 350 visiting hams. The Ladies Amateur Radio Klub (correct) observed its fifth anniversary with an open house for Chicagoland amateurs. OCB, a consistent c.w. man, is getting a great kick out of 2-meter phone, but has not lost the knack of operating his bug. PDH finally made good his threat and got on 80-meter c.w., but TVI drove him to opera-

(Continued on page 98)





Viking "Match-Stick" Vertical Antenna

Fully automatic! Bandswitching 80 through 10 meters!

Remotely motor driven from operating position

Here's the antenna system every amateur has been looking for. The "Match-Stick" is a completely pre-tuned, multi-band antenna system automatically controlled and remotely motor driven from your transmitter location. Installation is simple . . . easily mounts on roof top or in limited space location. Low SWR (less than 2 to 1) on all bands—impedance: 52 ohms. Low vertical radiation angle for DX. Antenna tuning network is enclosed in a weatherproof aluminum cabinet located at the base of the antenna . . . effective antenna length and network selected by weather-proof relays mounted directly on the mast.

SPECIFICATIONS—Vertical mast is 35′ in length—made of 2″ diameter, hard-temper aluminum tubing—mast sections separated by steatite insulators. Six nylon guy ropes furnished—will not affect radiation pattern. Fused isolation transformer. Complete "Match-Stick" assembly includes: Vertical mast, base, tuning network and relays; control box for remote operation; and six nylon guy ropes. Detailed installation and operating instructions also included.

(NOTE: Due to individual station requirements, the "Match-Stick" assembly is furnished less transmission line, 6 conductor control cable and ground radial wire.) **Cat. No. 137-102. . . . Amateur Net $129.50**

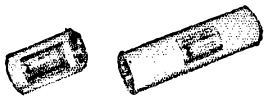
station accessories

"SIGNAL SENTRY"—Monitors CW or phone signals up to 50 mc. Powered by receiver. With tubes.

Cat. No. 250-25 Wired . . . **$18.95 Net**

CRYSTAL CALIBRATOR — Provides accurate 100 kc check points to 55 mc. Requires 6.3 volts at .15 amps and 150-300 volts at 2 ma. With tube.

Cat. No. 250-28 Wired . . . **$17.25 Net**

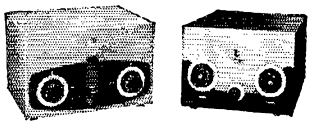


SWR BRIDGE—Provides accurate measurement of SWR for effective use of a low pass filter and all antenna couplers.

Cat. No. 250-24. . . . . $9.75 Net

LOW PASS FILTER—Handles more than 1000 watts RF—provides 75 db or more attenuation above 54 mc. Wired and pre-tuned.

Cat. No. 250-20 52 Ohms . **$13.50 Net**
Cat. No. 250-35 72 Ohms . **$13.50 Net**



VIKING "MATCHBOXES"—Self-contained—bandswitching 80 through 10 meters. Provide integrated antenna matching and switching. Tunes out large amounts of reactance—no load-tapping or plug-in coils necessary.

Cat. No.	Amateur Net
250-23 275 Watt	$ 49.85
250-30 Kilowatt	$124.50

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Most authorized Johnson distributors offer liberal terms. Often as little as 10% down puts you on the air, and your used equipment (especially if it's Johnson) is always worth top dollar in trade.

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2804 SECOND AVENUE SOUTHWEST • WASECA, MINNESOTA

Maximum legal power...a full 1000 watts CW, AM and SSB!

Yours for just **$159.50** down*

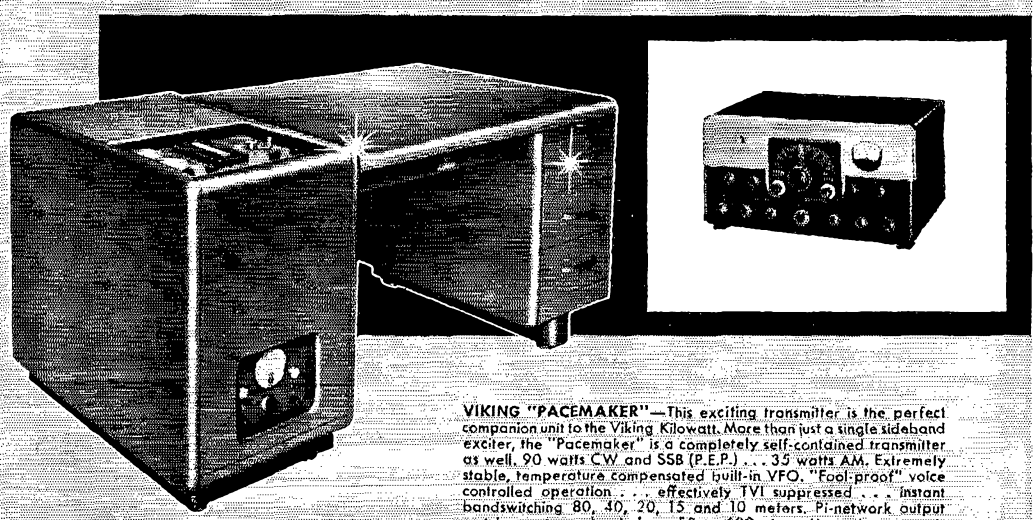
Imagine yourself at the controls of this exciting Viking Kilowatt. You'll marvel at the ease of selecting maximum legal input AM, CW or SSB with the flip of a single switch . . . you'll be delighted with the convenience of its desk-top controls . . . and you'll immediately sense the authority of its *full* kilowatt signal, placing the world at your finger tips.

Truly tomorrow's concept of electronic equipment design and operating convenience, the Viking Kilowatt provides continuous frequency coverage from 3.5 to 30 megacycles, wide range antenna matching and complete TVI suppression. The compact pedestal contains the complete Kilowatt—rolls out for adjustment or maintenance. Excitation requirements: 30 watts RF and 10 watts audio for AM; 2-3 watts peak for SSB. Completely wired and tested with tubes.

Cat. No. 240-1000 . . . . . Amateur Net $1595.00

Matching accessory desk top, back and three drawer pedestal.

Cat. No. 251-101 . . . . . FOB Corry, Pa. $123.50



Write today! Free 8 page descriptive brochure available.

VIKING "PACEMAKER"—This exciting transmitter is the perfect companion unit to the Viking Kilowatt. More than just a single sideband exciter, the "Pacemaker" is a completely self-contained transmitter as well. 90 watts CW and SSB (P.E.P.) . . . 35 watts AM. Extremely stable, temperature compensated built-in VFO. "Fool-proof" voice controlled operation . . . effectively TVI suppressed . . . instant bandswitching 80, 40, 20, 15 and 10 meters. Pi-network output matches antenna loads from 50 to 600 ohms. More than enough power to drive the Viking "Kilowatt" or grounded-grid amplifiers. With tubes and crystals, less key and microphone. Wired and tested.

Cat. No. 240-301-2 . . . . . Amateur Net $495.00

POWER DIVIDER—Provides up to 35 watts continuous dissipation. Designed to provide the proper output loading of the "Pacemaker" when used to drive the Viking Kilowatt Amplifier.

Cat. No. 250-34 . . . . . Amateur Net $24.95

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*See your distributor for a plan tailored to your budget. The 10% down payment price listed above is typical of the convenient terms offered by most authorized Johnson distributors.

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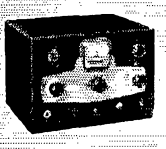
2903 SECOND AVENUE SOUTHWEST • WASECA, MINNESOTA

Punch your signal home ...with one of these 4 VIKING full power* amateur rigs!

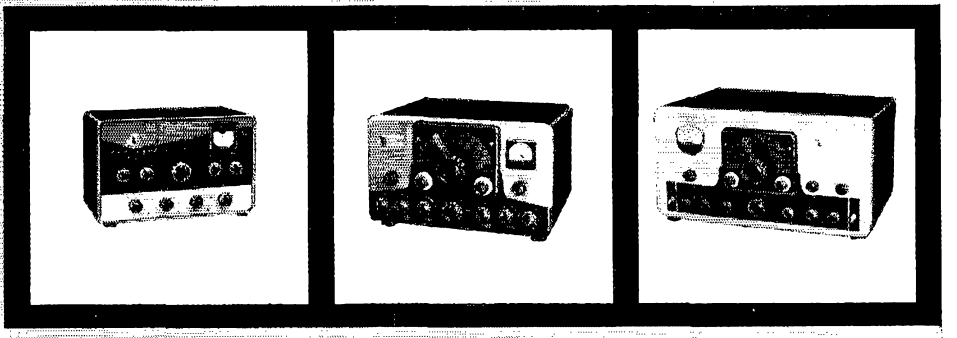
*Top performance isn't simply a matter of watts. Only carefully integrated equipment design can be counted on to develop effective power that punches your signal home, every time. That's what we call "communication power"... and your Viking transmitter delivers it in full measure! Viking transmitters are engineered for outstanding flexibility and performance. Integrated in design from their rugged, highly stable VFO through high effciency output circuits, Viking transmitters deliver *full* communication power!



"ADVENTURER"

VIKING "ADVENTURER"—Used to earn the first Novice WAC! (Worked all continents.) Self-contained, effectively TVI suppressed, rated at 50 watts CW. Instant bandswitching 80 thru 10 meters—operates by crystal or external VFO. Break-in keying is clean and crisp. Wide range pi-network output handles virtually any antenna without a separate antenna tuner. Designed for easy assembly. With tubes, less crystals and key.

Cat. No. 240-181-1 Kit . . . . . **Amateur Net $54.95**



VIKING "6N2"—Instant bandswitching on 6 and 2 meters, this compact VHF transmitter is rated at 150 watts CW and 100 watts phone. Effectively shielded and TVI suppressed—may be used with the Viking "Ranger", Viking I, Viking II or similar power supply/modulator combinations capable of at least 6.3 VAC at 3.5 amp., 300 VDC at 70 ma., 300 to 750 VDC at 200 ma. and 30 or more watts audio. May be operated by built-in crystal control or external VFO with 8-9 mc. output. With tubes, less crystals, key and microphone.

Cat. No.	Amateur Net
240-201-1 Kit	$119.50*
240-201-2 Wired	$159.50*

*Price subject to revision.

VIKING "RANGER"—This outstanding 75 watt CW or 65 watt phone transmitter also serves as an RF and audio exciter for high power equipment. As an exciter, it will drive any of the popular kilowatt level tubes—no internal changes necessary to switch from transmitter to exciter operation. Self-contained, instant bandswitching 160 through 10 meters—operates by extremely stable, built-in VFO or crystal control—effectively TVI suppressed. Easily assembled—with tubes, less crystals, key and microphone.

Cat. No.	Amateur Net
240-161-1 Kit	$214.50
240-161-2 Wired	$293.00

VIKING "VALIANT"—Designed for outstanding flexibility and performance. 275 watts input on CW and SSB (P.E.P. with auxiliary SSB exciter) 200 watts AM. Instant bandswitching 160 through 10 meters—operates by built-in VFO or crystal control. Pi-network tank circuit matches antenna loads from 50 to 600 ohms—final tank coil is silver-plated. TVI suppressed—timed sequence keying—high gain push-to-talk audio system—low level audio clipping—built-in low pass audio filter—self-contained power supplies. With tubes, less crystals, key and microphone.

Cat. No.	Amateur Net
240-104-1 Kit	$349.50
240-104-2 Wired	$439.50

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Most authorized Johnson distributors offer liberal terms. Often as little as 10% down puts you on the air, and your used equipment (especially if it's Johnson) is always worth top dollar in trade.

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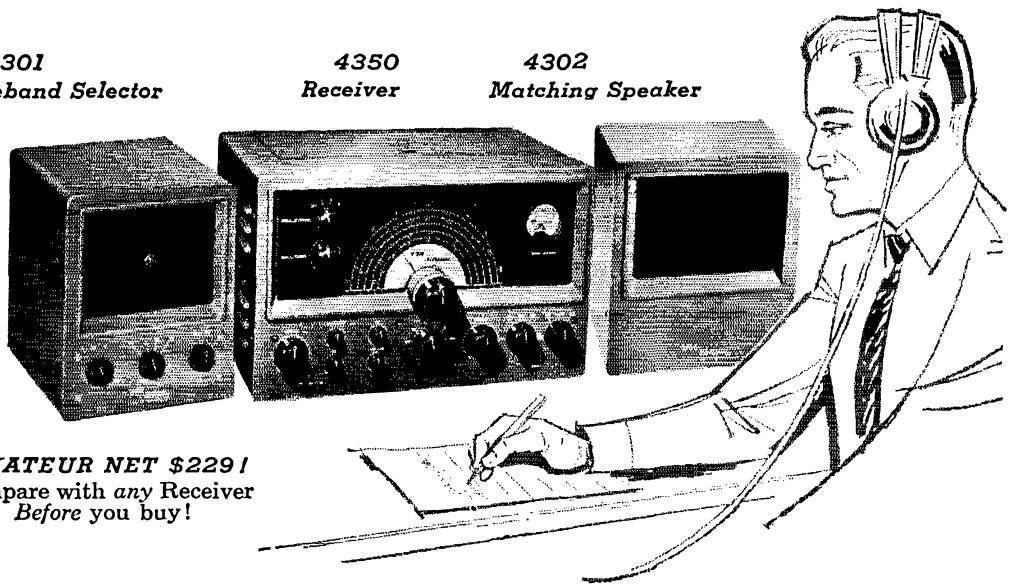
A Ham's Best Friend...

The New RME 4350 Receiver

4301
Sideband Selector

4350
Receiver

4302
Matching Speaker



AMATEUR NET $229!
Compare with *any* Receiver
Before you buy!

Dual Conversion for all Amateur Bands

At last, your long-standing desire for better controls to complement your judgment and skill has been achieved in a receiver that sells at a sensible price. Yes, all the design features you want and need for present conditions in amateur bands, and usually found only in expensive receivers, are available to you in the RME 4350. It's laboratory-engineered to give maximum performance for SSB, CW, phone DX, Traffic and contests.

Superior Design Features Cost Less . . . with the RME 4350

- **Dual Conversion.** Maximum performance results through the use of crystal-controlled dual conversion; images on all amateur bands are down 54 db or more.
- **High Selectivity and Rejectivity.** Even at high frequencies, you can precisely tune the signal you want.
- **Easy, Pinpoint-Precision Tuning . . . Velvet-Smooth Operation** with the E-V exclusive, new two-speed tuning control. With it, you can tune to any part of the band and then micro-scan the area or the whole dial range by means of a 75 to 1 differential planetary reduction mechanism. This mechanism is an integral part of the tuning knob.
- **A High Degree of Mechanical and Thermal Stability** has been achieved by a 6-pound, die-cast panel, welded chassis and case, widely-spaced tuning condenser plates, voltage regulation and temperature compensation of thermal-sensitive elements. As a result, there is negligible frequency shift or drift.
- **Sensitivity** is between 1 and 2 microvolts throughout the tuning range.
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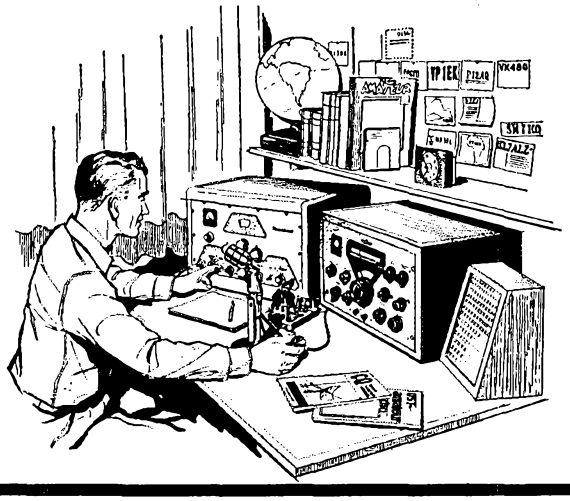


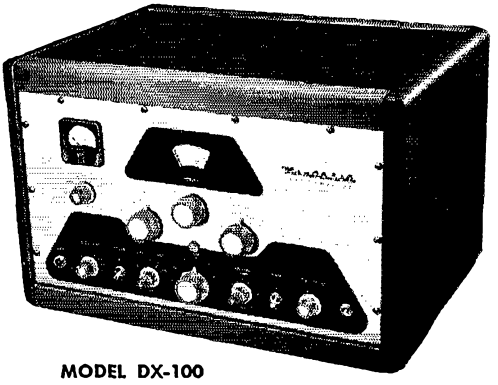
Top quality ham equipment in kit form . . . designed especially to meet your requirements!

Heath amateur radio gear is designed *by* hams—*for* hams, to insure maximum "on the air" enjoyment. Good design and top-quality components guarantee reliability. Heathkits are easy to build and are easy on your budget! You save by dealing direct, and you may use the Heath Time Payment Plan on orders totaling $90.00 or more. Write for complete details.

HEATHKIT DX-100 TRANSMITTER KIT

PHONE AND CW

- *Phone or CW—160 through 10 meters.*
- *100 watts RF on phone—120 watts CW —parallel 6146 final.*
- *Built-in VFO—pi network output circuit.*
- *Easy to build—TVI suppressed*



MODEL DX-100

$189.50

$18.95 dwn., $15.92 mo.

Shpg. Wt. 107 Lbs.

Shipped motor freight unless otherwise specified. $50.00 deposit required on c.o.d. orders.

The Heathkit DX-100 phone-CW transmitter offers features far beyond those normally received at this price level. It has a built-in VFO, built-in modulator, and built-in power supplies. It is TVI suppressed, and uses pi network interstage coupling and output coupling. Matches antenna impedances from approximately 50 to 600 ohms. Provides a clean strong signal on either phone or CW, with RF output in excess of 100 watts on phone, and 120 watts on CW. Completely bandswitching from 160 through 10 meters. A pair of 1625 tubes are used in push-pull for the modulator, and the final consists of a pair of 6146 tubes in parallel. VFO dial and meter face are illuminated. High-quality components throughout! The DX-100 is very easy to build, even for a beginner, and is a proven, trouble-free rig that will insure many hours of enjoyment in your ham shack.

HEATH COMPANY BENTON HARBOR 9, MICHIGAN

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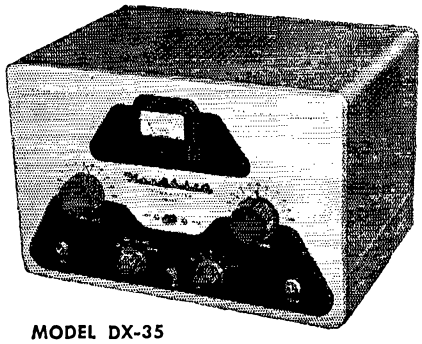
HEATHKIT DX-35
TRANSMITTER KIT

PHONE AND CW

This transmitter features a 6146 final amplifier to provide 65 watt plate power input on CW, with controlled-carrier modulation peaks up to 50 watts on phone. Modulater and power supplies are built in, and the rig covers 80, 40, 20, 15, 11 and 10 meters with a single band-change switch. Pi network output coupling provides for matching various antenna impedances. Employs 12BY7 oscillator, 12BY7 buffer and 6146 final. Speech amplifier is a 12AX7, and a 12AU7 is employed as modulater. Panel control provides switch selection of three different crystals, reached through access door at rear. Panel meter indicates final grid current or final plate current. A perfect low-power transmitter both for the novice or the more experienced amateur. A remarkable power package for the price. The price includes tubes, and all other parts necessary for construction. Comprehensive instruction manual insures successful assembly.



MODEL DX-35

$56.95

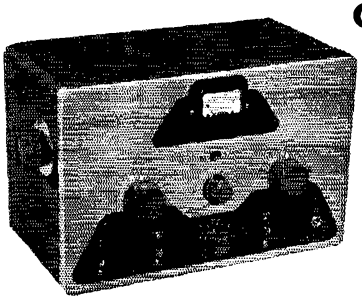
Shpg. Wt. 24 Lbs.

$5.70 dwn., $4.78 mo.

- *Phone or CW—80 through 10 meters.*
- *65 watts CW—50 watts peak on phone—6146 final amplifier.*
- *Pi network output to match various antenna impedances.*
- *Tremendous dollar value—easy to build.*

BRAND NEW

HEATHKIT DX-20
CW TRANSMITTER KIT



MODEL DX-20

$35.95

$3.60 dwn., $3.02 mo.
Shpg. Wt. 18 Lbs.

- *Designed exclusively for CW work.*
- *50 watts plate power input—80 through 10 meters.*
- *Pi network output circuit to match various antenna impedances.*
- *Attractive and functional styling—easy to build.*

Here is a straight-CW transmitter that is one of the most efficient rigs available today. It is ideal for the novice, and even for the advanced-class CW operator. This 50 watt transmitter employs a 6DQ6A final amplifier, a 6CL6 oscillator, a 5U4GB rectifier and features one-knob bandswitching to cover 80, 40, 20, 15, 11 and 10 meters. It is designed for crystal excitation, but may be excited by an external VFO. A pi network output circuit is employed to match antenna impedances between 50 and 1000 ohms. Employs top-quality parts throughout, including "potted" transformers, etc. If you appreciate a good signal on the CW bands, this is the transmitter for you!

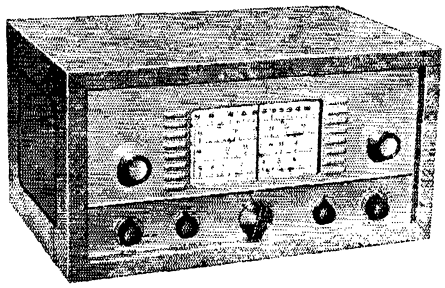
HEATH COMPANY BENTON HARBOR 9, MICHIGAN

A Subsidiary of Daystrom, Inc.

HEATHKIT

COMMUNICATIONS-TYPE, ALL BAND

RECEIVER KIT



This receiver covers 550 kc to 30 mc in four bands, and is ideal for the short wave listener or beginning amateur. 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—headphone jack—and AGC. Has built-in BFO for CW reception. Shpg. Wt. 12 Lbs.

MODEL AR-3

$29.95

incl. excise tax
(less cabinet)

$3.00 dwn., $2.52 mo.

CABINET: Fabric covered cabinet with aluminum panel as shown. Part 91-15A. Shipping Wt. 5 Lbs. $.50 dwn., $.42 mo. $4.95

Ⓐ HEATHKIT VFO KIT MODEL VF-1

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 VDC at 15 to 20 ma, and 6.3 VAC at 0.45A. Incorporates regulator tube for stability and illuminated frequency dial. Shpg. wt. 7 lbs. $1.95 dwn., $1.64 mo. **$19.50**

Ⓑ HEATHKIT GRID DIP METER KIT MODEL GD-1B

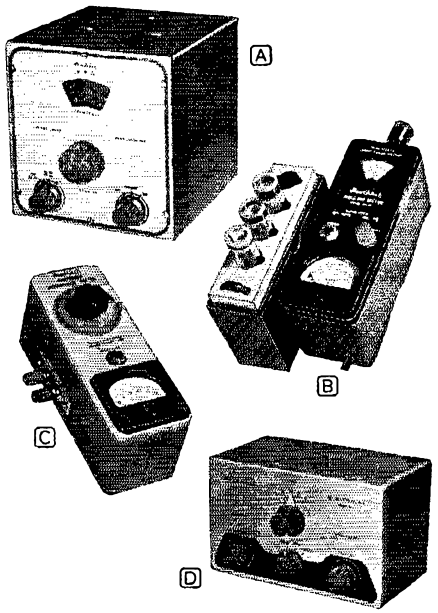
Continuous coverage from 2 mc to 250 mc with prewound coils. 500 ua panel meter for indication. Use to locate parasitics, for neutralizing, determining resonant frequencies, etc. Will double as absorption-type wavemeter. Shpg. wt. 4 lbs. $2.00 dwn., $1.68 mo. **$19.95**

Ⓒ HEATHKIT ANTENNA IMPEDANCE METER KIT MODEL AM-1

The AM-1 covers 0 to 600 ohms for RF tests. Functions up to 150 mc. Used in conjunction with a signal source, will determine antenna resistance and resonance, match transmission lines for minimum SWR, determine input impedance, etc. Shpg. wt. 2 lbs. $1.45 dwn., $1.22 mo. **$14.50**

Ⓓ HEATHKIT "Q" MULTIPLIER KIT MODEL QF-1

Functions with any receiver having IF frequency between 450 and 460 kc that is not AC DC type. Operates from receiver power supply, requiring only 6.3 volts AC 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. Provides extra selectivity for separating signals, or will reject one signal to eliminate heterodyne. Effective Q of approximately 4000. Shpg. wt. 3 lbs. $1.00 dwn., $.84 mo. **$9.95**



HOW TO ORDER...

It's simple—just identify the kit you desire by its model number and send your order to the address listed below. Or, if you would rather budget your purchase, send for details of the Heath Time Payment Plan for orders totaling $90.00 or more.

HEATH COMPANY BENTON HARBOR 9, MICHIGAN

A Subsidiary of Daystrom, Inc.

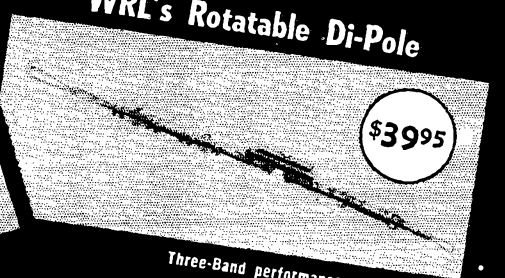
THE *Complete* TRI-BANDER SERIES!

the *Only Factory* PRE-TUNED PRE-MATCHED PRE-ADJUSTED 3-BAND BEAMS FOR 10, 15 & 20 METERS.

WRL's 2-Element Space-Saver

Pay $6.95 down; $6.00 per mo.
Maximum gain for Minimum space and cost!

WRL's Rotatable Di-Pole

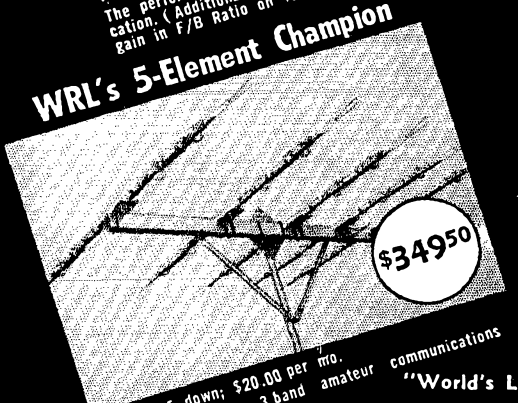


Three-Band performance at lowest cost!

WRL's 3-Element Standard

Pay $10.00 down; $8.50 per mo.
The performance standard in amateur radio communication. (Additional director element allows increased gain in F/B Ratio on 10M; — Just $19.95)

WRL's 5-Element Champion



Pay $34.95 down; $20.00 per mo.
Finest, heavy-duty, 3 band amateur communications array in existence.

Incorporates New "Insu-Trap"

which acts as an insulator at selected frequencies, isolating the various element sections on 10, 15 & 20 meters.

- One beam, one feedline, three bands (10, 15 & 20M), and low SWR.
- Guaranteed for one year against any defects in material or workmanship.
- Better performing than three stacked arrays because interaction and de-tuning effect is eliminated.
- May be erected in extremely short time; no adjustment necessary; no test equipment needed.

There are now more WRL Triple Globe Spanners in use than all other Tri-Band Beams

Combined!

Write For Further Information Today!

WORLD RADIO LABORATORIES

"World's Largest Distributor of Amateur Radio Equipment"

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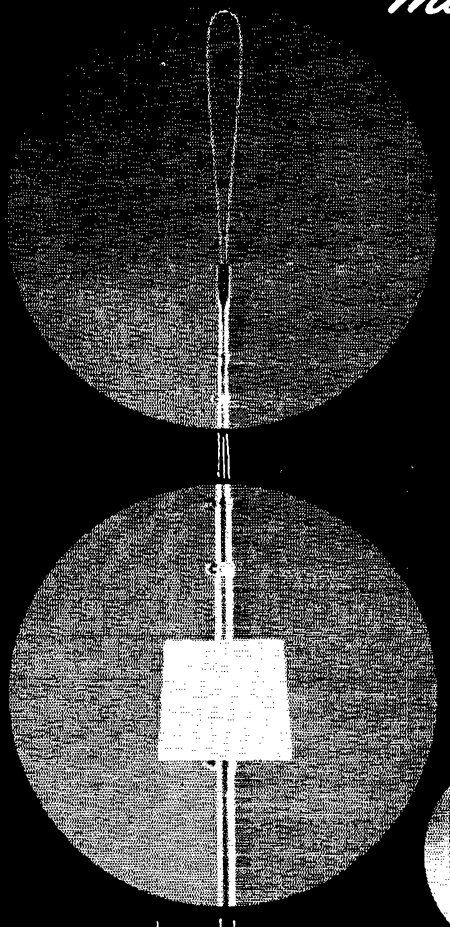
PHONE 2-0277

Prices Subject To Change Without Notice!

THE *Complete* VERTICAL SERIES!

Meet the Brand New



WRL Globe Topper!

Remote-controlled, continuous tuning, vertical antenna system for the frequency range 3.5-30 megacycles!

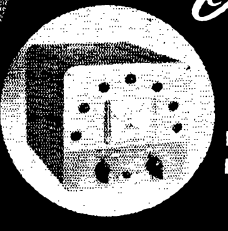
Here's an inconspicuous vertical antenna requiring only 1 sq. ft. of real estate, completely factory pre-tuned with no adjustment required, and low SWR on all bands. The weather-proof, tuning network is mounted at the vertical center for maximum radiating efficiency. Calibrated at 10, 11, 15, 20, 40 & 80 meters. Overall height is 35 ft. Fed with 52 ohm RG-8U coaxial cable. Complete Topper includes vertical aluminum mast sections, base insulator, base mounting plate, weather-proof tuning network, remote control box and band indicator, and complete installation and operating instructions.

✓SAVE SPACE ✓SAVE MONEY
✓WORK ALL BANDS

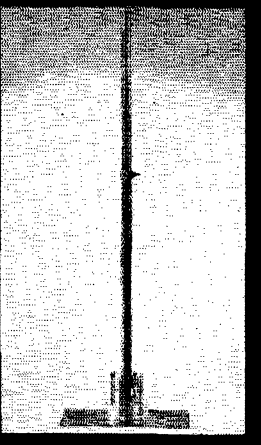
Only $8.50 per mo.

Pay Just $10.00 Down

Cash Price: $99.95



Remote control box. (SWR Indicator as shown optional!)



and the WRL Economy Toppers

WRL's Economy Toppers offer multi-band vertical operation with manual bandswitching at lowest possible cost. Low SWR current feed on all bands is maintained by the proper tapping of a base loading coil furnished with each system. Antenna is furnished complete with vertical mast sections, loading coil, polystyrene combination base insulator and coil holder, base mounting plate and side mounting bracket and bracket insulator. Includes all necessary hardware, and complete and detailed installation and operating instructions. Available for immediate delivery.

40-V (for 40, 20, 15, 11, 10 & 6M) $14.95
80-V (for 80, 75, 40, 20, 15, 11, 10 & 6M) $16.95
160-V (for 160, 80, 75, 40, 20, 15, 11, 10 & 6M) $18.95

For Further Information, Write to WORLD RADIO LABORATORIES!

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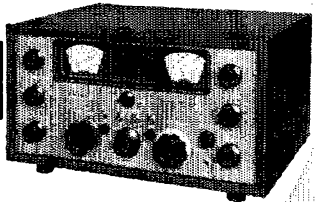
COMMUNICATION RECEIVER

GPR-90



Bulletin 179

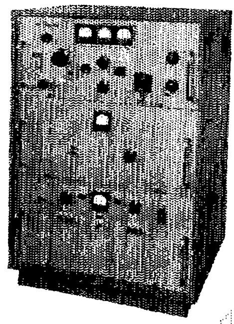
SINGLE SIDEBAND ADAPTER

GSB-1

Bulletin 194

COMMUNICATION TRANSMITTER

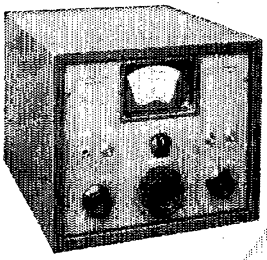
GPT-750



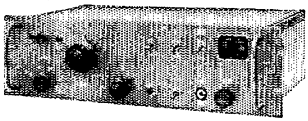
Bulletin 174

Abou

MODE
SELECTOR
RECEIVING

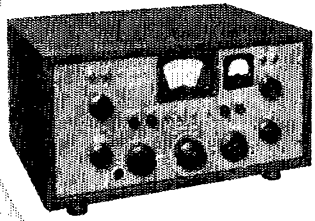


MSR-1



Bulletin 196

SINGLE
SIDEBAND
EXCITER



SBE-1

Bulletin 195

t Single Sideband.....

About Single Sideband . . .

We in the communications business sometimes cast a rather jaundiced eye toward the claims, opinions and prejudices which surround a given technique which gains popularity.

Parallel with these comments, and some others like "nobody reads an instruction book", is the thought that people really don't digest articles which give the facts.—

Take George Grammers article (QST, January, 1954) . . .

> "Several years ago Don Norgaard, W2KUJ, showed that it is possible to obtain an impovement of 8 times, or 9 db., by using single sideband instead of conventional amplitude modulation. There are indications that this figure is being bandied about in a way that is entirely improper, and certainly not intended by the author of the article. Irreconcilables cry in their beer over it as giving single sideband a tremendous, and unfair advantage over their cherished amplitude modulation. But althought this may come as a shock, the reasons for the superiority of "sideband" as a method of amateur communication have to be looked for elsewhere, because the power gain in the way most fellows visualize it is largely a mirage."

. . . or take the article by John F. Honey (TELE-TECH and Electronic Industries, September, 1953) . . .

> "Imagine that a SSB communications link is set up beside an AM link and that the two systems are operated identically in the presence of noise, and under theoretically ideal propagation conditions. It will be found that the two systems will perform identically (the same S/N at the output of the two receivers) if the total sideband power ouput of the two transmitters is the same. If the output of the SSB receiver may be said to contain the one unit of signal power, the output of the AM receiver will contain two units of signal power because of the coherent addition of the two AM sidebands in the receiver detector. If the output of the SSB receiver contains one unit of noise power, the output of the AM receiver will contain two units of noise power because of incoherent addition of the noise voltages accepted in each of the two sidebands received. Thus, the signal to noise ratios at the output of the two receivers are the same."

Neither of these qualified people is trying to "unsell" you on sideband, but they are telling you that you won't find the gain in the usual places!

In view of the discussions that are going on, it seems as though a few things should be pointed up, for instance.—

1. Statistics tend to prove that SSB draws its advantage from such things as better propagation, better signal to noise ratio (assuming a narrow band receiver), conservation of spectrum space, and such things as lack of heterodyne interference, etc.
2. Statistics also tend to prove, in our opinion, that the advantage will vary from 0 to 9 db, with the average around 3 db, depending on conditions. (Don't sneeze at that 3 db, it's pretty important).
3. There is nothing magical about the term peak envelope power. In fact, P. E. P. is the same whether it's A.M., SSB or CW. It might be a darn sight more edifying to look at the average voice power in the emission.
4. Peak envelope power as an expression becomes meaningless unless it is qualified by the amount of distortion products, unwanted harmonics or spurious emissions which are produced. (Have you heard some of those bad phones?).
5. Weight for weight and watt for watt SSB transmitters are probably more economical to build and operate for voice transmission than conventional AM transmitters. They are also more complex and difficult to maintain.
6. The idea seems to be prevalent that any transmitter capable of a kilowatt of A.M. is capable of two or three kilowatts of SSB, or that 10 watts of SSB are as good as 100 watts of A.M. This just ain't necessarily so!

Now don't get the idea that we're panning sideband, or anything else. We make good sideband equipment, and generally speaking we make what you want, but we feel the customer must always know what he's getting for his money. It has been said that sooner or later everyone rides in a Cadillac (because a lot of hearses are Cadillacs), and maybe if the congestion in the phone bands continues we'll all have to go sideband or something, but let's remember fellows, nobody just discovered sideband—it's been around a long time—maybe longer than you think. Keep an eye on DSSC (Double sideband suppressed carrier), it has advantages too! While we do not necessarily endorse the content, we suggest you read Costa's article (CQ, January, 1957) and (IRE, December, 1956).

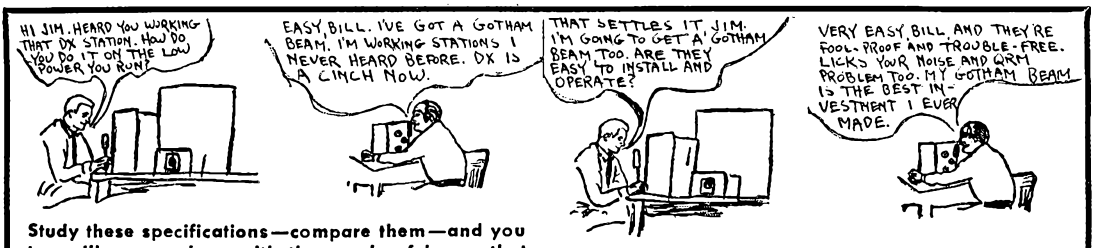
Well anyway, these things are what make communications an interesting business (and hobby).

(Continued from page 86)

tion after midnight. BVR finishes his first year back on the air after many years' absence. He formerly was EPJ and FWD. CSW reports the North Central Phone Net handled 335 messages in December while ILN handled 344 in the same period. MAK, the Asst. RM, worked some nice 80-meter DX but still gets into the nets. LL is back on the air with a 30-foot indoor antenna and puts out six watts. JC now signs K4AV and can be found lurking on 80 meters. BA likes his new TR switch and reports his Conelrad works fine. DRN is trying to set up a daily sked on 220 Mc. with the assistance of EFE and BOD. Write them. IBC writes that the Tri-Town Radio Amateur Club will hold its 25th anniversary dinner Mar. 16th. Write the club secretary, CNF, for tickets. K9BIY is burning up the 6-meter band along with RSY and RSZ. JMY is building an all-band mobile to run 50 watts. The Central Illinois Radio Club of Bloomington is doing its best to keep the city officials up on c.d. VEY, his XYL, plans a complete 50-Mc. station with a 50-ft. tower. EZA is building a 50-Mc. mobile to keep in touch with home. GDI writes he is sending too many OO cards to Novices heard with harmonics in the 7-Mc. range. HUX says that Santa brought him a mill. Novice DLQ got a 2-meter beam and Communicator. A new General Class ticket belongs to K9DDP. Former Novices K9DDP, K9CYZ, K9DUA, and K9DLA are to be congratulated on passing the General Class exam. QGO is visiting in W6-Land for the winter. K9GIQ now signs from Kankakee, Ill. HME has built a home in Roselle and now is on 28-Mc. with a new beam. DEI has a new Viking and is trying it out on a T2FD antenna. Maybe KJ is going to give up raising his 67-ft. tower. OVA plans to raise his rooftop tower another 30 feet. ZA is getting FB results with a 44-ft. vertical with QRP. A large sign on the top of a house in Des Plaines says in neon "Resume TV-watching. NN has QRT." A new receiver at PEB is an NC-300. New officers of the Radio Amateur Megacycle Society (RAMS) are UHO, K9BWJ and KN9DQP. The Peoria Area ARC group were guests at the local TV station recently and participated in a program. 4BPT is now K9GIN, (the XYL of K9CKP). PNS is experimenting with 420 Mc. JEI now is in the Far North working on radar defense gear. KN9DNS is trying to get on 2 meters with a fire extinguisher close by. FB code classes are being conducted by the Mt. Vernon Club. New officers of the YLRL of Chicago are MXI, pres.; K9CQF, vice-pres.; BOC, treas.; GME, secy.; and Elsie Harper, chairman. The present address of UZ is Box 2645, Manatee Station, Bradenton, Fla. A large group of Illinois amateurs, headed by AC, gave him a farewell dinner. Among the guests were 1BUD, from Headquarters. Traffic: (Dec.) W9DO 1404, MAK 1210, YYG 936, OR 304, IDA 272, OYL 152, YIX 147, OKI 125, FAW 93, STZ 92, OCB 76, YRH 73, CTZ 65, VHD 58, PCQ 36, BUK 34, K9AXI 32, W9SXL 31, EDH 26, VEY 21, BA 7, K9AMD 5, AXL 2, W9KLD 2, LL 2, PDH 2. (Oct.) W9UBI 7.

INDIANA—SCM, Seth Lew Baker, W9NTA—Nets, all times EST: IFN, 3910 kc., 0900 Dy and 1830 Mon. through Fri. QIN, 3656 kc., 1900 Dy. RFN, 3656 kc., 0800 Sun. CAEN, 1805 kc. 2000 Mon. through Sat. Interstate S.S.B. Net, 3985 kc., 2000 Dy. North Central 6-Meter Net, 50.5 kc., 2130 Mon. and Fri. Novice Weather Net in Evansville, 3735 kc. 0900 Sun. Club elections: Hoosier Hills ARC—CTF, pres.; PQZ and Dick Asbell, vice-pres.; CTM, secy.-treas.; ZSX, act. mgr. New Castle ARA—K9AOB, pres.; PPD, vice-pres.; K9EDG, secy.-treas. Madison ARC—QOT, pres.; HMR, vice-pres.; K9GBD, secy.; URE, treas.; PFC, act. chairman. The XYL Club of Marion Co.—Edith Beckerich, pres.; Esther Pittman, vice-pres.; Katy Bowman, secy.; Rosemary Fitch, treas. Seymour ARC—ex-OGO, pres.; HGV, vice-pres.; KN9GEN, secy.-treas. Lake Co. ARC—MNO, pres.; EHY, vice-pres.; AMW, secy.; MIF, treas. Gary RC—AMW, chairman.; YVB, secy.-treas.; EHH, EHY and JGH, committeemen. BKJ reports IFN morning traffic as 302, evening 393, total 695. TQC gives QIN as 469 and TT reports RFN as 133. CAEN had 136, as given by EHZ. Interstate S.S.B. had 690, reported by KOY. Those making BPL were JYO, NZZ (his 70th straight), EQO, EHZ, JOZ, TT, SVL, DGA, KTX, BKJ and WTY. The Wabash Valley ARA has a 20-week code and theory class with 40 enrolled and 8 instructors. The FWRC also has a code class with BKJ as instructor. New calls: KN9EOK at Peru, KN9GKO at Culver and KN9GCL South Bend. VNV will be back from Mexico in April. GPI, our new Director, was speaker at the Michiana ARC banquet at which 114 attended. LDL has a 32-element colinear beam on 2 meters. DGA is building a 6-meter rig. HSG/6 sends greetings to all from Burbank. EBQ is building an all-band s.s.b. exciter. HOG is a Silent Key.

(Continued on page 100)



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

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

MORE DX CONTACTS

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

THE DESIGN IS PROVEN

FRONT-TO-BACK RATIO. We guarantee a minimum F/B Ratio of 19 db. for any of our 2-element beams; 29 db. for any of our 3-element beams; 35 db. for 4-element beams.

THOUSANDS IN DAILY USE

MATCHING. Matching of the transmission line to the beam is extremely simple and quick. Everything is furnished and the matching is automatic. No electronic equipment or measuring devices are required.

ALCOA QUALITY ALUMINUM

ASSEMBLY AND INSTALLATION. No special tools are required for assembly and installation. Entire job can be done by one man in less than an hour. Full instructions are included with each beam.

CONSISTENT PERFORMANCE

MAST. Any Gotham beam can be mounted on a simple pipe mast. Diameter of the pipe should be between ¾" and 1⅝".

QUICK INSURED DELIVERY

STANDING WAVE RATIO. A very low SWR of approximately 1.5 to 1 will result from following the instruction sheet, depending on the height above ground and the surrounding area. If an SWR indicator is available, Gotham beams can be quickly and easily adjusted to 1.1.

YOU WILL WORK THE WORLD

STANDARD AND DELUXE BEAMS. Standard beams in the 6, 10 and 15 meter bands use ⅝" and ¾" tubing elements; the deluxe models for these bands use ⅞" and 1". In 20 meter beams, the standard has a single boom, while the deluxe uses twin booms.

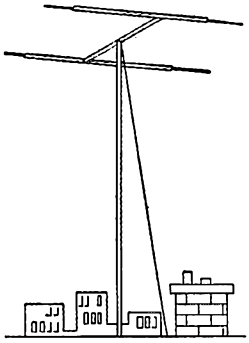
AND THE PRICE IS RIGHT!

HOW TO ORDER FROM GOTHAM

Send check or money order to GOTHAM — we ship immediately by Railway Express, charges collect.

HOW TO ORDER FROM A DISTRIBUTOR

ANY electronic distributor can order a Gotham antenna for you. Here are some of the leading distributors who sell Gotham beams: Atronic Corp., Alltronics, Amateur Radio Supply, Lew Bonn Co., Burghardt Radio, Capitol, Curle, Crabtree's, Dixie, Duffy, Evans, Electronic Distributors, Emco Electronics, Electronic Supply, Miami, Emrich, W. H. Edwards, Fargo, Ft. Wayne Electronics, Graham Electronics, Henry of Missouri and Calif., Harris, Johannesen, Kinkade, Mytronic, Melrose Sales, Nidisco, Offenbach & Reimus, Purchase, Rome Electronics, Radio Electric Service, Radio Equipment Co., Radio Parts Co., Radio Supply Co., E. A. Ross, Sacramento Amateur Radio, Specialty Distributing, Swan Distributing, Srepco Inc., Selectronic Supplies, Thurow Distributors, Tel-rad, Thrifty TV Supply, Universal, World Radio.



This Full Size Gotham Cost Only $21.95 And Brought In 87 Foreign Countries, All Continents And 30 Zones On 35 Watts!

Airmail Order Today — We Ship Tomorrow

GOTHAM Dept. QST

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Enclosed find check or money-order for:

2 METER BEAMS			
☐ Deluxe 6-Element	$9.95	☐ 12-El	$16.95
6 METER BEAMS			
☐ Std. 3-El Gamma match	12.95	☐ T match	14.95
☐ Deluxe 3-El Gamma match	21.95	☐ T match	24.95
☐ Std. 4-El Gamma match	16.95	☐ T match	19.95
☐ Deluxe 4-El Gamma match	25.95	☐ T match	28.95
10 METER BEAMS			
☐ Std. 2-El Gamma match	11.95	☐ T match	14.95
☐ Deluxe 2-El Gamma match	18.95	☐ T match	21.95
☐ Std. 3-El Gamma match	16.95	☐ T match	18.95
☐ Deluxe 3-El Gamma match	22.95	☐ T match	25.95
☐ Std. 4-El Gamma match	21.95	☐ T match	24.95
☐ Deluxe 4-El Gamma match	27.95	☐ T match	30.95
15 METER BEAMS			
☐ Std. 2-El Gamma match	19.95	☐ T match	22.95
☐ Deluxe 2-El Gamma match	29.95	☐ T match	32.95
☐ Std. 3-El Gamma match	26.95	☐ T match	29.95
☐ Deluxe 3-El Gamma match	36.95	☐ T match	39.95
20 METER BEAMS			
☐ Std. 2-El Gamma match	21.95	☐ T match	24.95
☐ Deluxe 2-El Gamma match	31.95	☐ T match	34.95
☐ Std. 3-El Gamma match	34.95	☐ T match	37.95
☐ Deluxe 3-El Gamma match	46.95	☐ T match	49.95

(Note: Gamma-match beams use 52 or 72 ohm coax. T-match beams use 300 ohm line.)

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

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

☐ Beam #R6 (6 Meters, 4-El).....$38.95
☐ Beam #R10 (10 Meters, 4-El)..... 40.95
☐ Beam #R15 (15 Meters, 3-El)..... 49.95

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Address.....

City.....Zone....State.....

K9EEL has 15 states with an Adventurer and an NC-88. The South Bend 2-Meter Net serves the following cities: South Bend, Plymouth, Mentone, Elkhart, Ligonier, North Liberty, Notre Dame, Warsaw, Bristol, Goshen, Knox, Mishawaka, Osceola, Lakeville, Lapaz, Ind., and Edwardsburg, Mich. WTY is manager. A good operator always signs his own call LAST. You are invited to check in to the IFN Fri. evenings when the NCS will be an s.s.b. station. Traffic: (Dec.) W9JYO 2161, NZZ 1283, EQO 1077, EHZ 858, JOZ 613, TT 511, SVL 467, ZYK 456, TQC 289, AB 205, DGA 196, KTX 190, BKJ 162, TFS 134, WTY 133, KOY 122, EJW 91, WUH 78, DHJ 76, NTA 72, CC 55, EGQ 55, DOK 52, BUQ 46, UQP 45, VNV 43, STC 35, VPJ 32, RTH 27, WHL 24, YVX 24, PQZ 22, CMT 20, PIN 20, QR 18, K9AUE 17, W9CDW 17, LGD 17, JVF 15, CYZ 14, HST 14, MHP 14, SVZ 14, YB 14, K9AYH 13, W9QYQ 13, ZSW 13, BDP 12, IMU 11, DDT 10, EJC 10, KN9GEO 10, W9ZSK 10, ALL 8, AMW 8, URQ 8, AZF 7, EHY 7, QBD 7, UXK 7, EZW 2, SWD 2, UCT 2, WAU 1, YVS 1. (Nov.) W9JYO 296, CDW 15, HST 7, DDT 6, AZF 4, EHY 4.

WISCONSIN—SCM, Reno W. Goetsch, W9RQM—SEC: OVO. PAMs: NRP and AJU. RMs: KQB and KJJ. Nets: WIN 3535 kc. 7:15 P.M. daily; BEN 3950 kc. 6 P.M. daily; WPN 1215 Mon.-Sat., 0930 Sun. Wisconsin mobile and c.d. frequency: 29,620 kc. Christmas traffic swelled CXY's total to a record 1075. YRO is hammering at the door of DXCC. KJJ made his first BPL and is planning higher power. K9AEQ has a new HRO-50T1 receiver and has 46 states confirmed out of 48 worked. SZR's new all-band antenna accounted for 14 new countries to bring him up to 83 worked and 63 confirmed. KXK is pushing hard for the 200 mark on DXCC. FZC has been using his new phone-patch and two-element beam to good advantage on 28 Mc. MIN and K9AQT are interested in the ORS appointment. SQM converted an S41-G for Conelrad use. Are you set up for Conelrad monitoring? TRG has moved to W6-Land, where he is employed by the Gonset Co. K9AQT has finished the VFO and needs New Mexico and Delaware cards to complete WAS. GAB worked 4LTU via meteor-scattering on 144 Mc. with signals up to S9 for a few seconds. IMQ was hospitalized, with LON the attending physician. GFL was kept busy when not on v.h.f. with a new Johnson 6N2 issuing 117 OO notices of harmonic operation (mostly Novice). Highlight of MRAC activity was the Old Timers Night Jan. 4th, with Fred Schnell, UZ, elected to Honorary Life Membership. FDX spent the holidays in the hospital following surgery. K9CAN, with over 500 contacts in the SS, is following in his OM's (GIL) footsteps as a contest operator. A Net certificate (WIN) was issued to SZR. VBZ is back and active as an OO after a hitch in the Army. KQB's wall is papered with certificates for RM, WAS, WAC, Al-Op., WIN, CAN, OTC, RCC and Asst. EC. GWK was the originating station for the Wisconsin message in the Governor to President Relay. VAK received his "General" after 4 years as "Technician." RQN and VAK are promoting a station at the U. of W. Traffic: W9CXY 1075, KJJ 551, KQB 169, K9AEQ 162, W9SAA 132, SZR 39, FZC 37, LGR 28, MIN 23, K9AQT 22, W9AZN 22, RQM 10, YZA 9, KWJ 7, SQM 6, OVO 4.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Elmer J. Gabel, WØKTZ—SEC: CAQ. PAM: HVA. RM: FYG. Phone Net: 3845 kc. 1800 Mon. through Sat. C.W. Net: 3670 kc. Mon., Wed. and Fri. 1830. EBTAN: Mon., Wed. and Fri. 3845 kc. at 0700 and Sun. only. The Goose River 160-Meter Net: 1980 kc. 0900. KØCNC is manager of the Early Bird Teen Age Net and NCS on Wed. mornings, as well as a regular member of the ND Phone and C.W. Nets, the SD 40-Meter Phone Net at noon and the Tenth Regional C.W. Net. QGP will be in W7-Land for a couple of years. KØGGH is back from the West Coast where he evidently struck it rich, as he will be on the air with a Valiant and an SX-99. VCQ reports he had a swell time at the Fargo Radio Club's pre-Christmas Party. Traffic: KØCNC 155, WØBFM 48, GQD 46, KØADI 19, CND 18, WØYCL 18, KØHLT 16, WØMQA 14, EXO 12, KLP 11, IHM 9, HVA 8.

SOUTH DAKOTA—SCM, Les Price, WØFLP—Asst. SCM: Gerald F. Lee, ØYKY. SCM assistants: HOH, FKE, APL, GQH, NEO, TI, MZJ and GDE. SECs: YOB and GDE. PAM: UVL. RM: SMV. The South Dakota 80-Meter C.W. Net, SMV as NCS, in December had 11 sessions, QNI 57, high 9, low 2, average 5.2; QTC 29, high 7, low 0, average 2.6. The South Dakota 75-Meter Phone Net, GDE and UVL as NCSs, had 31 sessions, QNI 836, high 43, low 20, average 2.6; QTI 114, high 14, low 0, average 3.6. The South Dakota 40-Meter Noon Net, EXX as NCS, had 12 sessions,

(Continued on page 102)

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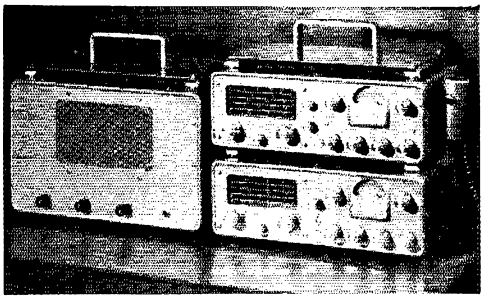
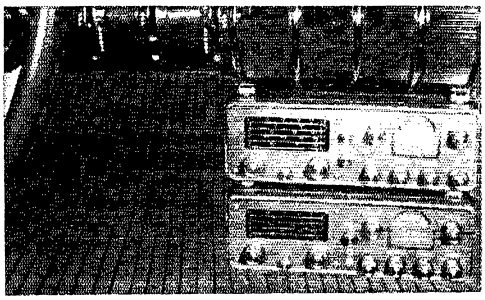


MOBILE



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** Necessary for fixed station and portable.
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QNI 190, high 25, low 9, average 15.8; traffic 28, high 7, low 0, average 2.35. The South Dakota WX Net, ZWL as NCS, had 26 sessions, QNI 392, high 22, low 8, average 15; QTC 354, high 30, low 6, average 14. The South Dakota 160-Meter Net, FKE as NCS, had 28 sessions, QNI 398, 46 informals, 18 formals, 19 high check-ins, 7 low. ZIQ now is working for CAA in Sioux Falls, instead of Power City. RYP has a new YL jr. operator. KNØGDS received a son (the third) born Christmas Day. LXD, Centerville, had a YL, born Dec. 13th, to add to two sons. The SFARC is making 2 new Novices a week. OII and IWE are on 2 meters in Rapid. DIY, SIR, HON and KNØDKV are on 2 meters in Sioux Falls. GWS has an 813 on the air. KSW now is living in Elk Point. NNX has his Johnson KW final back from the factory, but still cannot use the full gallon 75-meter phone. VMM has a new Valiant, an NC-33, and a Mosley three-element 10-meter beam. TNM and folks are living in Lead for the winter. EQV and DVB have a tower with a Globe Spanner beam 55 ft. high, and moved the station to the living room to accommodate the tower location. GKU, Sioux Falls, the first woman ham, and SFARC president a few years ago, is getting the bug again, and operated FKL in Lennox on Dec. 1st. CJS has a new Valiant on the air. We have a YL round table on Tue. afternoons at 1:00 P.M. MST on 3870 kc. Traffic: WØSCT 555, ZWL 441, ARF 124, DVB 63, OII 40, NEO 34, DIV 23, SMV 22, BQS 18, YKY 14, QDU 12, NNX 11, RTD 11, DKJ 10, KØBMQ 6, WØEXX 6, SIL 6, FJZ 3.

MINNESOTA—SCM, Charles M. Bove, WØMXC—Well, KJZ and KLG did it again. What I mean is BPL. That is a lot of message-handling. ALW's rig broke down but should be back on the air by now. ERO passed his exam and has now joined the General Class ranks. Traffic: WØDQL 395, KJZ 373, KLG 312, AZF 138, UNG 128, DNM 118, KFN 110, WMA 79, UMX 50, ALW 45, OJG 38, RLQ 35, BUO 34, QVR 29, BUD 28, QDL 23, EHO 20, QDP 20, ADI 19, IRJ 19, PBI 18, LUX 18, TQQ 17, EMZ 16, BTE 15, CWB 14, KXW 14, QDZ 14, RVO 12, TCK 11, DIA 9, MXC 6, VEZ 6, GVW 1.

DELTA DIVISION

ARKANSAS—SCM, Ulmon M. Goings, W5ZZY—We are glad to welcome WSM to Arkansas from Oklahoma. K5HOL has a new DX-35. Congratulations to K5WDB on making the BPL. K5CRK has a new DX-100 on the air. KN5IPL has joined the ranks of hams in Arkansas. He and JWL are active on 2 meters. KN5GLI, who recently passed his General Class exam, is DXing on 15 meters and reports a QSO with a station in the Antarctic. The Pine Bluff Amateur Radio Club is making rapid progress and has a program of instruction in both code and theory for the newcomer to amateur radio. The club is putting forth much effort in setting up a c.d. unit in its vicinity and already has some 6-meter stations on the air. All amateurs in or near Pine Bluff are invited to attend the club meetings. K5CIR is secretary of the club. VKE, our SEC, is trying very hard to find active amateurs in many of the counties to serve as ECs where vacancies exist. The Arkansas EC Net meets on 3885 kc. each Tue. at 0600. All Amateurs in Arkansas are invited to check into this net. New ECs: W5s VQD, WEE, ENG, TLC, HZU, EOJ and K5CIR. ZZR has a Collins KW and a new 75A-4 and is on single sideband. VAE has a homemade kw. on c.w., a.m. and s.s.b. EMN has finished building a kw. and is on c.w. with it. Traffic: K5WDB 528, W5KRO 61, DAG 40, LUX 23, WSM 13, FPA 7.

LOUISIANA—SCM, Thomas J. Morgavi, W5FMO—K5DDH, who made WAS, recently was appointed OPS. SUM now is working on a new receiver. JPV reports activity on MARS, Delta 75 and Nucklehed nets using a DX-100. K5DGI incorporated block-grid keying on his Viking II for better note and keying. He has worked 96 countries, 72 confirmed, with CA8BK and VP2LU as his latest. K5AGJ is an active traffic man on voice or c.w. VAR has an 813 on the Crayfish Net on 7220 kc. EA received his RAL-7 from MARS. He has his Conelrad alarm going, too. BMD is now on s.s.b. with a homebuilt 20-A. FQN received a c.d. appointment for Desoto Parish. He has a 2-meter rig in the jail at Mansfield. IHI/SRM will be off the air while moving to a new house. Judging from NDV's traffic count he really is handling traffic 90 per cent and experimenting 10 per cent. ØJHY/M5 is active around New Orleans, mobile on 29.626 Mc., and attending meetings with the New Orleans Radio Club while on active duty with the Navy. CEW, our PAM, reports very good activity on Delta 75 but not much traffic. He just about passed out when BV called him on s.s.b. recently. AL now has 221 countries worked on phone and c.w. with 212 confirmed. TTB, a new OBS, has skeds on 14-Mc. phone and c.w. at 9:00 P.M. CST. K5CHC, now an OES, is active on 50-54 Mc. and 144-148 Mc. FMO is back on 20 meters with a new beam and is active on 20, 40 and 75 meters a.m. and some s.s.b. EM has the s.s.b. bug. Please mail reports in on time. Check the expiration dates of appointments and contact the SCM for endorsement. Traffic: W5NDV 279, K5AGJ 192, W5IHI 29, EA 24, JPV 8, VAR 4, BMD 3, CWC 2.

MISSISSIPPI—SCM, Julian G. Blakely, W5WZY—FPI has been appointed your new Route Manager. Bill is well known to the c.w. men as well as the phone men and has been our mainstay on RN5. Bill is very anxious to get a Mississippi c.w. net going and already has started laying the groundwork. All of you who are interested in helping Bill form this net, watch this column and announcements on the Hurricane Net concerning progress and frequency, etc. All persons interested in RTTY or who have equipment that can be placed in operation are asked to please drop us a card. All persons interested in a 2-meter net and all persons already on 2 meters, please drop us a card with all the dope about your station, frequency, etc., and we will compile the dope into a mimeo news letter and mail it to interested parties. Traffic: W5FPI 104, JHS 68, K5-DXL 3.

TENNESSEE—SCM, Harry C. Simpson, W4SCF—Asst. SCM: Richard A. Crowell, 4WQW. SEC: RRV. PAM: PQP. RM: IV. PL sent a graphic account of his trip to Florida and visits with ATA, IE and PZT. We were very sorry to hear of the passing of TZD, Tom Blackburn, of Knoxville, who was a friend to thousands of hams. K4DIZ turns in another fine traffic total in spite of antenna and transmitter trouble. K4EFN reports that W4s BFS, DMU, VLS, YRM, CLY, and K4s CPO, DNG, INK, JJB, KAH, AIA, CWB and EFV participated in a recent toy drive in Nashville. PQP reports a change in the time and frequency for TNON, Mon. through Fri. 2200 CST on 3980 kc. HUT and SCF made a Whirlwind trip to Lake Charles and also visited BQG, K4EWI and K4GFL. TDZ says he is consistent on missing 6-meter openings. ZL3ID and W4NZK contacted each other 202 times during 1956 on 40 meters! FEB is back in action after a long illness. BQG, also ill, is getting along nicely. ARW, who has a host of Tennessee friends, is now FCC Engineer-In-Charge for this Division. WQW is recovering from, of all things, a case of *chicken pox!* IFN is puzzled about his V-beam pattern on 20 meters, having received 579 reports from all continents. Certain Tennessee individuals will be interested to know the military is now issuing SSB-100-MIL, and SSB-1000 amplifiers to some of their installations. UWA built a *QST* 6-meter converter and is now working on a 400-watter. UWA also reports UQV is now assistant fire chief in Cookeville, with W4s APD, HPL and KN4JCA the ham volunteer members. KN4JNI worked a WL7 for her first DX. YRM reports hearing Texas, Washington and Florida on 6 meters. RM IV reports that a Net certificate is going to K4GCO, the son of EIN. Smitty is just 11, and the youngest TN member. ZZ would like 6 meters to "close" for a week or so in order for him to catch up with his work schedule! Traffic: W4PL 664, OGG 623, K4DIZ 402, W4WQT 206, K4EFV 102, W4VJ 70, SCF 58, IV 55, UVL 34, YRM 22, K4GFL 21, W4VNE 15, PFP 14, ZZ 12, UIO 8, K4CWS 7, W4SZI 7, TDZ 3, K4DKX 2, W4UWA 2, DMU 1, HSX 1, HUT 1, IFN 1, K4JXG 1, KYN 1, W4NPS 1, PQP 1, PVD 1, RRV 1, WQW 1.

GREAT LAKES DIVISION

KENTUCKY—SCM, Albert M. Barnes, W4KKW—SEC: JSH. PAMs: VYV and SUD. RMs: QCD and ZDA. The Amateur Radio Transmitting Society in Louisville elected the following officers for 1957: TLU, pres.; BTA, vice-pres.; KWR, secy.-treas.; TDQ, asst. secy.-treas. KQI, MBD, WQC and MFI, board of directors. NGN and TQD are new ECs. MGT is OO Class II. AIS is the biggest traffic man with the highest total, 5GOH/4 is active again. ZDB asks everyone to give the new RM, QCD, fullest cooperation. RPF is very active on MARS and KPN. JSH liked the Novice Accent article. BAZ is working DX on 80 meters and watching the gals go by! CDA wants ARRL Headquarters to revise its operating manual. KKG is active on 10 and 15 meters. DLI has a new homemade three-element 10-meter beam working FB. JCN is trying out a new antenna, Vibroplex and s.s.b. exciter. CJT is active on KYN and KPN with a DX-100. SZL is working DX on 20 meters. OMW is QRL remodeling the house not the shack. JUI now has a kw. s.s.b. on all bands from 160 to 10 meters. YP is continuing fixed portable operation at Fort Campbell. JUI and HTO, a father-son combination, are new OESs. SYL also is a new OES. GEZ, president of the Blue Grass Amateur

(Continued on page 104)

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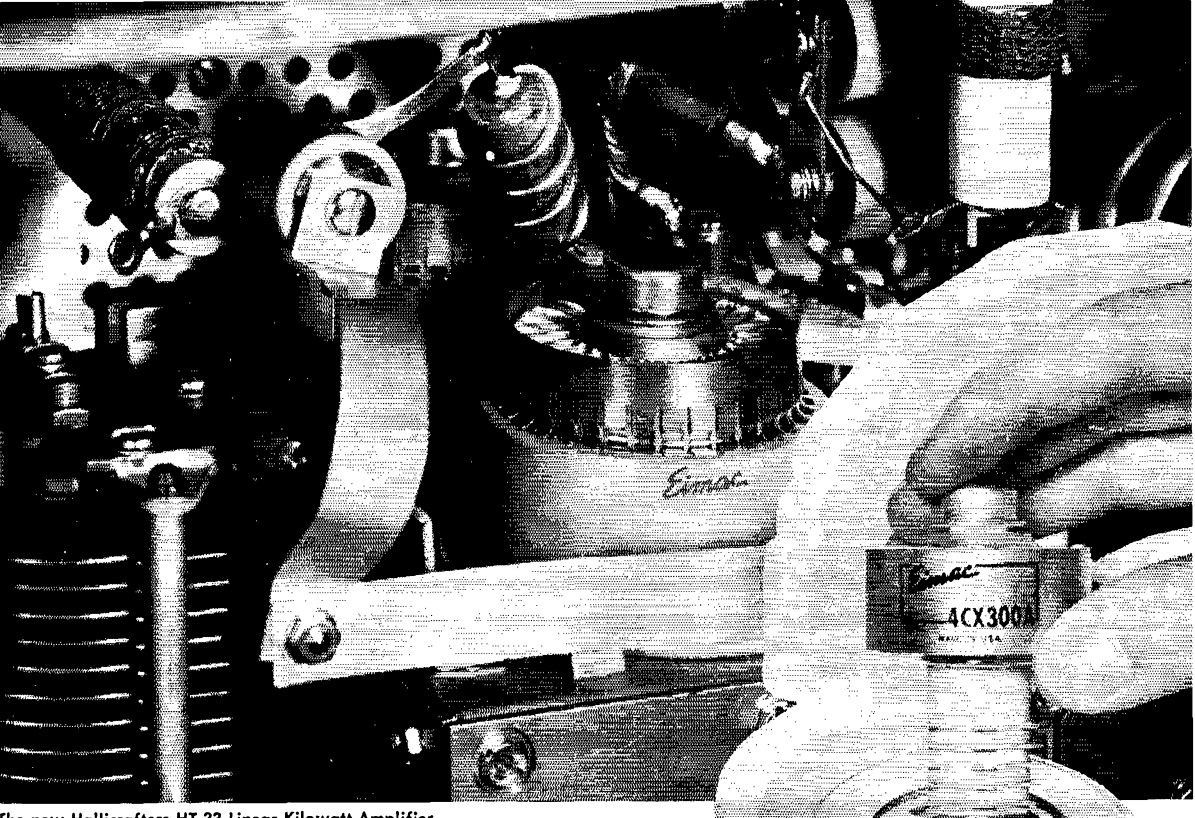
Radio Club, Lexington, is a very active OO and son GSU now has the OM beat with 191 countries. SEC JSH reports PXX is Asst. EC for Graves County. TAY has been QNI into KPN. Traffic: K4AIS 440, W5GOH/4 322, W4KKW 261, QCD 170, ZDB 155, RPF 133, JSH 91, BAZ 51, ZDA 49, CDA 44, KKG 40, NIZ 38, KQU 33, HEA 28, TQD 28, K4HOE 24, W4MWX 23, K4BPX 22, DLI 20, BVB 18, W4JCN 18, MWR 16, K4CJT 15, DVR 13, W4SZL 9, SZB 8, WZE 8, OMW 3, JUI 2.

MICHIGAN—SCM, Thomas G. Mitchell, W8RAE—Asst. SCM (c.w.): Joe Beljan, 8SCW; Asst. SCM (phone): Bob Cooper, 8AQA. SEC: GJH. December appointments: PNF as Emergency Coordinator for Kalamazoo County and WPD as OES. Congratulations and best wishes to both. Many of the club bulletins report activity in providing code and theory classes in their areas. This is a very worthwhile service that more of us should make available. Remember that the ARRL will provide valuable training aids and guides to club groups planning to start courses. Inquiries should be directed to ARRL Headquarters. New officers of the Edison Radio Amateur Assn. are PKA, pres.; VRB, vice-pres.; ILP, secy.-treas.; and RLH, act. mgr. According to reports received to date, there are a wide variety of Conelrad monitors in use. They range from the simplest to some very elaborate auto-alarm type devices. Regardless of the type we use, let's fully comply with the FCC regulation and not be caught off guard by an unannounced test alert. PUV/7 sends best wishes to the Michigang and is looking for QSOs on 40 or 20 meters. QQO soon will be in his new QTH a few miles removed from the present one so he still will be able to serve the same area with traffic. UAT has moved to Hartford, Conn. TCY has his DX-100 perking and is back on QMN. TIC has a new home-built 813 rig with variable inductor pi network output. NOH is active as ever on 6 and 2 meters. His lower frequency activity also is paying off with the new three-element WRL 3-band beam. Since Nov. 4th he has worked 83 countries with his Ranger. According to LIM the v.h.f. activity in the UP still is increasing in scope. He is having good luck with low power 2-meter work over the 40-mile path between Ironwood and Ashland, Wisc., despite the fact that his beam is pointed directly into a hill of iron ore just a block away. Traffic: (Dec.) W8ELW 961, ILP 221, NTC 170, NUL 154, ZLK 138, K8NAW 121, W8QQO 121, FWQ 77, DAP 73, NOH 73, YAN 61, IV 54, AUD 52, SCS 40, SCW 26, FX 25, DSE 22, RVZ 21, RAE 19, HKT 16, LIM 9, IHN 8, SJF 6, SKI 6, EGI 4, UCN 4, TIC 3, DUS 2, FGB 1. (Nov.) W8IUJ 27, TIN 21.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCMs: J. C. Erickson, 8DAE, and E. F. Bonnet, 8OVG. SEC: 8UPB. RMs: DAE and FYO. PAMs: HPP and IIUX. AJW won the Ohio award in the '56 Vermont QSO Party with a score of 810; AQ was second with a score of 700. Canton ARC's 1957 officers are IKM, pres.; OYV, vice-pres.; and AL, secy.-treas. GBJ, IKM, OYV, TND, TTJ and LDR repaired and put back up AL's 10-meter beam. Thirty-six amateurs and their families attended the Canton ARC's Christmas Party and AL won the QSL Contest and a year's subscription to *QST*. OKB put up a 21-Mc. three-element beam and worked 57 countries on c.w. OKB took a message from JNA/ZD4 for Cleveland and with EQN's aid delivered it and sent a reply. The Massillon ARC and the Springfield ARC held successful auctions. Massillon ARC's 1957 officers are NWR, pres.; FRB, secy.-treas.; and YHU, act. mgr. JCC is an ensign in the Naval Reserve and operates c.w. mobile. ZRL is on 6-meter s.s.b. KN8CZJ has worked 34 states. WFJ and QXH are on 15-meter c.w. GFE had a 15-meter quad and it worked fine. HNP, UPH, GFE and DAE made BPL in December. MNM has a Ranger. GBH has a Viking 122 v.f.o. EQN reports that the Ohio County QSO Party will be held on April 13th and 14th. We would like to see stations in all the 88 counties get into the party, both on phone and c.w. This party has grown larger each year, so let us make '57 a banner year. You will not want to miss the Dayton Hamvention to be held on April 6th. K8SSM moved back to Ohio. IVE reports the Greater Cincinnati ARA and the OVCDA have established a RACES plan for the Hamilton County Area. YKF is Toledo's ham of the month. RRZ passed on to Silent Keys. KII has a new baby girl. The Columbus ARA had its largest Christmas Party with 121 members and their families attending. DMR has his TV station on 420 Mc. IBX has his WAS. K8DKO has his Technician Class license and a new HQ-150. He works on 6 meters at home and mobile. GAB and FMW have a Viking KW excited by a Ranger. With regret we report that ARO and OJW lost their fathers. WJB and GXK have new 10-meter Telrex beams. K8BSV has a new Valiant. SMK passed his 1st-class radiotelephone exam. Traffic:

(Continued on page 106)



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Here is a practically "break proof" tetrode. Made entirely of ceramic and metal, a pair will easily take a full kilowatt input in SSB, yet they are small enough to fit in the palm of your hand.

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D-C Plate Voltage	1000	1500	2000 volts	Max-Signal D-C Screen Current	25	20	15 ma
D-C Screen Voltage	350	350	350 volts	Peak R-F Grid Voltage	50	50	50 volts
D-C Grid Voltage (approx.)*	−50	−50	−50 volts	Driving Power	0	0	0 watts
Zero-Signal D-C Plate Current	100	100	100 ma	Max-Signal Plate Dissipation	125	150	175 watts
Max-Signal D-C Plate Current	250	250	250 ma	Max-Signal Plate Power Output	125	225	325 watts

*Adjust grid voltage to obtain specified zero-signal plate current.

W8UPH 1050, DAE 288, VTP 281, GFE 215, QLJ 210, HNP 163, UPB 140, HXB 131, AL 122, ARO 76, K6SSM/8 39, W8SMK 34, QIE 31, HZJ 29, LMB 24, DG 20, EEQ 10, W9VBV/8 10, W8BEW 9, RO 8, AQ 5, GBH 4, MGC 4, YCP 4, KN8CZJ 3, W8BUM 2.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: KGC, RM: BXP, PAMs: GDD, IJG and NOC. Section nets: NYS on 3615 kc. at 1845, NYSPTEN on 3925 kc. at 1800, SRPN on 3980 kc. at 1130, IPN on 3980 kc. at 1500, MHT on 3716 kc. Sat. at 1300. Eastern New York is proud to have three members, BXP, NOC and K3EDH, listed in BPL for December traffic. New officers of the Harmonic Hill RC include KGV, pres.; K2RUU, secy.; OIT, treas.; WQL, act. mgr. LXW added a linear amplifier to his Gonset. K2DRN says a good ground on the rig cured his 20-meter TVI. A new all-band antenna 70 feet high stretched above the shack of EZL. The IBM Club will miss the family team of EWO and VDX, who have moved to Owego, N. Y. MHE has a new 10-meter beam; ditto for K2JMY. K2TYS is now mobile 10 through 75 meters. Transistorized equipment demonstrated by BMU was the January feature of the Schenectady Club. Having worked 45 states and 35 countries with his AT-1, K2HXR is adding a pair of 807s. K2EIU, at the helm of SZ, came up with a fine score in the October CD Party. Our thanks to AAO for obtaining a message from Governor Harriman during the Presidential Relays for the inauguration ceremonies Jan. 20th. Lighthouse Larry, JZK, reports General Electric received approximately 45 contenders for the 1956 Edison Award. Why not start sending in your nominations for the '57 Award? The new officials of the NYSPTEN are COB, mgr.; BKC, asst. mgr.; K2IYP, secy. Ace traffic-handler and former RM of NYC-LI, VNJ is now a resident of Nanuet. Glad to have you with us, Vic. ZBY is back on 20- and 75-meter s.s.b. Five new states on 6 meters are reported by GDD. Traffic: (Dec.) W2BXP 547, K2EDH 277, W2NOC 269, EFU 257, PHX 146, ATA 76, GDD 74, K2HPQ 60, W2KLI 48, DGD 12, K2HNW 7, W2GTC 4.

NEW YORK CITY AND LONG ISLAND—SCM, Harry J. Dannals, W2TUK—SEC: ADO, PAM: OBW, RM: WFL. Section Nets: NLI, 3630 kc. nightly at 1930 EST and Sat. at 1915 EST. NYC-LIPN, 3908 kc. Mon. through Sat. from 1730 to 1830 EST. Holiday traffic earned BPL cards for JGV, JOA, KEB, KFV and K2s AMP and PHF. OBW announces that the NYC-LIPN is devoting a special session on the first Sun. of each month at 1400 EST on 3908 kc. to AREC activities. Sixteen stations reported into the first session. Our section nets continue their fine work but urgently request stations in Brooklyn, Queens and the Bronx to help out. K2IYK, home for the holidays, built a 2E26 rig to take back to college. New hams in Amityville are DMF and K2MNJ. K2DEM started the new year off right with UA9 and JA6 contacts to complete his WAC. Officers of the Bronx H. S. of Science RC are K2OEG, pres.; B. Teitel, vice-pres.; K2DEM, secy. The station call is MQQ. KN2VXS, a YL, is a new member of the Fieldston School RC. K2TBW dropped the "N." IVS received cards to complete his 3.5-Mc. WAS and passed 100 countries for DXCC. K2LUM received an NC-300 for Christmas. UGF and K2KSP added Matchbox couplers. A new 40-meter vertical is on the way up at BO. K2PGP received WAC and WAS certificates. New officers of the Tu-Boro RC are MES, pres.; LGK, vice-pres.; IAG, treas.; and YSM, secy. K2CMV installed a time-sequence keyer in his Viking II. YHP built a 6-meter rig for the V.H.F. Contest and worked the West Coast during pre-contest testing. Officers for 1957 of the Radio Club of Brooklyn, now 38 years old, are PF, pres.; CCD/KW, vice-pres.; BKP, secy.; AAZ, treas.; and AGW, ARW, BZG/DAK, HDV and K2EIB, directors. K2FC is going to make a business trip around the world. Members of his club, the Order of the Boiled Owls, hope to contact him. JTO is now NCS on the Queens 10-meter AREC Net. IAG, Queens 10-meter EC, is looking for new stations. Listen on 29.5 Mc. at 2030 EST Mon. for him. IIJ has a kw. pair of 813s on 20 and 40 meters. K2KRC has 31 states on 50 Mc. K2OKW is on 6 meters. K2GKY worked his first W6 on 50 Mc. K2UOY needs only 4 more states to complete his WAS. EEN has a new Pacemaker on s.s.b. and installed an eight-element Telrex 2-meter beam. KN2VWZ joins Dad, VL, and Mom, KDP. K2AED added a C.E. Model B slicer to his HQ-140X. Ex-K2DX now signs W4UI from Virginia with a new DX-100. After 2 years on 144 Mc. exclusively, K2HJN has a Ranger and 813s for work on the d.c. bands. K2LTC added a 10-meter Skysweeper beam. New Generals are K2s TRJ, UBB and UNJ. K2TIM dropped

(Continued on page 108)

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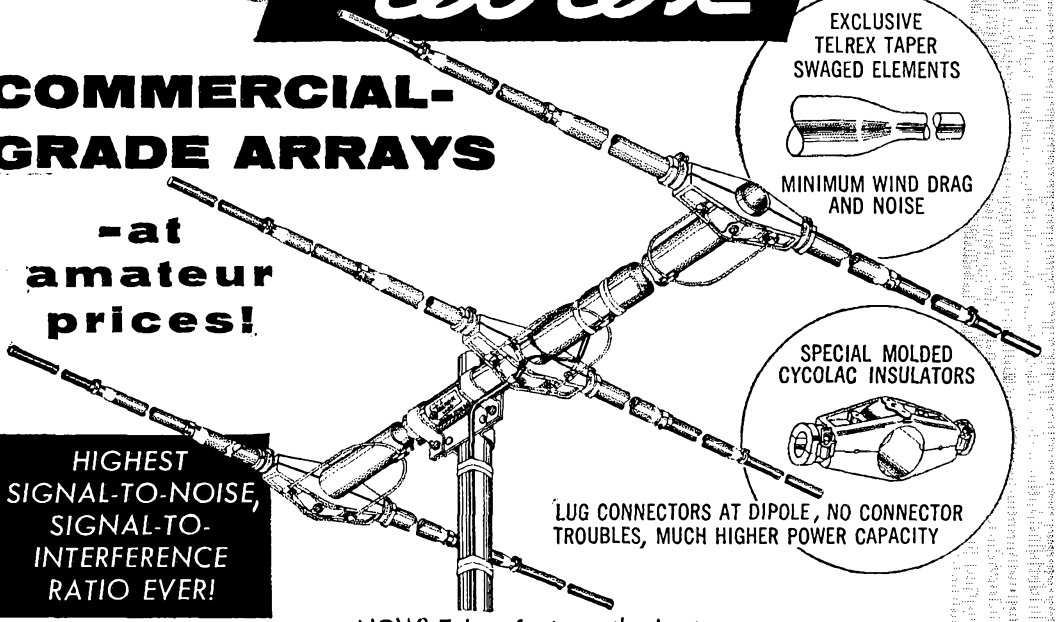

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MINIMUM WIND DRAG AND NOISE

SPECIAL MOLDED CYCOLAC INSULATORS

LUG CONNECTORS AT DIPOLE, NO CONNECTOR TROUBLES, MUCH HIGHER POWER CAPACITY

HIGHEST SIGNAL-TO-NOISE, SIGNAL-TO-INTERFERENCE RATIO EVER!

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- **Hair-pin resonated**
- **Wind drag reduced 55%**
- **Rugged, lightweight aluminum construction**
- **All stainless steel hardware**

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NOW! Telrex features the best arrays ever produced, and new lower cost models designed to do the job.

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ORIGINATORS AND MANUFACTURERS OF THE WORLD'S FINEST TV AND COMMUNICATION ANTENNAS

the "N" and worked W6-Land with 4 watts on 14 Mc. KN2UEA has an NC-300 and BW5100 on the Novice bands with a Communicator II on 144 Mc. The Garden City HSRC received the call K2VST. NWK has a 75A-4. PFL has a new Viking KW. New officers of the Lake Success RC are KDC, pres.; DMD vice-pres.; and YSI, secy.-treas. K2QBR is building a 180-watt rig. K2CTK put up a multi-band dipole. Ditto K2MYW, who used Oct. '56 *QST* for his reference. K2DGT/6 writes from his Navy QTH in California that he worked 40 countries in just 6 days! Ex-OLZ is signing 6OLZ and not OLU as reported earlier. K2PBH is on with a DX-100 and HQ-140X. KN2TNN has worked 32 states, Canada and Hawaii with an Adventurer and S38-D. 3KCI/2 is active from Bethpage with a 6L6 rig and an SX-24. New officers of the Amateur U.H.F. Club of Jamaica are OTA, pres.; OKX, vice-pres.; QPQ, corr. secy.; K2EEK, rec. secy.; and K2BBO, treas. K2UQX has 29 states on 40 meters. KN2TXT has 10 countries and 3 continents. New officers of the Brooklyn Civic Center RC are K2BDD, pres.; K2IWC, vice-pres.; JFL, secy.; and IUL, treas. There again will be a Single Sideband Dinner (Seventh Annual) Tue., March 19, '57, arranged by AMB and the Single Sideband Association. Location is to be announced later, or get details from AMB on 3.8-4.0 Mc. s.s.b. Please check your appointment expiration date. Traffic: (Dec.) W2KEB 4662, KFV 1442, K2AMP 562, W2JOA 529, JGV 250, K2PHF 242, W2WFL 218, K2DEM 181, QZS 135, W2TUK 112, K2GHS 107, KXZ 96, W2AEE 74, IVS 68, K2LUM 59, KSP 50, W2BO 38, K2RJO 37, CRK 35, EP 32, W2OBW 32, UGF 32, GP 30, DRD 24, K2PGP 24, JZR 23, GLP 22, W2LGK 22, OME 22, K2CMV 18, W2PF 14, EC 10, JBQ 10, MUM 7, K2AAW 6, W2IAG 6, K2DVT 5, ITZ 5, KRC 4, LEP 4, PSV 4, W2YBT 4, K2UQX 2. (Nov.) W2KEB 3214, KFV 1204, K2CTK 9, MYW 8, W2MUM 5.

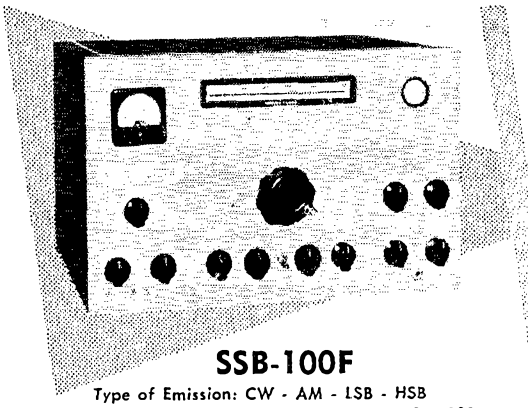
NORTHERN NEW JERSEY—SCM, Lloyd H. Manamon, W2VQR—SEC: IIN. PAM: VDE. RMs: MLW, NKD and CGG. K2OBJ has moved to a new QTH in Union. BRC has taken over as new net mgr. on NJN. CFB is having a hard time keeping his skeds because of an interior-decorating job being done on his home. The State Line Radio Club will hold its third annual dinner at the American Legion Hall, Monsey, N. Y., on Mar. 2nd. The newly-elected officers to be installed on that date are K2GPK, pres.; K2BPG, secy.; SVS, act. mgr.; and K2ODF, pub. chairman. TPJ has moved his QTH to Port-Au-Peck. K2AFQ has curtailed activities because of studies at the U. of Penn. KN2UBW is a new ham in Long Branch. FZY has a new NC-300. BOK has a new rig and beam on 20 meters. MPA is back on the air after a long lay-off. The GSARA held its first social night of the season on Jan. 23rd. Members and their XYLs had a very wonderful evening. CQB is doing a fine job for the GSARA in arranging such programs for members and their friends. K2BWQ finally made the BPL column this month. AZL was guest speaker at a recent meeting of the Central New Jersey V.H.F. Society. A special December meeting was called by the Society and the following officers were elected: VPL, moderator; TTM, asst. moderator; K2BJP, recorder; and K2HYQ, treas. KN2TWK is interested in starting a Novice net in the N.N.J. section. Anyone interested is requested to drop him a line at 40 E. Palisades Blvd., Palisades Park. K2PSW is moving to Gardiner, Mass. K2PIM has received a 25-w.p.m. C.P. sticker. He is well on the way to WAS with 47 states and is looking for Wyoming to complete the circuit. ESW is the new head of the publicity department of the Windblowers V.H.F. Society, replacing FPM. The club is 100 per cent ARRL. The new slate of officers is as follows: ISK, pres.; K2CMP, vice-pres.; IMI, secy.; K2BC, treas. K2DFS is on 40, 80 and 2 meters from his new QTH at Saranac Lake. Rumor has it that K2CMB is pretty hot on the mandolin and that combined with the voices of ESW and ZDR they rocked the walls at the QTH of NUI recently. GEX is on with a new KWS-1 at a new QTH in Colonia. K2KSH is a new daddy. IMG, ISK and NUL are experimenting with s.s.b. Remember the Windblowers Net each Fri. at 1900 on 144.9 Mc. K2MMM has a new bug. VDE has a new HQ-100 and has just received an Honor Certificate from the NY-LI Net for continuous service. The Penn-Jersey Club is planning its annual banquet in March. GVU has a new trap antenna on all bands. A new tower is growing in the back yard of the Fair Haven Civil Defense Coordinator, namely BTG. YLS is lending much moral support during the tower-erection period and promises to plant enough seeds on topside to grow a couple of new beams on 10 and 20 meters. HJL is erecting a new 75-meter antenna. K2DHE is hard at work on the RACES technical committee, along with K2DO and RG. IPR, an old stand-by on 2 meters, is toying with the idea of going

(Continued on page 110)

one name stands out . . .

ELDICO

SSB Equipment



SSB-100F

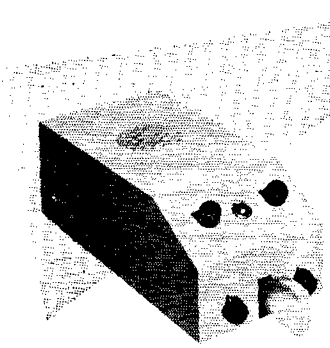
Type of Emission: CW - AM - LSB - HSB

Power Ratings: DC average input SSB-100 watts; AM input (two tone test)-80 watts. Peak envelope power input SSB-144 watts. Peak envelope power output SSB-100 watts.

Harmonics and Spurious Responses: Spurious mixer products—40 db or more down. Third order distortion products—35 db or more down. TV interference suppression—40 db or more second harmonic, 60 db or more higher harmonics.

Unwanted Sideband and Carrier Suppression: 50 db or more down, THROUGH LOW FREQUENCY CRYSTAL—LATTICE FILTER.

Frequency Stability: Control Oscillator — (800 to 1300 kc)— ±100 cycles after two minute warm up period. Output frequency — within 300 cycles after five minute warm up period. Dial accuracy— ±2 kc after calibration.



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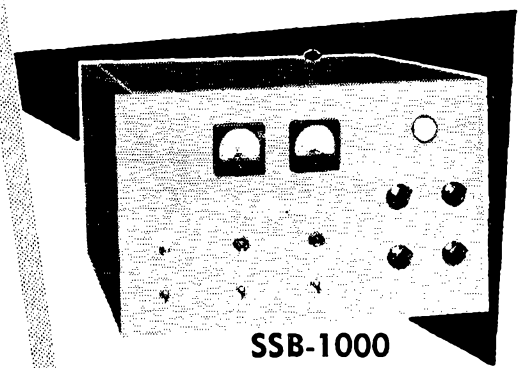
New ELECTRONIC KEY for finer CW

- Characters complete before next command can be obeyed.
- Smaller modern cabinet: 4" x 4½" x 7½".
- Receiver muting and audio transfer to headphones.

- Separate tone, volume and speed controls for 8 to 50 words per minute—located on front panel. Weight, ratio and receiver muting threshold controls—located on rear of unit.
- Self contained with transformer, Selenium Rectifier, 2 dual tubes, 2 extremely quiet relays and miniature speaker.



SSB-1000

LOW DRIVE REQUIREMENT — 3 watts PEP will drive the unit to full kilowatt.

PI-NETWORK OUTPUT — Single knob bandswitch and high-efficiency silver-plated Pi-network output circuit. Matches wide range of antenna-impedances.

HIGH HARMONIC ATTENUATION — High-Q plate and grid circuits and Pi-network output circuit provide maximum harmonic-attenuation.

POWER RATING
DC Input CW—1000 Watts
AM— 700 Watts
Peak Envelope Power Input SSB-1000 Watts
Peak Envelope Power Output SSB- 625 Watts

FREQUENCY RANGE
5 Bands: 80m 3,500 to 4,000 Kc
40m 7,000 to 7,300 Kc
20m 14,000 to 14,350 Kc
15m 21,000 to 21,450 Kc
11/10m 26,000 to 30,000 Kc
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to the lower frequencies. VMX now is a Class I OO. K2ICE is trying to get on 220 Mc. He has the gear but the antenna is a problem. K2GIQ is doing a good job on EAN. The NJN monthly report for December shows the following: Evening Net—sessions 26, attendance 450, traffic 467. This is a new net record high for NJN. The NJN Morning Net—sessions 22, attendance 83, traffic 73. The overall trend in Northern New Jersey in all departments during December shows a new high in activities. Let's continue on for a bang-up 1957. Traffic: W2MLW 415, K2BWQ 264, EQP 162, BHQ 145, W2VDE 144, BRC 138, ZVW 76, RXL 70, K2MFF 69, OBJ 42, W2VMX 42, OXL 28, K2GIQ 23, W2CQB 18, KFR 17, CVW 9, K2SKK 9, W2CFB 5, K2MMM 4, EMJ 3, W2GVU 1.

MIDWEST DIVISION

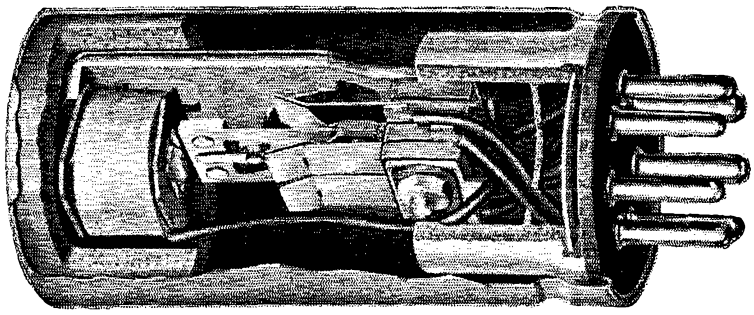
IOWA—SCM, Russell B. Marquis, WØBDR—UQG has joined Silent Keys. YUA received a PAM appointment and GXQ an ORS. BSG renewed his OPS appointment. NGS is official Conelrad alert station for the 75-meter phone net. GQ has a 51SB exciter for s.s.b. NGS is sporting a new beam and is working the DX on 10 meters. New officers of the Campus Radio Club in Ames are UHZ, pres.; ZUV, vice-pres.; KØAVZ, secy.; ZMU, treas. New officers of the IDM Net are ZAQ, NCS; KØCLS, manager and pres.; CVI, secy.; SMS, publicity; KØBWN, treas. The Teen-Age Net is active Mon., Wed., and Fri. on 3960 kc. at 1645 CST. The Cedar Rapids Civil Defense Council has received approval for matching funds from FCDA to provide equipment for WSV. FMX is on his annual vacation in Texas. ERP has gone to Florida for an extended stay. KØCMC has a new Valiant and an NC-300. The Hamilton County Amateur Radio Assn. is a new club in Webster City. VCM has a new Pacemaker. NWX, Midwest Division Director, gave a talk at the Fort Dodge Club. KØDZX and DDA have received TLCN net certificates. Traffic: WØBDR 2435, SCA 1907, PZO 1608, LCX 1573, LGG 1306, CZ 734, BJP 540, GXQ 521, UTD 239, KVJ 226, BLH 134, TGQ 82, EHH 60, YAL 56, QVA 55, KØAAH 52, WØLJW 49, NGS 49, BTX 48, KØBEC 47, WØWHE 44, KJN 34, KØWAD 32, WØZPM 28, KØCLS 26, WØVWF 24, ZAQ 22, EEG 19, KØEXN/Ø 18, WØPTL 16, KØAPL 14, WØYI 14, ZZF 14, KØAHZ 12, WØFDM 12, FMZ 12, FNR 12, KØDBW 11, BRE 10, WØDJY 8, RQW 8, SLC 8, UTX 7, KØAIC 6, WØGQ 6, SRQ 6, YUA 6, KØDSS 4, WØTTO 4, KØBMV 3, CMC 2, EVE 2.

KANSAS—SCM, Earl N. Johnston, WØICV—SEC: PAH. RM: QGG. RAM: FNS. Election of new officers of radio clubs tops this month's news. The Jayhawk Amateur Radio Society of KCK announces SIJ, pres.; YFT, vice-pres.; KØDVJ, secy.-treas.; KØs DOF, pub.; HVG, membership.; BER, tech.; BZK, act. mgr.; ZGK, EC, with BXF putting out the club bulletin. The Coffeyville ARS elected YLI, pres.; WFD, vice-pres.; K6CWT, secy.; HRG, treas. The KVRC of Topeka has TRG, pres.; JIV, vice-pres. and treas.; KØBJD, secy. YFE is chief operator and announcer at KMDO, Ft. Scott. UAT also is announcer there. RXM and WSO, who are technicians at YFE's TV shop, both have new DX-35s. CKRC's *Ink* quotes new CKRC officers for 1957 as STC, pres.; HAJ, vice-pres. (also publishes *Ink*); PKD, secy.-treas.; MVG, act. dir.; JAS, dir. HAJ also is a new EC. The McPherson ARC's new officers are ETX, pres.; KNØEKN, vice-pres.; K6AYS, secy.-treas.; BBO, c.d. coordinator. CHJ, of Junction City, has built up a product detector and Q multiplier as a unit as well as a Q5-er. Hats off to KØDIP, ex-9DPA (1930), who was off the air for 25 years. Curt is recovering from a heart ailment and gives ham radio the credit. The Wheat Belt Radio Club, which draws members from a 300-mile area, was two years old Dec. 27th and is aiming for 100 club members in '57. Traffic: WØBLI 773, KØFEI 558, WØFNS 336, NIY 304, TOL 293, QGG 263, SAF 206, MXG 181, YVM 169, ABJ 133, IHM 61, ONF 52, KØBXF 42, WØQQQ 39, KØAHW 37, ICV 34, KØBIX 31, WØFDJ 28, WWR 27, DEL 21, KØEWS 16, WØLIX 15, TRG 14, UOL 14, ECD 12, TNA 12, MOU 11, VZM 10, LQX 7, RXM 7, HL 6, ASY 5, IFR 5, BET 4, FHU 3, UAT 3.

MISSOURI—SCM, James W. Hoover, WØGEP—Six Missouri stations made BPL during December. CPI has made BPL 50 times in 51 months. WYJ, St. Louis, is looking for Missouri stations to start a mid-day traffic net on 40 meters. JHY is back in the Navy and is stationed at New Orleans. K5DKT/Ø worked 20 states in 3 weeks from the new QTH in Joplin. New officers of the Heart of America Radio Club are KØAEU, pres.; RDI, vice-pres.; TFQ, secy.; UHB, treas. FXA is attending school at M.I.T. KØCOD has a new DX-100. MMZ and KNØEET, Marshall, have been working a 2-meter schedule with BKV, in Colum-

(Continued on page 112)

MALLORY HAM BULLETIN



NEW Mallory Heavy-Duty Vibrator

features unique design for longer life, constant output

The internal mechanism in the new Mallory Series 1700 vibrator is so different from any other that we thought you should have a close look at it. Notice that there are *no* conventional button contacts. Instead, the make-and-break action is done by special alloy leaves, which serve both as contacts and as spring elements.

This construction provides a contacting area *as wide as the spring leaf itself.* It also eliminates the extra weight of the usual button contacts, making a lighter, simpler assembly for the driving coil to move. The result is a considerable improvement in vibrator performance.

Consistently longer life. On heavy duty cycle tests, the new vibrators give up to 100% longer service.

More constant voltage. The larger contact area reduces the rate of erosion of metal. Contact spacing stays more constant . . . output voltage holds steadier.

Sure starting. Because contacts are lighter, they can be spaced wider to prevent start-up flare, without need for greater driving power.

High uniformity. The new, simplified design uses fewer parts . . . is made to exceptionally uniform characteristics.

You'll find the new Mallory vibrator just right for powering two-way mobile rigs and other heavy-duty battery operated gear. This design is available in the split-reed type shown here for 6/12 volt service*, and in a Duplex heavy-duty model without the split-reed construction. Your local Mallory distributor is stocked to serve you promptly. See him soon . . . and write to us for a complete catalog of all Mallory precision components for amateur experimental use and repair work.

Use dropping resistor in series with drive coil for 12 volt operation

for a dependable, power-full mobile supply—*Vibrapack*®

No sir—you just can't tie a better, more dependable mobile power supply to your transmitter or receiver than the famous *Vibrapack*—by Mallory. If you plan mobile operation—plan Vibrapack power. They use the new Mallory vibrator with the improved contacts and longer life.

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bia. GEP has a new 6-meter coaxial antenna. The V.H.F. SS stimulated increased activity on 6 meters in the St. Louis Area. EEE is now on 6 meters. The following stations in the western part of Missouri are looking for contacts east on 6 meters: MID, Raytown; VWO and HVW, Lees Summit; MLX, Butler; IBL, Mt. Vernon; DDX, Gashland. Traffic: (Dec.) WØCPI 1515, GAR 616, OMM 508, UXT 312, BVL 278, KØDEX 233, WØWYJ 229, OUD 164. LQC 155, CKQ 136, JHY 131, MHS 127, KIK 114, HUI 62, IIR 56, KØDRY 50, WØEEE 46, KA 38, WAP 32, ECE 31, KØAQO 29, WØYKC 19, K5DKT/Ø 17, WØRTW 17, KØACK 6, WØBUL 5, GEP 5, GBJ 4, OVV 4, VFP 3, GCL 2. (Nov.) WØWFF 20, LQC 9, VTF 2.

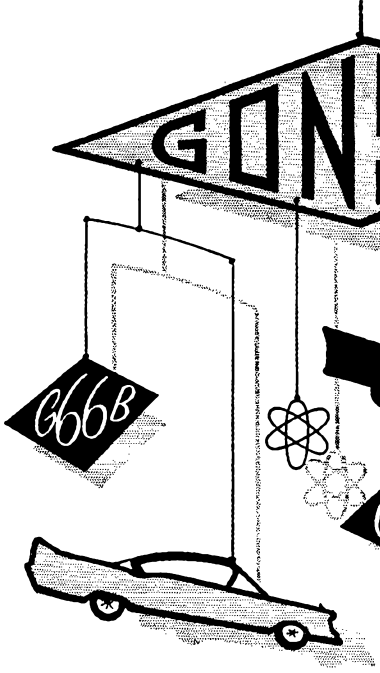
NEBRASKA—SCM, Floyd B. Campbell, WØCBH—SEC: JDJ. PAM: MAO. New officers of the Lincoln Amateur Radio Club are GVA, pres.; UUP, secy.-treas. Ak-Sar-Ben Club officers for '57 are AMM, pres.; AEM, vice-pres.; JJK, secy.; UKQ, treas. The Wheat Belt Net meets at 12:30 CST Sat. on 3825-kc. phone with QHE as NCS and KDW and RPY as alternate NCSs. Any station is welcome to QNI. December QNIs for WB net 72. The Western Nebraska Net had: QNIs 306, average 11.7 and handled 55 pieces of traffic. KNØHUF has a new RME-4300 and Globe Scout 65B. JDJ got a new mike but we don't hear him on phone. QHE is C.D. Communications Director For Furnas County and QHF is Radio Officer. ECs are needed and if your club has not been contacted by the SCM, please send or recommend someone to him at once. If you do not have an EC in your community let's get one. The Nebraska 75-meter (morning) Net had: QNIs 432, average 13.6, QTCs 139, average 4.5, total time 857 minutes, average 27.7. There are a total of 31 members. NSS reports: QNIs 225, average 7.3, QTCs 62, average 2, total time 1467 minutes, average 47.3. The Nebraska Noon Net had: QNIs 781, average 25.2, QTCs 172, average 5.6, total time 1087 minutes, average 35.1. There are 52 members on the Noon Net roll call. Traffic: WØZJF 285, MAO 229, KØDGW 201, CDG 91, WØZWG 79, EGQ 78, SPK 77, NIK 72, DDT 71, DQN 65, ZOU 64, UJK 56, VGH 42, KØBRS 36, WBF 20, DFO 19, WØBOQ 17, KØBRQ 17, ELQ 17, WØOOX 15, KIB 12, KDW 10, KFY 10, AEM 8, FRS 8, NHT 6, OCU 6, TIP 6, KØBDF 5, GVE 5, WØHOP 5, LSO 5, ZWF 5, KNØHUF 4, WØNHS 4, ORW 4, QKR 4, KØAKR 3, WØRNH 3, BEA 2, HQE 2, HXH 2, NGZ 2 VZJ 2.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Milton E. Chaffee W1EFW—SEC: EOR. RM: KYQ. PAM: YBH. Traffic Nets: MCN, Mon.-Fri. 0645 on 3640 kc.; CPN: Mon.-Sat. 1800, Sun. 1000 on 3880 kc.; CN: Mon.-Sat. 1845 and 2200 on 3640 kc. KYQ reports the lack of activity on the late CN session may force it to lapse. Let's try to stir up more participation among the late evening traffic men. Drop in on 3640 kc. for a few minutes and meet old friends—and bring some traffic, too! In December, CN met 52 times, handling 358, and with LV (30), KYQ (24) and IUC (22) most frequently QNI. CPN met in 31 sessions and handled 372, averaging 12 per session. YBH notes QNI honors to DHP (31), EVH (30) and VQH (29), with YBH, FYF, TVU and VIY close behind. For CPN work, Net certificates go to VIY, IAK, RPX, GEA and FKE. MCN, early birds only, held 17 sessions and moved 66 messages, with IBE, RFJ and EFW rising most regularly. RGB has been off the nets because of evening overtime work. DHP hits several nets, plus an OBS schedule. YNR reports LUP, JSU and WNs IXY and LHS have joined the CQ Radio Club at Torrington. Reports received: OO from BVB and OES from UJG and FVV. UJG is an electronics programmer for IBM, which curtails his v.h.f. activity. The Hamden RC is an active club, according to UJG and WHL. WHL has a new DX-100. WX came through with a report on AREC/RACES activities in Fairfield. YOC and UBM have resumed family station work, aided by a new Ranger from EDO, the father of UBM. FHP sports a new AF-67 for portable/mobile work and lectured on ham radio for the Grange 4-H Club. BDI is happy that his rooftop antenna farm withstood the sleet storm. FYF has a new antenna and see what it did for his traffic score. HYF moved 3 miles but stayed in Ridgefield and has a new 6N2 running on 2 and 6 meters. YBH stayed in form with another BPL. EJH is busy with the local RACES and named FRN his Asst. EC. FRN and GWW are active on 6 meters working DX, with GTK, EJH, DZC and IGG ready to join them. Many thanks to all for making my tour as SCM most enjoyable. Please give my successor your support and loads of monthly reports and keep Connecticut up front. VSI, Hartford County Amateur Radio Assn. secretary, reports that code and theory classes started

(Continued on page 114)

GONSET mobile twins

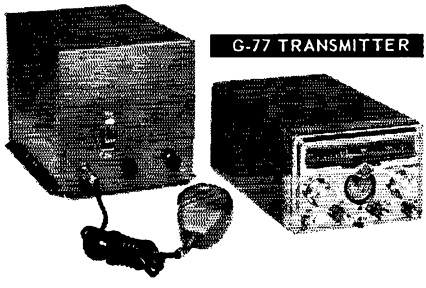


Each by itself . . .
or together as a
team . . . unexcelled!

G66B, compact, conveniently accessible, is widely used and acclaimed for mobile reception . . . . . performs in an equally outstanding manner as a multi-band communications receiver for fixed stations. Separate power supply/speaker combination unit operates from 6 and 12 volts DC (specify) and 115 volts AC, makes either operating mode possible.

G77 typifies the finest in modern mobile transmitter design, offers multi-band operational flexibility.

Operated together as Mobile Twins, G66B and G77 point up the effectiveness of GONSET forward thinking, coordinated designs.



G-77 TRANSMITTER

FREQUENCY RANGE: 80-40-20-15-10 meters. VFO or xtal, switchable. Highly stable VFO, each band spread over most of slide rule dial.

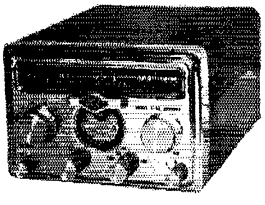
FULL BANDSWITCHING: Exciter ganged with VFO, pi network output.

POWER INPUT: 50-60 watts, modulated. CW provisions, 6146 tube in output. New modulator has integral speech clipping. High gain speech for PA-type dynamic, reluctance or xtl mikes.

POWER SUPPLY: Heavy-duty, vibrator, 6 and 12V DC. Output voltage 500-600V full load, Selenium rectifier, low drain both on standby and transmit. Power supply is a separate compact unit.

G77 with power supply...(less microphone and crystal)..... 279.50

G-66 RECEIVER



6 BANDS: 540-2000 kcs. 3500-4000 kcs. 7000-7300 kcs. 14,000-14,350 kcs. 21,000-21,450 kcs. 28,000-29,700 kcs.

STEEP SKIRT SELECTIVITY: 265 kc 2nd I.F. 8 high Q tuned circuits. 3.5 kc I.F. bandwidth at 6 db down.

AM, CW, SSB RECEPTION. Highly stabilized HF and BF oscillators and xtl controlled 2nd conversion oscillator.

DOUBLE CONVERSION ALL BANDS: 2050 kc 1st I.F. Double input tuning (3 tuned circuits) on high bands for high image rejection.

AVC—Noise limiter—Panel S meter—antenna trimmer—BFO pitch—Audio-RF gain control—slide rule dial—3 watts audio.

G66 RECEIVER...(less power supply).....(#3046).....net 189.50

"3 way" (6V-12V-115V AC) Universal power supply/speaker....net 44.50

GONSET DIVISION OF L. A. YOUNG SPRING & WIRE CORP. • • • • • • Burbank, Calif.

Feb. 7th with instruction one-half hour before meetings on the 1st and 3rd Thurs. of each month. Traffic: W1YBH 449, FYF 319, EFW 306, AW 253, NJM 180, CUH 166, HID 139, DHP 122, LV 112, IUC 102, BDI 86, ULY 81, RPX 51, EKJ 45, RFJ 44, AVS 35, FHP 33, GVK 32, VIY 26, EBW 19, BVB 18, GEA 14, YOG 13, GVJ 10, HYF 9, SJ 6, EJH 5.

MAINE—SCM, Allan D. Duntley, W1BPI/VYA—Asst. SCM: Oliver R. Hamlin, 1WRZ. SEC: TVB. PAM: FNT. RM: EFR. OOs: WRZ, CBU and TVB. The Barn Yard Net meets Mon. through Sat. at 0800-0930 on 3960 kc.; the Sea Gull Net meets Mon. through Sat. at 1700-1800 on 3940 kc.; the Pine Tree Net meets Mon. through Sat. at 1900 on 3596 kc.; the Horse Traders Net meets Sun. from 1700 to 1800 on 3940 kc. WJN has finished his obligation to Uncle Sam and is back in Dixfield. Whatever happened to YVN? We miss you, Budge. WXI is doing well on 2 meters; also the kilowatt sounds good—another product of LHA. New officers of the PAWA recently were installed. Why not join the radio club in your area? DIS has a new DX-100 and is working all countries. VXR is doing well with a new beam on 10 meters. Don't forsake 160, Cliff. Why doesn't that "dead one" on the nets put some modulation on it? There is more and more 6-meter activity. EFF is keeping Maine out in front in RTTY. Are there any others in Maine? Although ZEN and GNX live in Massachusetts we feel they belong in Maine. Their help on the Sea Gull and Barn Yard Nets is greatly appreciated. Our deepest sympathy to JIS in this time of trouble. Chin up, Pappy. Let's get behind the nominees for SCM and vote for the one of our choice. HKZ is going modern—s.s.b. WSV is back in the Pine Tree State. Hope you all have your Conelrad monitors. Congrats to Nona Morton, the sweetheart of the Barn Yard Net. Traffic: W1LKP 405, CEV 319, BCD 76, WTG 62, UDD 48, FNT 29, AHM 26, BDP 19, EPN 14, JIS 14, JMN 13, HYD 12, GYJ 11, OTQ 11, K2KVP/1 8, W1FD 3, HTD 3.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, jr., W1ALP—Appointments endorsed: IBE Rockport, SMV Cohasset, MCR Boston, WLU Watertown, RCJ Marlboro, ZYX Area 1 Radio Officer, OSS Townsend, VYS Weston, as ECs; GDY and VMD as OBSs; BB, K1USA and LM as ORSs; BB as OPS. PF is on 2 meters at home and in the car. ALP worked 7HUV on 10 meters. HNK has Ranger. RTW is home for awhile. Heard on 2 meters: KN1AAO, AGH, QKA and 7KON/1. AOT is 100's father. Heard on 10 meters: OHA, JXM and K1AMP. GOU is now a member of the Dim Lights. DWW/5, in Louisiana, is on 10 meters. JLN is acting chairman of the Federation of Eastern Mass. Amateur Radio Associations, and all clubs in this section have been invited to join. AHX is a member of this committee for the Cape Cod & Islands ARA. PN writes that he is on M/M on 15 and 10 meters with a Ranger and an SX-96 and is looking for the W1s. The T-9 Club held a meeting at Hal Baker's QTH. SX gave a nice talk at the South Shore Club. BGW, TZ, AYG and WK took part in ARRL's November F.M.T. We are sorry to have to announce the passing of ARC of Harwich. The Cape Cod & Islands ARA elected BCN, pres.; LYV, vice-pres.; MKW, secy.-treas.; DJK, YHQ, UTU and ZEJ, directors. BCN is R.O. for Sector 2C. BNW is on 15 meters with a new beam. CFQ is on 2 meters with a 60-footer and a 522. DPO has a Wonder-Bar Beam. EYK has an Elmac and has gone to Florida mobile. GGZ is on 2 meters. GRC, BCN, KFF and MKW are working DX on 80-meter c.w. LYV is on again after moving up from the cellar. NPR is on 160-75 meters. OAQ is in Florida. OQT is out of the hospital. QHQ has a new 2-meter antenna. WHC is mobile on 10 meters. Ten towns on the Cape have RACES. RHZ has a new rig. Everyone who works SSS wants his card. ZHC, mobile, is a fine traffic net link into the Buzzards Bay Cape Cod Area. DIR has his modulation working. ILT got a modulator for his Adventurer. AZU is on 15 meters. The Braintree Radio Club had three pictures at its last meeting. KN1ADH, Brookline is on the air. The Winthrop RACES group is active and has a new antenna for 6 and 10 meters and a 6-meter Gonset. RMF worked Europe on 6 meters. DJ is on 6 meters. AHE has a Gonset for 6 meters and a Lunenburg five-element beam. NF received an L-1000-A from the XYL. The G-BARS held a meeting with a talk by Nat Hallenstein, of FCC. DQF, BB's XYL, has a very nice QSL card with a scene of the surf during a "Northeastern" storm at Winthrop Beach in the background. WN1KCR has a 6-meter receiver and is hearing DX. Area 1 Radio Comm. held a meeting with QQL, ZYX, TXZ and ALP present. LDR, mobile in Vermont, worked Hawaii on 10 meters. CTW

(Continued on page 116)

Three Times the "Audio Punch" in Globe King 500B

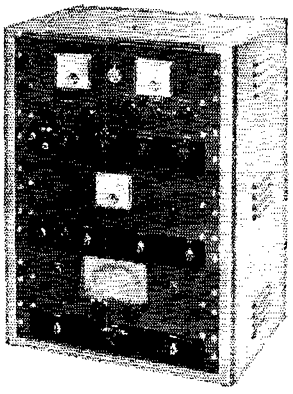
NEW COMPRESSION CIRCUIT MAKES THE DIFFERENCE IN QRM PENETRATION!

WRL's 500 Watt COMPLETELY BANDSWITCHING Globe King 500B

Only $38.10 per mo.

Pay Just $69.90 Down

Cash Price: $699.00



Bandswitches 160-10M, 540 watts on fone, CW & SSB (P.E.P.)*. Pi-Net matches most antennas from 52-600 ohms. Electronic Grid-Block Keying for maximum clarity of signal (time sequence operation). New audio compression circuit holds modulation at high level without usual clipping distortion. RF Section enclosed with complete screening for TVI-elimination. Separate power supply for Modulator, allowing better overall voltage regulation. And many other top features, including provisions for push-to-talk and built-in VFO.

*with external SSB exciter

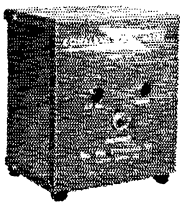
Modification Kit for the King!

If you own one of the older models of the Globe King (400, 500 or 500A), you can now add this same "communication punch" available in the new 500B. WRL's new King Modification Kit with simplified instructions can be easily installed in your old rig, reducing sideband splatter and keeping modulation at 100% level, allowing a greater penetration of the QRM Barrier. Same principle as used by broadcast stations.

Only $10.95

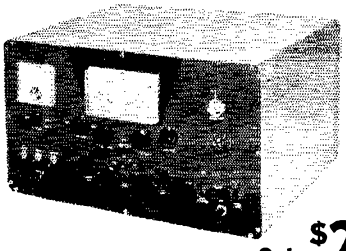
Installation made at the WRL Factory, $20.00 complete.

CONELRAD ALARM



Use of the new Fail-Safe WRL Conelrad Alarm permits easy compliance with the FCC Regulations. Operates, completely automatically, from any receiver with AVC; takes Xmttr. off air automatically. Is compact and low cost. Extremely simple to connect; complete instructions. Just two leads to receiver; receives AC plug from Xmttr. Printed Circuit for ease in assembling kit.

Kit, with printed circuit: $22.50
Completely wired: $29.50



THE World Radio Globe Champion 300

Completely bandswitching, 160-10M. 350 watts on CW, 275 watts on fone, 300 watts SSB (P.E.P.)* Built-in VFO, push-to-talk, antenna changeover relay. Improved time-sequence Keying. Pi-Net output circuit, 48-700 ohms. Extensively TVI-shielded, filtered and by-passed. High level Class B Modulation with splatter suppression; new audio compression circuit holds modulation at high level without usual clipping distortion. Ready to go on SSB, with any external exciter. Two new Amperex 9909 Final tubes (1000 V on plates) allow 33⅓% safety factor.

Only $24.47 per mo.

Cash Price: $449.00, Pay Just $44.90 Down

Kit Form: $349.00, 10% Down, $19.02 per mo.

SAVE UP TO **50%** ON RECOND. EQPT.

Here's a Sample from MORE THAN 800 ITEMS!

Hallicrafters 5R10A	$ 25.00
Hallicrafters S77	69.00
Johnson Ranger	175.00
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COMING SOON!

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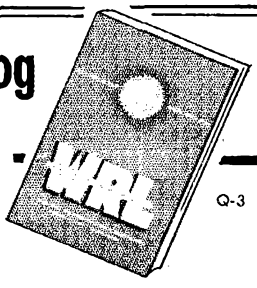

Q-3

Please rush me: ☐ FREE 1957 Catalog, and information about the items listed below! _____

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also spoke at the G-BARS meeting on V.H.F. Converters. EPE made BPL. The Fall River ARC, ACT, is on phone and c.w. with 100 watts and also is active on Dragnet. TZ is active on the air and in nets. BY's XYL gave him a DX-100 kit and an NC-300 for Christmas. Thanks to FRZ for his information to the XYL. WAY is on 10 meters. WFQ has gone into the Army for 6 months. KN1ACO has a new DX-35. GKE is on 6 meters. MF, Salem EC, and AUQ, ORS, had appointments endorsed for another year. BGW worked ZL1WB on RTTY three times for the longest ham RTTY contact. There is a new "Just Hamming" net on 145.3 Mc. each night at 9 P.M., reports DFS. Traffic: W1EPE 660, IBE 356, AVY 178, EAE 155, YHY 148, GNX 120, TZ 57, EMG 50, TY 48, ZFS 46, AUQ 40, BY 25, WU 20, UKO 16, SRG 4, LM 2, ALP 1.

WESTERN MASSACHUSETTS—SCM, Osborne R. McKeraghan, W1HRV—SEC: RRX. RM: BVR. PAM: MNG. The WMCW Net meets on 3560 kc. Mon through Sat. at 1900 and 2200 EST. JZG has been appointed Radio Officer for Granville and has accepted an EC appointment. His activities in planning for C.D. RACES communications has interested a large group of prospective hams and plans for code and theory classes are moving along fast. SPF has been appointed RO for Oxford, with HRN as alternate. SPF has set up a fine emergency net in the Greater Worcester Phone Net which has 25 members who have either mobile or portable equipment immediately available for emergencies. The Western Massachusetts fellows were very busy during the January V.H.F. Contest with especially heavy activity in the Hampden County Area, where HCRA members made an all-out effort to win over the Hartford Club in their yearly inter-club contest. Scores are not available at this writing. The Hampden County Club held its annual auction on Jan. 4th in Agawam. The affair was a huge success with many visiting hams and much gear changing hands. LDE and DLS made BPL this month, making four months in a row for LDE. We have some fine Frequency Measuring Test reports from RLQ, QQO, BKG and MUN. UEQ recently moved to Western Massachusetts from Vermont. ICW reports 115 DXCC confirmed with a Viking II and now has a new Collins KWS-1 and 75A-4. DZV reports working DX on 80-meter c.w. AJX also is busy hooking new countries with 40 watts. JKD has a new HRO-60 and has 167 countries total. NPL has a new DX-100 doing a fine job for him. BYA is in KR6-Land. KFV has a new

(Continued on page 118)

EIGHTH NEW HAMPSHIRE QSO PARTY

The Concord (N. H.) Brasspounders, W1OC, announce their sponsorship of the Eighth New Hampshire QSO Party, and cordially invite all interested radio amateurs to participate. Here are the details:

(1) Contest period: Saturday, March 16th, 6 P.M. EST, to Sunday, March 17th, 6 P.M. EST.

(2) No time limit and no power restrictions.

(3) Scoring: N. H. stations count 1 point for each N. H. contact, plus 2 points per outside contact; stations outside the state count 2 points per N. H. contact; both multiply by the number of counties worked (10 maximum).

(4) Engraved certificates will be issued to all participants reporting, with special endorsements for the highest-scoring stations, both in N. H. and outside, in the following categories: phone only, c.w. only, combined phone and c.w.

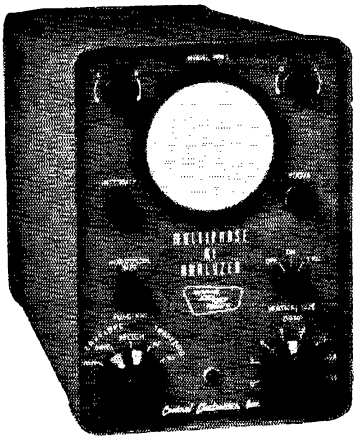
(5) The same station may be worked for additional credit on more than one band, phone or c.w. Suggested frequencies to congregate near are as follows: 1810, 3550, 3842, 7050, 7200, 14,100, 14,250, 21,075, 21,350, 27,000, 28,100, 28,800 kc.; 51.145 and 221 Mc. (Suggested time schedule for the above frequencies will be mailed upon request.)

(6) General call: "CQ NH" on c.w.; "CQ NH QSO Party" on phone.

(7) Contact information required: Report and QTH (including county of N. H. stations) and number of QSO. Logs and scores must be postmarked not later than April 11, 1957, and should be mailed to the Concord Brasspounders, Box 312, Concord, N. H.

(8) The WNH (Worked New Hampshire) certificate will be awarded to stations working all ten counties during this QSO Party, participating logs confirming.

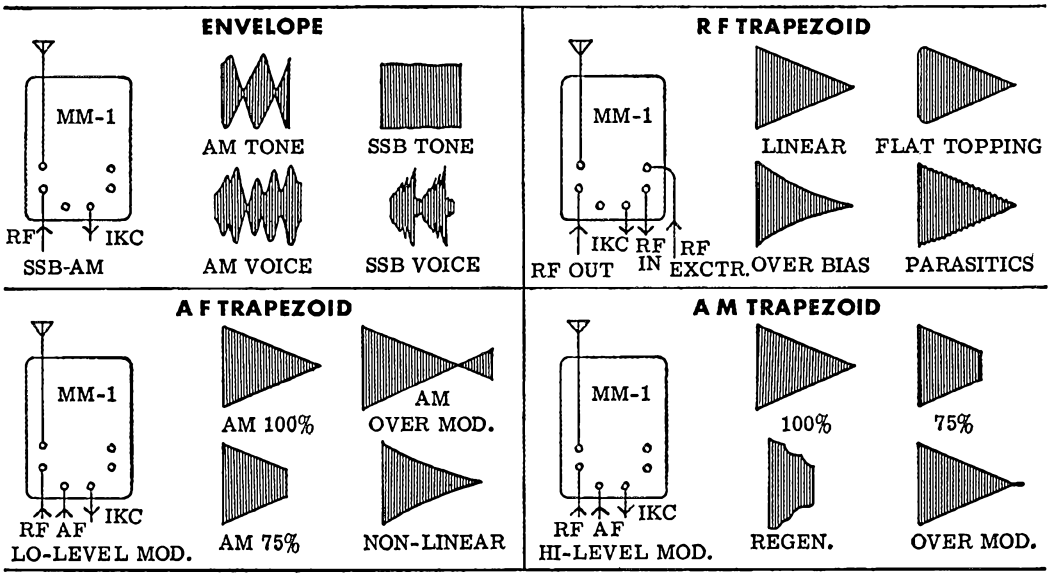
NEW MULTIPHASE MODEL MM-1
RF ANALYZER



Amateur Net - Kit . . . $99.50
Wired . . . 129.50

- NO TUNING required. Broadband response flat 1 MC to 55 MC at power levels of 5 watts to 5 kilowatts. Useful indications to 200 MC.
- Built-in 1 KC audio oscillator has less than 0.5% distortion.
- Automatic blanking protects CRT during standby.
- RF attenuator controls height of pattern, calibrated in 3 db steps.
- For use in "Series" with 50-72 ohm co-ax lines. A short pickup antenna is recommended for other systems.
- The MM-1 provides: SPEECH ENVELOPE patterns without annoying 60 cycle double trace.
- TONE ENVELOPE patterns automatically synchronized with self-contained 1 kc audio generator.
- AF TRAPEZOID patterns for HIGH LEVEL AM systems.
- DOUBLE TRAPEZOID OR BOW TIE patterns for analysis of LOW LEVEL LINEAR AM systems.
- RF TRAPEZOID for determining linear amplifier "LINEARITY" by sampling input and output signals. CONTINUOUS AUTOMATIC MONITORING OF SSB-AM-CW.

One compact unit provides oscillator and 3" scope for alignment of SSB exciters and general modulation analysis.



OTHER MULTIPHASE PRODUCTS

Model 20A Bandswitching SSB Exciter	$249.50	Kit . . . $199.50
Model 600L Broad-Band Linear Amplifier - immediate delivery. . .		$495.00
Model GC-1 Gated Compression Amplifier . . .	$59.50	Kit . . . $49.50
Model 10B 10 Watt Multiband Exciter	$179.50	Kit . . . $129.50
Model B Slicer and Q Multiplier	$99.50	Kit . . . $69.50
Model A Slicer, less Q Multiplier	$74.50	Kit . . . $49.50
Model AQ Q Multiplier for Slicer	$29.50	Kit . . . $22.50
Model DQ Desk Type Q Multiplier	$29.50	Kit . . . $22.50
Model 458 VFO Conversion Kits and Cabinet . .	$25.00	

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MULTIPHASE – THE OVERWHELMING CHOICE OF HAMS EVERYWHERE.

10-meter beam. RFU has erected a new 40-foot aluminum tower for his u.h.f. beams. TXS has a Viking 6&2 with VFO for 2 meters. FAB has a new Viking Valiant. New novices are KN1ANF in Monson, KN1ANX and AJI in Easthampton, KN1ADS in Pittsfield and KN1AOS in Chicopee Falls. Traffic: W1LDE 981, DLS 415, BVR 157, DZV 91, WEF 61, HRV 40, TAY 27, KGJ 25, FZY 21, SPF 19, AJX 12, DGL 7.

NEW HAMPSHIRE—SCM, John A. Knapp, W1AIJ—SEC: BXU. RMs: CRW and COC. PAM: CDX. The New Hampshire C.W. Net meets mon. through Sat. at 1900 on 3685 kc. This net needs more participation and activity. All interested amateurs, please check in. The New Hampshire Emergency Net is on 3850 kc. every Sun. at 1300. The Granite State Phone Net holds forth Mon. through Fri. at 1800, with an informal session on Sun. at 0900. See you in the Annual New Hampshire QSO Party, Mar. 16th. at 1800. See box on page 116 for details. All requests in re this QSO Party, should go to AOQ in Concord. JB has been appointed trustee of the Concord Brasspounders Club station, OC. EZC is on 6-meter phone with a TBS-50. GJM is Asst. EC in Rockingham Co. The Concord Brasspounders newly-elected officers are ZFP, pres.; AIJ, vice-pres.; HUR, secy.-treas. Welcome to the following new hams: KNs, AAH, AAR, AAT. WNs OQZ, OQN, ONS, OOB, OOH, OGQ and ORU. Traffic: (Dec.) W1NBD 215, WUU 110, IIQ 19, PFU 18, CDX 15, FZ 14, EVN 13. (Nov.) W1FUA 40, PFU 26.

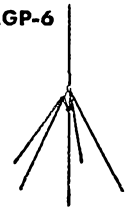
RHODE ISLAND—SCM, Mrs. June R. Burkett, W1VXC—RM: BTV. PAM: YNE. SEC: TQW. Officers of the newly-formed Classical High School Radio Club are FII, pres.; IIF, vice-pres.; and HKN, secy. DHX and his XYL, who are moving to W6-Land, were honored by the Polecats at a going-away party Jan. 3rd. FVZ, ZPC, WMW and YIX are experimenting with TV on 420 Mc. Anyone else? FIG, VWR, NFD and WTR are VFO on 6 meters. LKX is building a 3-band mobile rig with a 6146 final. DFB is pleased with the results he's getting with the new DX-100. YRC is a new OPS. IHE has a transmitter on 220 Mc. using a.m. and f.m. and is experimenting with antennas for 1296 Mc. RHN members and guests had their first dinner get-together Dec. 15th. EYH has returned from radio school at Ft. Sill, Okla., and is building rigs for 50 and 420 Mc. VWR is now NCS of the Southern N.E. Net. ULS and his XYL, WPX, are on the air from a new QTH in Esmond. IGP is s.s.b. on 6 meters. NNY wants to QSO former W1s in the San Diego Area on 29,680 kc. NMH is getting good results with a new 10-meter three-element beam. Ex-TRX now is operating mobile from Virginia and vicinity on several bands with a new call, K4LPR. Traffic: W1BTV 179, VXC 116, YNE 99, BBN 76, JJW 60, ZXA 34, TGD 28, QR 25, HLY 14, YRC 11, CCN 10, DZI 8.

VERMONT—SCM, Mrs. Ann L. Chandler, W1OAK—SEC: SIO. RM: BNV. PAM: SEO. Traffic nets: VTN, Mon.-Sat. at 6:30 P.M. on 3520 kc.; VTPN, Sun. 9 A.M. on 3860 kc.; GMN, Mon.-Sat. at 12 noon on 3860 kc. Net reports: VTN held 25 sessions in December with an average of 6 stations, 4 messages per session and BNV states ELJ (20), GQJ (19), BNV (13), OAK (12), ZNM (11) and KRV (9) reported in most regularly. SEO reports 43 different stations on VTPN, averaging 20 stations per session for 4 sessions. VMC reports 66 different stations on GMN handling 20 messages and bulletins. BXT is a new OPS. ORS endorsements go to KRV and OAK. FMK is enjoying some Florida sunshine. RLS is hospitalized at Mary Washington Hospital in Fredericksburg, Va., suffering a coronary attack while driving through. ZYZ is not straining his new 811s. Using s.s.b., CBW worked KC4USA and KC4USB in Antartica! Congrats to new Novices KN1AJL and WN1LJB in Rutland; KN1APA, Brattleboro; KN1ADQ, St. Johnsbury and WN1NXB in Poultney. Novice APA worked KNØICV for his first QSO with a Globe Scout transmitter and an S-38C. While on a vacation trip to New Jersey BNV visited 2KVT. A class for Novices has been conducted by TFB. The BARC held its annual Christmas Party Dec. 15th beginning at the home of CML and TLI and then to dinner at Lincoln Inn. ZFA received a new NC-300 for Christmas. Brother ZEW has a new Viking II and is working 80-10 meters phone and c.w., also taking NCS Sun. mornings on the RAC'ES Phone Net from the c.d. headquarters station. MMV's most recent countries are VP8BT, VP8BS, UQ2AN, OY1AR, F9YP/FC, CR4AS, Antarctica and South Shetlands. UGW put up a new 14-Mc. beam with a new 500-watt final and now has 91 countries worked. SEO's confirmed DX total is now 88. Active on 6 meters

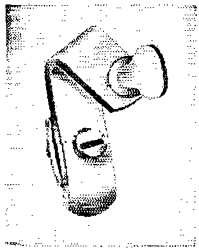
(Continued on page 120)

GROUND PLANE
(Drooping Type)
FOR 6 METERS

No. MGP-6



Aluminum alloy tubing, coax cable connector. For medium or low powered trans.
$14.95



No. 10H
TENAHOLD
Protects antenna, prevents whipping. Easily attaches to car.
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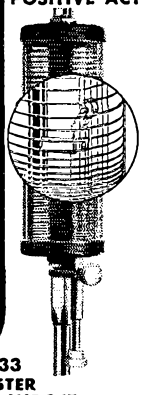
go mobile with Master Mobile

***NEW!* . . SILVER-PLATED ROLLER WITH POSITIVE ACTION, STAY-PUT CONTACT**

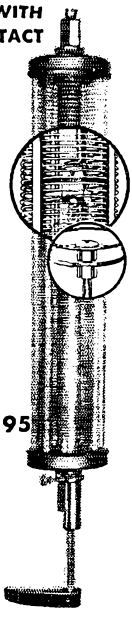


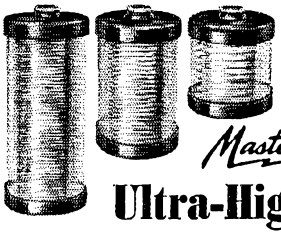
ANTENNA COILS
MASTER DELUXE ALL-BANDER
No. 750

HY "Q" construction with wider spacing of turns for high frequency bands. Use as center or base loaded antenna with 60" whip.

- Covers 10 thru 75 and all intermediate frequencies.
- Silverplated single turn contact, positive spring.
- Eccentric cam contact, easy selection of turn.
- Automatic lock prevents damage to coil.

Amateur net **$14.95**





- Ruggedized construction
- Greater efficiency
- Precision made
- 2¼" Diameter

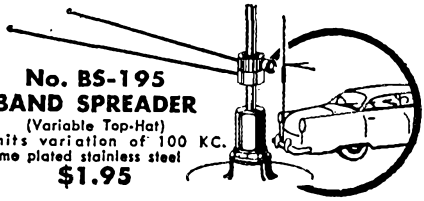
Master

Ultra-High "Q" COILS

For 80-40-20 & 15 Meters

After many years of experimentation, here is the coil with the highest "Q" ever obtained. Tested and found to have a "Q" of well over 515. Use with 36" base section, 60" whip. **$5.25 Each**

No. 333
MASTER MIGHTY MIDGET
. . . engineered to provide the highest "Q" consistent with good design. Compact, extremely rugged, yet lightweight, its operation assures precision tuning with the new adjustable silver-plated roller that stays put! Perfect for 40-20-15-11-10 meters. "Get 5 Bands Plus on 1 Coil." **$9.95**



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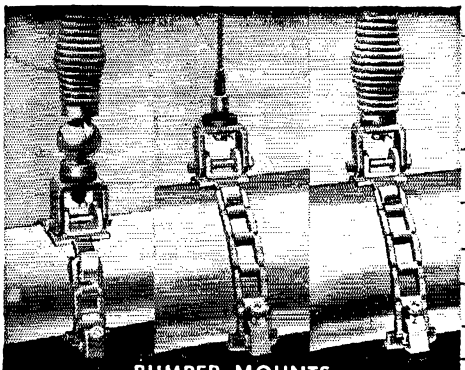
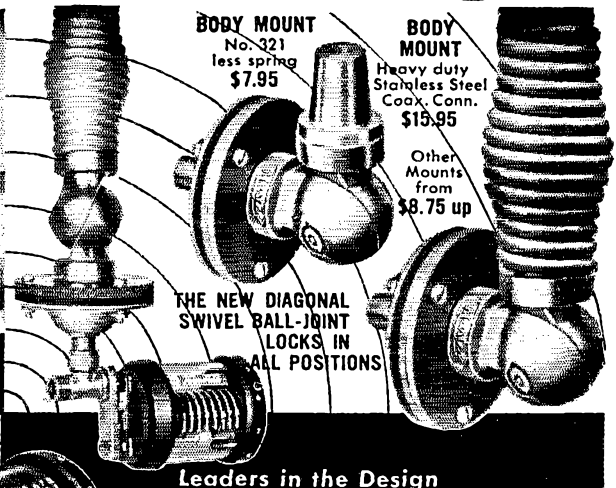
BAND SPREADER
(Variable Top-Hat)
Permits variation of 100 KC.
Chrome plated stainless steel
$1.95



BUMPER MOUNTS
No. 444 $17.80 No. 445 $7.95 No. 446 $13.45



BODY MOUNT
No. 321
less spring
$7.95

BODY MOUNT
Heavy duty Stainless Steel Coax. Conn.
$15.95

Other Mounts from
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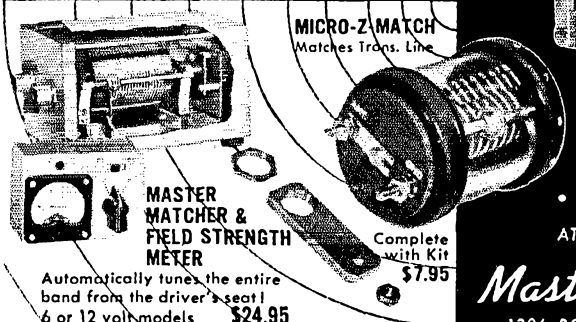
THE NEW DIAGONAL SWIVEL BALL-JOINT LOCKS IN ALL POSITIONS



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Matches Trans. Line

MASTER MATCHER & FIELD STRENGTH METER
Automatically tunes the entire band from the driver's seat!
6 or 12 volt models **$24.95**

Complete with Kit
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AT LEADING RADIO JOBBERS EVERYWHERE

Master Mobile Mounts, Inc.

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during the Jan. V.H.F. Party were EXZ, KRV and FTF/1. Sorry to report the passing of AZJ on Aug. 3, 1955. Traffic: (Dec.) W1AVP 66, OAK 62, ELJ 49, BNV 45, KRV 33, KJG 20, ZNM 15, ZEW 9, UGW 1. (Nov.) W1UGW 2.

NORTHWESTERN DIVISION

IDAHO—SCM, Rev. Francis A. Peterson, W7RKI—Congratulations on sending in so many reports. Keep up the good work. Our sympathies to IWU on the death of his mother-in-law. Conelrad monitors are busting out all over, commercial or *QST* models. IY is working out with his new drooping doublet in Boise. CDA is scheming to put his new Collins BC transmitter on the ham bands. GFW is bouncing receivers again with his rebuilt 900 watts. LQU had a new 100-watt grounded grid linear ready for the CD Contest. TXC is working DX on 350 kc. with an Ercoupe for an antenna pole. EMT also has a new pole, but only 63-ft. high. EYR is working the Far East trying for his DXCC. GMC got a new all-band mobile antenna from Santa. QYC's daughter won a TV in a contest, but no TVI! CDA is the new president of the Pocatello club. REF has a new Oct. *QST* antenna. Is your name missing here? Send in a report by the 7th. Traffic: W7GMC 444, EMT 14, QYC 12, IY 2.

MONTANA—SCM, Vernon L. Phillips, W7NPV/WXI—SEC: KUH. New officers of the Hellgate Radio Club are EAM, pres.; BNK, vice-pres.; and Pat Nickerson, secy.-treas. OOG got married on Dec. 8th and is teaching his wife the code so she can get a license. RSJ got married in January and moved to Chandler, Minn., as an RCA Tech. Rep. IKA was in a car accident but not seriously injured. WDE moved to Salt Lake City to work for the CAA. ØHMW moved to Scobey. HJM and ZJZ went to Texas for the winter. CAL was reissued his old call, AU, and is active on 75 meters with a home-built s.s.b. mobile. AYG received the call GQI for his station in town. Hank operates s.s.b. on both stations. FGZ is on 20 and 75 meters with s.s.b. GCS, SFK and TGG worked the Antarctic Expedition. YQZ has a new transistorized converter. TGU has a new Globe King. WN7DWM built a new power supply. RDM is doing finishing work on his new home. SFK is receiving RTTY. The Harlo Radio Club made $300 on its Christmas activity. Traffic: W7SFK 83, TNJ 17, SMY 12, WMT 10, YPN 10, DWJ 6, YHS 6, CQC 4, NPV 4, MQI 3, FIS 2, VGZ 2.

OREGON—SCM, Edward F. Conyngham, W7ESJ—LT is getting the antennas back up after the November storms and worked 46 states in the SS. PQJ's new shack remains unfinished while he assists the younger set with big technical problems, but he found time to come out top man in Oregon on the F.M.T. UGE has been hospitalized. VIL, BEG and LNG are working on 2 meters. ZLD and MAO seem to be getting a lot of overtime for Ma Bell. QMS and SMM were snowed under with exams at U. of O. BCG shifted his QTH to Newport. ENU hit the highest traffic count ever for her. WHE is rebuilding a Navy TCE for a second rig. WAA, PFA, WGB and NGW are modifying old Navy TCS rigs to extend operations into the 160-meter band. MTW is modifying a Navy TCX for extended operation, also. WSP made application for AREC membership. REX sold out the mobile equipment and now is shopping for fixed station gear. A new club was formed this month, the Santiam Radio Club, with DHW, pres.; PQJ, vice-pres.; SAR, secy.; RER, treas. QFY talked with his XYL, who is in Brisbane, at VK4PR's for 35 minutes on Christmas Day. QFY has left for KH6, KX6, KG6, DU, VS4, VS1, and FI8 while on his way to VK4-Land. TAZ is having crystal calibrator troubles. Traffic: (Dec.) W7APF 848, TLC 629, ENU 365, HDN 99, OLU 72, LT 48 EUG 43, PRA 17, TAZ 12, JCJ 3. (Nov.) W7TLC 234, UJL 30, QYS 15, LT 6.

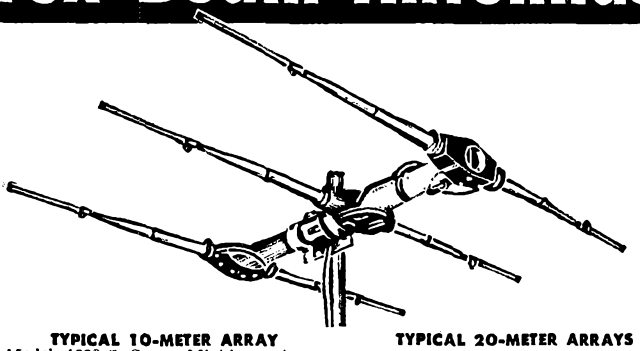
WASHINGTON—SCM, Victor S. Gish, W7FIX—The Radio Club of Tacoma, Inc., elected the following: OS, pres.; RGD, vice-pres.; WOS, secy.; COP, treas.; MFG and RXS, trustees. The Lewiston-Clarkston Radio Club elected UJA, pres.; CTT, vice-pres.; HDT, secy.-treas. On the agenda for the year are incorporation of the club and finding a permanent home for the club station, VJD. The McChord AFB Club holds meetings the 2nd and 4th Mon. in Bldg. 545. Four men passed the General Class exam in December. USO now is Alternate Radio Officer and manager of the Clark County 2-meter C.D. Net and reports excellent coverage on 2 meters. ER sends in a good traffic report. LVB reports too much holidays for much traffic. WLK is on the air with a borrowed Adventurer. YFJ sold his rig. OE is busy plugging the 3550-kc. C&E plan (see page 68

(Continued on page 122)

HARVEY HAS IT...

NEW 1957 Telrex Beam Antennas

Commercial grade arrays at amateur prices; superior in performance, design and construction. Hair-pin resonated, precision tuned, matched and calibrated. Provide highest signal-to-interference and signal-to-noise ratio possible, 75% reduction in precipitation static. Elements insulated from boom by "Cycolac" support. Equipped with famous Telrex "Balun" match for balanced pattern and minimum TVI.



FEATURES

- Extremely rugged elements of advanced sectional design; taper-swaged to reduce useless wind drag and silhouette by 55%.
- Special sturdy molded element support, made of Borg-Warner "Cycolac", a very high-impact thermoplastic resin; holds, insulates and capacity-couples element to the boom for automatic dissipation of precipitation static.
- Stainless-steel airplane-type clamp, holds element sections firmly in exact position.
- Precisely constructed and resonated "Hairpins" reflect the perfection of a Telrex array.
- Heavy-duty gusset-plate mounting enables easy attachment to a 2" support mast, eliminating the need of drilling masting holes.
- Precision tuning, matching and the famous Telrex "Balun" help produce outstanding performance per element, clean-cut balanced pattern and minimum TVI.
- Single, heavy-wall aluminum boom is small in size, rugged in strength, and light in weight.
- Stainless steel "Hairpin" grounding lug provides element grounding at voltage node for lightning protection.

TRANSMISSION LINE

These arrays are designed for *52-ohm* transmission line feed such as RG-8/U, RG-14/U or RG-17/U.

TYPICAL 2-METER ARRAY

Model 2M-5C is a medium-spaced, five-element array, precision-tuned, matched and calibrated for high performance with extremely low wind drag and bulk. Designed for long lasting performance at low cost. Due to compact designing, the unit can be used at picnic or mountain-top fixed-portable installations by transporting it on car top by carrier brackets. The excellent match characteristics enable frequency shifting with minor change in loading of the transmitter without re-tuning.

TYPICAL 6-METER ARRAY

Model 6M-4C is a medium-spaced matched array that can be assembled and installed in ten minutes. Minimum bulk design reduces wind-load and weight to a minimum and permits rotation with low-cost, medium torque rotators. May be used as a single bay or stacked for an additional 3 db gain. Materials are high-tensile strength, providing minimum corrosion and longer lived installations. Car-top portability for truly versatile performance. Tuned for maximum gain; wide front-to-side ratios; large degree of off-beam protection. Six-meter arrays are available in a variety of styles: optimum or medium spaced; standard or super-deluxe models; and 3, 4, or 6 elements.

TYPICAL 10-METER ARRAY

Model 1030-S Super Mini-beam is an extra small 10-meter beam that provides performance characteristics near those of most full-sized antennas. Durable, light weight 75 mph construction for easy assembly, installation and rotation. High performance at low cost. Provides extremely high signal-to-noise and signal-to-interference ratio, and minimum TVI and BCI. Complete, clear, illustrative instructions are supplied to assure accurate assembly. No adjustments of any kind are necessary Ten-meter arrays are available in 3-element Super Minibeam, 3-element Medium-spaced Deluxe, 4-element Wide-spaced Deluxe, 5-element Wide-spaced Super Deluxe, and 6-element Optimum-spaced Super Deluxe. These arrays are carefully tuned, matched and calibrated before shipment to assure perfect performance. All are made of the finest materials: rugged, light-weight aluminum for low bulk and least wind resistance.

TYPICAL 20-METER ARRAYS

Mechanically, electrically and technically perfected for optimum results on any one of the three frequencies within the 20-meter band. No modification is required or recommended. Elements are taper-swaged aluminum for light weight and aerodynamic design. Quick, easy mounting and assembly. Model 20M-57-112 is a low priced 3-element Deluxe array recommended where original cost and rotator cost are factors. The Super-deluxe, medium-spaced Model 20M-57-149 is a heavy-duty array equipped with 3" OD boom and longer elements for more gain and staying power; recommended where exceptional ruggedness is desired. Model 20M-57-168 produces the ultimate results possible with 3 elements; compact H-plane beamwidth reduces QSB; extra-sturdy construction for use anywhere in the world; performs as well as or better than a rhombic.

"57 SERIES" SPECIFICATIONS AND PRICES

Telrex No.	Meter Band	Elements No.	Elements Spaced	Gain db	F/B Ratio db	Boom Lgth.	Beam Width Hor.	Beam Width Vert.	Shpg. Wt. Lbs.	Amateur Net Each
¾M-15C	¾	15	O	16.2	26	10' 6"	27°	28°	13	$ 29.00
1¼M-5C	1¼	5	O	11.9	25	3' 6"	48°	53°	3	6.95
1¼M-15C	1¼	15	O	16.2	26	16'	27°	28°	16½	31.00
2M-3C	2	3	O	9.4	18	3'4"	55°	80°	2¼	5.95
2M-5C	2	5	M	10.5	23	5'	51°	52°	3	7.25
2M-6C	2	6	O	12.7	22	8' 6"	46°	51°	4	12.50
2M-8C	2	8	O	13.5	26	13' 9"	35°	38°	10	13.75
2M-808†	2	16	O	10.5	26	14' 6"	35°	38°	15	33.50
2M-15C	2	15	O	16.2	26	27' 9"*	27°	28°	28	39.25
6M-3D	6	3	O	9.4	18	7' 7"	55°	80°	7	16.25
6M-4C	6	4	M	9.7	23	12'	55°	62°	10	19.75
6M-6C	6	6	O	12.7	22	23' 4"*	45°	49°	20	57.50
6M-57-135§	6	6	O	12.7	24	23' 4"*	45°	49°	44	135.00
1030-S	10	3	MI, M	7.0	18	9'	61°	100°	9	36.50
10M-57-79‡	10	3	M	8.9	21	10'	58°	82°	27	79.50
10M-57-120‡	10	4	W	10.1	26	18'	54°	67°	33½	120.00
10M-57-165§	10	5	W	11.2	26	26'	50°	63°	77	165.00
10M-57-235§	10	6	O	12.7	27	36'*	45°	49°	93	235.00
1130-S	11	3	MI, M	7.0	18	9'	61°	100°	9½	38.50
15M-57-67‡	15	2	MI	4.8	14	6' 10"	69°	130°	22	67.50
15M-57-99‡	15	3	M	8.9	24	13' 8"	58°	82°	32	99.50
15M-57-118‡	15	4	M	9.7	25	18'	55°	70°	37	118.00
15M-57-198§	15	4	O	11.1	26	26'	52°	63°	64	198.00
15M-57-245§	15	5	O	11.9	27	36'*	48°	53°	94	245.00
20M-57-79	20	2	MI	4.8	14	10'	69°	130°	26	79.50
20M-57-112‡	20	3	M	8.7	24	18'	58°	110°	33	112.50
20M-57-149‡	20	3	M	9.0	26	20'	56°	81°	56	149.50
20M-57-168§	20	3	O	9.4	24	26'	55°	80°	63	168.50
20M-57-235§	20	4	W	10.4	26	32'*	53°	66°	74	235.00
20M-57-265§	20	4	O	11.2	23	36'*	53°	63°	90	265.00
40M-57-180	40	2	MI	3.4	16	14'	74°	136°	66	180.00
40M-57-365§	40	3	F	8.3	25	29' 4"*	58°	104°	130	365.00

Spacing: O—Optimum; M—Medium; MI—Super "Mini-Beam"; W—Wide; F—Full. *Includes boom struts. †Circular polarized. ‡Deluxe Model. §Super Deluxe Model.

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Established 1927

Jan. QST). BDK reports PRW had several JA contacts on 6 meters. PXA reports three active hams in Medical Lake, ETD, NBD and himself. GAT still is too QRL as newspaper publisher for much hamming. KCU and EQN, Marty and Mac, are at a new QTH, 602 Illinois Ave., Pullman. FWD started off the GPR message. BEC reports that Santa left a VF-1. WAH took over RN7 from VE7ASR, pending appointment of a manager. AIB reports very busy holidays at his QTH with not too much time for traffic. Eight make BPL—BA, PGY, FRU, VAZ, K7FAE, K7WAT, K7FEA and AHV on originations. Traffic: W7BA 2708, PGY 2398, FRU 1196, VAZ 1137, K7FAE 824, WAT 784, FEA 725, W7WAH 288, OE 182, USO 171, APS 107, AHV 105, AMC 105, JC 86, ER 56, EHH 37, LVB 37, AIB 34, JEY 33, WLK 26, WQD 19, HDT 8, NWP 5, EVW 4, GAT 3, FZB 3, YFJ 3.

PACIFIC DIVISION

HAWAII—SCM, Samuel H. Lewbel, KH6AED—At a dinner meeting in December the Honolulu Amateur Radio Club installed the new officers for 1957. The following were given the controls for the next year KH6AED, pres.; KH6ZD, vice-pres.; KH6AUJ, secy.; KH6AGH, treas.; KH6ALM and KH6ARO, directors. KH6AFS and BUU, of Hilo, climbed above the 11,000-foot level on Mauna Loa to make the first ham 2-meter contact between the big Island and Honolulu. On the Oahu end were KH6s AWG, EE, NS, OS, UK, ZD and AED. Note to clubs in the Islands: Have your secretary send news of your club members to the SCM. Watch for announcement regarding the Territorial Ham Convention for 1957. It will be held in Honolulu with the Honolulu Amateur Radio club as host. KH6EZ has been appointed as convention chairman. Regular announcements will be made. Plan to attend the convention this summer. Traffic: KH6AJF 1567, QU 904, BQS 405, KP6AK 133.

NEVADA—SCM, Albert R. Chin, W7JLV—In recognition of the good work performed by JU while serving as your past SCM and his interest in furthering *ham radio and civil defense* activities, it is my pleasure to appoint him as your SEC. Your SCM would like to hear from members interested in ARRL appointments. Write to P.O. Box 14, Reno. Hams interested in the RACES program are urged to contact your State Civil Defense Radio Officer, ZT, 1206 North Nevada Street, Carson City. K6UEU, ex-7MLK and K6MZN visited Reno during the holidays. 6MZN brought along his Gonset Communicator and made many East Coast contacts during the 6-meter openings. JLV, CX and JU are active on 6 meters. During the openings of Dec. 31st and Jan. 3rd and 4th, CX and JLV made many new eastern states toward WAS. MAH and JLV operated 6 and 2 meters from Mt. Davidson during the V.H.F. Contest. Net results were contacts with CX and PC in Reno. AZF is going after DX and erecting a new 61-ft. tower. Traffic: W7JU 5.

SANTA CLARA VALLEY—SCM, G. Donald Eberlein, W6YHM—Asst. SCM: Roy E. Pinkham, 6BPT. SEC: NVO. PAM: WGO. RMs: ZRJ and K6GID. WGO has been appointed PAM. K6QCI received appointment as ORS. K6DHO has been appointed Asst. EC for Sunnyvale. K6BBD's OO appointment has been endorsed. K6GID has resigned as manager of NCN because of business. K6UWC and SJS are new members of the PAARA. LSX is confined to the hospital. K6IEC made WAC using only 15 watts input. WJM has made DXCC. PH reports 200 countries confirmed. EFR has 160 confirmed. K6JAW is having trouble with TVI on Channel 8. OA5G was a visitor at the shack of UZV. PLG is doing a nice job on RN6 and PAN. K6DYX is building a kw. rig for traffic work. YHM is licking key clicks. 7NYJ is located in San Jose. VZT has a new exciter and is building high-power final. NW was down with the flu for a few days. K6IMI has a Viking Ranger on the air now. HC was QRL with open house in the Engineering Dept. at San Jose State for a week end. The PAARA lists the following new officers for the 1957 season: John Putz, pres.; Stan Kuhl, vice-pres.; Mel Grow, secy.; Ralph Hiesey, treas. Danny Weil of the *Yasme* expedition was guest speaker at the PAARA. OEJ has been appointed PAM. YBV and PLG are new ORS appointees. The traffic reports sent in show good results for the stations working the NTS nets during the holiday traffic period. Any station wishing to join in this work get in touch with HC for details. Traffic: W6BPT 592, K6DYX 492, GZ 293, W6YHM 238, ZRJ 233, YBV 190, PLG 186, HC 143, JCG 60, K6QCI 35, W6AIT 31, KN6RUO 16, W6MMG 8, K6BBD 4.

EAST BAY—SCM, Roger L. Wixson, W6FDJ—On Jan. 1st K6EPC took over the job of manager for the

(Continued on page 124)

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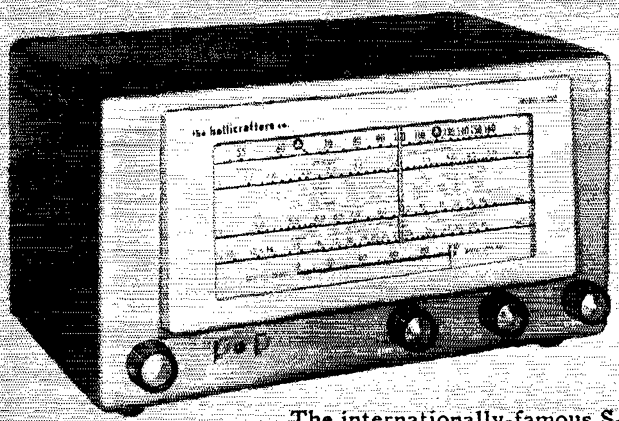

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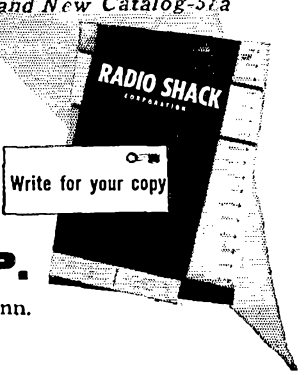

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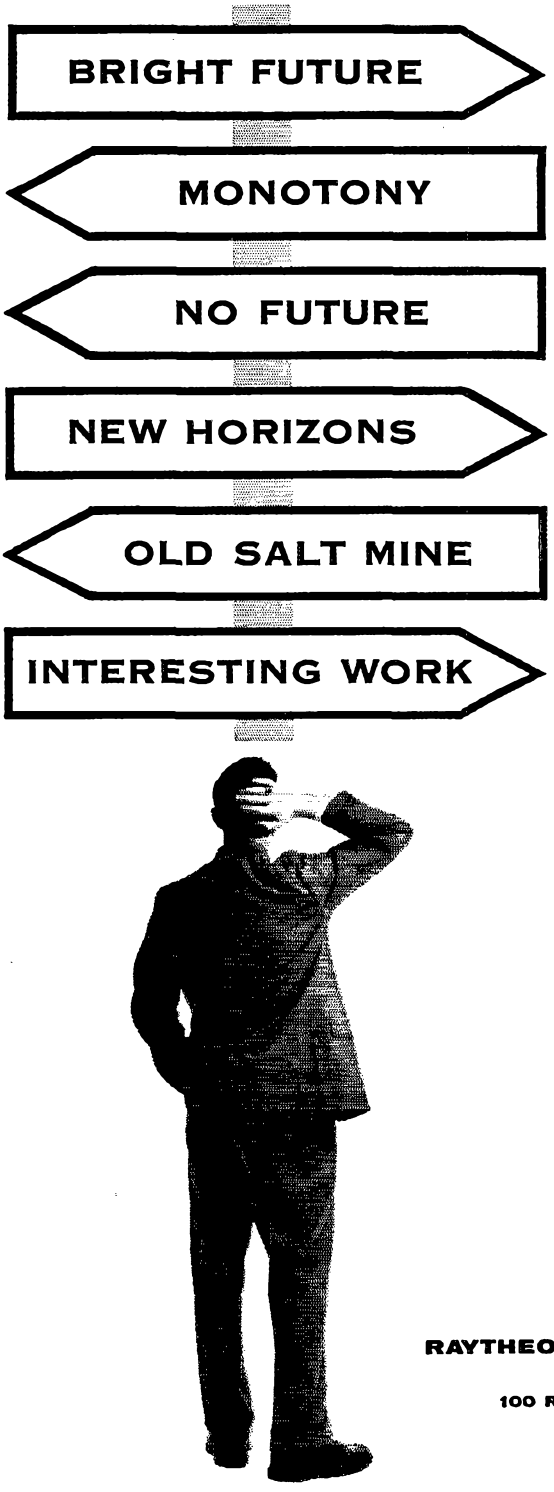
NCN. The SARO's new officers are VCG, pres.; EY, vice-pres.; LCG, secy.; FZC, treas.; and ASJ, comm. mgr. Out Diablo way another new team took over with K6AQ, pres.; OHR, vice-pres.; K6KWX, secy.; K6IMV, treas.; KFR and K6JER, board of directors; and LGW, EC. LGW reports that the Monday night theory class he holds is getting smarter than he is! Also the Wednesday night class in code is progressing quite nicely. The NCARTS, an RTTY club, met in the Oakland Radio Club rooms with FDJ reviewing his trip East and telling of some of the activities of the RTTY groups and reporting on the RTTY meeting held in Chicago. Prizes and refreshments followed the meeting. MTJ donated some relays and "load" coils to the club as well as a piece of old-time gear for the Oakland Radio Club museum. The East Bay Club has a new line-up which includes K6EDN, pres.; VSV, vice-pres.; K6MGM, secy.; and K6PNC, treas. Following the election EDX, from Fresno, gave some interesting accounts of 6 meters while VSV supplied background (v.h.f. music) tape recordings made during the recent opening to Japan and the eastern part of the U. S. The Oakland Radio Club had as its program for the month a talk on ceramic tubes. Paul Williams and Bill Senior were the guest speakers. A prize drawing and refreshments followed the meeting. AJF donated a Marconi receiver to the museum for which we are very grateful. Also ZX gave the club the first three issues of *QST*, plus the first anniversary issue. It was interesting to note that Volume Three, dated 1916, had stamped across the cover "LAST FREE COPY SUBSCRIBE TO-DAY." I want to personally thank "Pop" Dann for giving up those priceless copies of *QST*. NZ donated the Jan. 1922 issue which was featured in a recent issue of *QST*. Thanks, Sid, for your contribution. Anyone interested in old-time radio equipment should visit the Oakland Radio Club at 906 Fallon St., Oakland, Calif., on the first Fri. of any month. At present your SCM is preparing a series of stories about early amateur radio here in the East Bay section.

SAN FRANCISCO—SCM, Walter A. Buckley, W6GGC—GQA has qualified as a Class I Observer on 15 consecutive Frequency Measuring Tests. CBE is moving to Peninsula and taking a job with Stanford Research Institute. We are sorry to lose Ron as he was very faithful in sending in SAR each month. The Tamalpais Radio Club's officers are VME, pres.; RZS, vice-pres.; MQQ, secy.-treas.; END, publicity chairman; JB and JTP, board of directors. Greg Gomez is prize chairman, K6OPT technical adviser, K6SXS program chairman, PVC master at arms. The San Francisco Naval Shipyard held its monthly meeting at the Red Cross Bldg. and made plans for coming events. SIJ is giving K6PUB a hand on his low-frequency transmitter so he can get on the air. HVU has a new Morrow rig for Marine Mobile. K6EOW, SIJ, K6GIJ and K6GOW were able to work DX during the 6-meter band openings. GGC had some luck on 6 meters on band openings also. The Cathay Radio Club members enjoyed a fine dinner at a local Chinese Restaurant. The boys still are giving code lessons twice a week at the American Legion Hall in Chinatown and anyone interested in learning the code is welcome to attend these sessions. GQY is back handling traffic and reports that he's glad he had no "Flood Traffic Report" for this December like that in '55. QMO left A6USA as of Dec. 31st and expects to be active on c.w. traffic. The Marin Amateur Radio Club reported that 22 members and 6 guests attended the December meeting. The guest speaker was Vernon Esgar, who gave a very good talk on the Conelrad set-up. The Marin Amateur Radio Club is busily discussing plans for the Pacific Division ARRL Convention. RQT, K6BMW, K6CAR and OPL were appointed as a committee. If the MARC sponsors the convention most likely it will be held during July, 1957. This month is always ideal for any activities in the Marin District. The weather is neither too cool nor too hot during the summer months there. The San Francisco Radio Club members held their annual Christmas get-together at the New Tivoli Restaurant with many of the members attending. All reports have it that the gang enjoyed both the dinner and the music and singing. The XYL of BIP played the piano and the fellows and girls joined in the community singing. PHS had a head-on collision but escaped with numerous bruises and the loss of a week's work. K6BJ and Gertrude are hoping to attend the National Convention in Chicago. WF is retiring as traffic engineer for San Francisco and is moving to Santa Clara. We are glad to report that MXV is now convalescing at home after a long illness. DEK still is seriously ill. Perhaps some of his old "airwave" friends would like to send him a card. IKO has been in Permanente Hospital. We are sorry to report that NL has tendered his resignation as

(Continued on page 126)

MAKING THE BIG DECISION?



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SEC for this section. Sam Van Liew has put in many good years both in time and effort to get things going during any past emergency and it will be hard to replace him. Traffic: W6GQY 222, QMO 65, GGC 64, BIP 33, GHI 8.

SACRAMENTO VALLEY—SCM, Harold L. Lucero, W6JDN—December passed without an emergency, but all were prepared should one occur. Thanks for a very fine AREC. A great hand should be given the SEC, all ECs and, in fact, all the amateurs. We were ready, but the emergency didn't happen. K6ITY reports that he aided a fellow who is blind to obtain his Novice ticket. K6EHT is having some trouble with the CVNet and requests aid from those who are interested. With a few more stations the problem will be somewhat solved. Let's give Neil a hand, fellows. We still are hoping that the Pacific Division Convention will land in the Sacramento Valley this year. Should any club be interested, drop me a line and we will go from there. Thanks. All those who have official appointments are urged to contact the SCM as you may wish other appointments. Just drop me a line, fellows. The weather has been fine so far, but the next two months can really hit us, so keep that emergency gear in top shape. Check with your EC as to his drills. I want to thank each and everyone of you for the very fine aid that you have given me during the past year and I do hope that you keep up the good work for the League and your fellow amateurs and, of course, the public in general. Again thanks for a job well done. Traffic: K6EHT 170, IYC 40.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—WPV has a new Pacemaker on s.s.b. SGP now is located in Turlock. HQY has a new DX-35. CPT is going mobile. PJF, LRS and SGJ are operating on the high end of 2 meters. K6RUP is on 6 meters. K6LLF has a new Hallicratter 6-meter receiver. K6JGH has moved to a new QTH. WBZ is on a new project—electronic stroboscope. IUE has the s.s.b. bug. GS is on a trip to Old Mexico. K6HWS has a new QTH. ARC is on 75-meter mobile. K6MVY has a new Valiant. JSJ is on 75-meter phone. K6BGK has an NC-240. IRV has an HRO-50. PPO is the new president of the Fresno Amateur Radio Club. The Fresno Radio Club helped out on the Motorcycle Endurance Run Dec. 9, 1956. The club trailer broke a spring on the way up to the Sierras for the Enduro. K6GOX has worked 31 states on 6 meters, and reports that the band has been open to the East almost every day via F2. K6IMN has a new Eldico s.s.b. rig. NTV, ERE and BCL are operating on 420 Mc. 7FUZ/6 is now in Riverbank. KN6RPL is building a beer-can vertical. K6KRP completed his training course and expects overseas duty in the Army. The new officers of the Stockton Radio Club are NBQ, pres.; K6GMY, vice-pres.; K6PHV, secy.; OVR, treas. UTU is recovering from injuries received in an auto accident. PCB is on s.s.b. and has moved to Lake Tahoe. EBI has a new 75A-4. See you next month. Traffic: W6ADB 172, K6HII 12, W6EBL 6, JPU 3, CQI 2.

ROANOKE DIVISION

NORTH CAROLINA—SCM, B. Riley Fowler, W4RRH—SEC: ZG. PAM: DRC. Many of the Emergency Coordinators are busy converting their AREC plans to RACES throughout the State. Smith Woodson, EC of District 16, was the first to complete his plan. Area "F," which includes Districts one, two, three, four and five, have submitted an AREA Plan. Much work has gone into these plans and the amateurs are urged to cooperate with their District ECs in these matters. At the moment your SCM is getting each Emergency Coordinator certified as a RACES operator. Every EC except two has filed Form 481 (FCC) Loyalty Oath and Security Clearance with the SCM to be forwarded to the Communications Officer at Headquarters. Your SEC, Roy Corderman, is very busy getting a RACES program set up in the State. The section is doing excellent with the AREC. All except one EC have finished recruiting members. Most districts have an emergency plan and all are working. We have the most AREC members that the State has ever boasted. My congratulations to the entire field force of the ARRL in the section. This is what makes for real cooperation and work. Everyone in any leadership appointment is at work, and together we can accomplish what we choose. Thanks, fellows. Those amateurs who have not registered with your EC should check Nov. and Dec. *QST* in this column for the name of your EC. Traffic: W4BUJ 535, GXR 123, RRH 47, DRC 45, DSO 41, BCE 30, FUS 30, FTE 22, HUL 15.

SOUTH CAROLINA—SCM, Bryson L. McGraw, W4HMG—New officers of the Charleston Amateur Ra-

(Continued on page 128)

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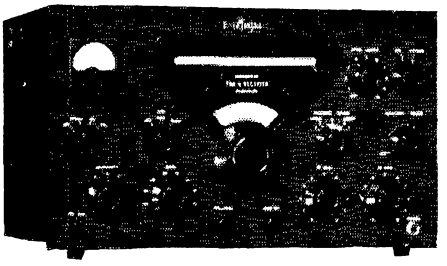

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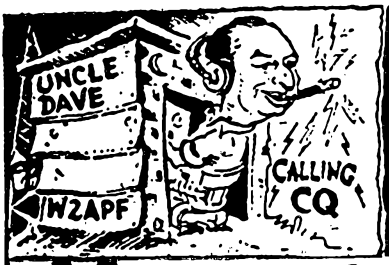
dio Club are K4EAR, pres.; ZRH, vice-pres.: K4AVG, secy.-treas. I request information on the secret antenna of K4BBL at his new QTH. K4AVG is the proud owner of a new fourteen-element 2-meter beam. Congrats to 3CCE/4, ZRH and EAR on their program for the Chas. Boy Scouts on their emergency-day doings. K4GHT and K4AOG both are making romantic contacts via 75-meter phone to the daughter of KN4JKG. K4EYV is proud of his new HQ-140 and new all-band vertical and needs only Nevada for WAS. ZVY turned in an average of 7.7 parts per million in the F.M.T. KN4LND, on only 23 days, has 108 contacts including 25 confirmed states, all on 80 meters. Newberry is getting on the map with 15 amateurs and a fine club station, K4WEB, with 150 watts on all bands. K4HIH has a new DX-100 on 75 and 20 meters. Thanks to HIA, of Newberry, for his fine guiding influence to all the fellows in his area. CCG sounds like a kw. with his new Viking. PIL is getting the hard ones via 20-meter c.w. EWR, with his Globe Scout, is on 20-meter c.w. only. HTM now is in KL7-Land. KN4KJI and KN4KVS, both only 11 years old, are doing FB on 80-meter c.w. with DX-35 rigs. EGI has a new 15-meter beam and 500 watts on s.s.b. The Virginia Phone Net with K4AET is most helpful in taking north-bound traffic. FAV and HHL are new s.s.b. stations. The Palmetto Radio Club was very pleased to receive a visit from ARRL-staffer, John Huntoon, who gave a very fine informal talk on League affairs. K4HMG is on the air from Rock Hill. Traffic: (Dec.) K4EGI 100, W4TTG 73, K4GHT 4. (Nov.) W4TTG 12.

VIRGINIA—SCM, John Carl Morgan, W4KX—PAK has accepted appointment as SEC, succeeding RTV who resigned. We know you'll give Hack your wholehearted support in helping maintain a strong AREC organization in Virginia. TNQ reports the Fairfax Co. C.D. Net is conducting drills with the emphasis on message-handling. VN stalwart KRR moved from Portsmouth to the Washington, D. C., Area. YL 3MSU, now K4LMB in Arlington, is having trouble with the local antenna permit law. YHD is back in Virginia working contests in between GWU studies. SHJ's Navy tanker, refitting in Philly, keeps Hoppy off VN, etc. An enforced visitor to the Fredericksburg Area is 1RLS, in the Mary Washington Hospital. K4DVX reports plenty of 10-meter activity on VON in the high school. AAD, with a kw. perking, takes time out to report the Peninsula ARC is perking along. CWB's grounded-grid gallon modulated the house lights, so he's back on 150 watts. IA now has 101 YLs worked, 96 confirmed. JUJ's wallpaper includes the Central American "DRD" Award and a certificate as Virginia winner in the '56 Vermont QSO party. BIJ worked 109 countries in the past year with 150 watts and no beams! ZM and BRF say DX is good on 80 meters. K4DKA complains that "workmen" not only cut down his 80-meter antenna, but chopped it to pieces. CVO dispatched to 3DJB who reported, via his mobile, being out of gas on a lonely country road on Christmas night. A number of *Virginia Bulletins* were returned for lack of a forwarding address. If you are not getting 'em and were on the mailing list, notify SCM KX. VFN, with 193 check-ins, had the best month of all in December with a heavy traffic credit and liaison outlets to TCPN, EBN, Md. EFN, and others. Net sessions run 2½ hours. Most consistent are K4CDX 31 times, K4BTM 29, W4CQW and KZS 28, W4CVO 27. The Richmond Amateur Radio Club announces a new certificate to be known as VA-JF, offered in connection with the 1957 Jamestown Festival. Requirements for obtaining the award are the submission of proof of 25 two-way contacts with different stations in the Commonwealth of Virginia during the period January 1 through December 31, 1957. C.w., phone, or any combination of both are acceptable, and stickers for additional 25 contacts at a time, up to 125, will be issued. Send your QSLs to Richmond Amateur Radio Club, P. O. Box 1985, Richmond 16, Va. Traffic: (Dec.) W4NTR 1596, IA 419, QDY 338, K4AET 158, KNP 123, W4SZT 89, FLX 58, AAD 42, KX 40, ZM 30, PVA 25, BZE 21, SHJ 20, LW 19, CVO 16, K4BUI 15, DKA 13, W4AQA 9, BRF 9, K4DBC 9, JLO 9, DVX 8, BYS 7, DWP 5, W4CWB 4, JUJ 4, YHD 2, K4ELG 1. (Nov.) K4KNP 45.

WEST VIRGINIA—SCM, Albert H. Hix, W8PQQ—SEC: GEP. PAM: FGL. RAMs: DFC, GBF and HZA. HRO, VYI, VZO, ICP, ESH, IAK, HTU and HI are doing lots of 6-meter work. GBF made an average error of only 1.3 parts/million in the last F.M.T. K8CSG is working lots of 10-meter DX and is planning on putting up a 20-meter beam. PBO renewed his ORS appointment. New officers of the MARC are VMM, pres.; HNR, vice-pres.; KN8BUM, secy.; WN8IFL, bulletin editor; KN8AKC, reporter; KN8BOP, librarian.

(Continued on page 130)



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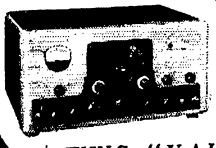

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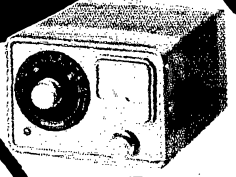

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KN8CQV is a new member of the MARC. HNR got his General Class ticket. The MARC was the first club in the State to give a 100 per cent contribution to NBG for the call letter license plate campaign. We need all the help we can get in making the campaign a success. KXD is recuperating and again is quite active on the various bands. BWK has a new SX-88 receiver. More activity is needed in the Huntington Area on the c.w. net (WVN 3570 kc.) K8DDB is operating on all bands and is putting up a beer-can vertical for 40 and has a four-element beam on 10 meters. TAP is back on 75 meters. The following are using trap antennas: HNC, HNK, FGL, QVP and K8BHG. KN8CFT has a Globe King ready to go as soon as he gets his General Class ticket. KBU has a 40-meter ground-plane antenna. West Virginia was well represented in the SS Contest. ORD has a Pacemaker RX and has a 75A-4 on order. He also is building a new kw. final for s.s.b. SSA has a new kw. using 4-828s driven by a 20A. GSW has a 4-250A ready to go. Traffic: W8BWK 77, KXD 64, HZA 61, GBF 54, SNP 49, PZT 22, NYH 13, K8DDB 2, W8PQQ 2.

ROCKY MOUNTAIN DIVISION

COLORADO—Acting SCM, William R. Haskin, KØCEN—SEC: NIT. RMs: KQD and MYX. PAM: IUF. The passing of WØHEM, James Simpson, has left a gap that will be hard to fill. Jim was a fine amateur and gentleman. We are all thankful we knew him. The Northern Colorado Radio Club reports new officers are NNL, pres.; KØEPH, vice-pres.: and FGB, secy.-treas. The club approved affiliation with ARRL and the purchase of a new receiver to make the club station complete. Meetings are held every Mon. night. KQD's OM gave her a Morrow CM-1 and NVU's XYL gave him a 20-A for Christmas. KQD is back on traffic skeds after taking December off. The Greeley Club is setting up a 2-meter group with ULZ and KNØIBF on the air. WUN has left Denver for Mesa, Ariz. Don't forget us, Ray, and get that Collins fired up soon. NYX is Lamar's new OPS. KQD has been endorsed for another year as ORS, RM and EC. Anyone in the section who feels that he is qualified for any of the appointments under ARRL, please get in touch with your SCM, EC, RM or PAM. We sure can use you. KØBCQ made BPL. Traffic: KØBCQ 625, WØTVI 195, NVU 161, KØWBB 159, WØKQD 158, NIT 154, ENA 130, KØDXF 128, DMW 36, WØDRA 32, AGU 16, KØCEN 11.

UTAH—SCM, James L. Dixon, W7LQE—The Ogden Radio Club officers for 1957 are LQE, pres.; ABI, vice-pres.; SAZ, secy.-treas.; BBN and ZJI, directors. The UARC's (Salt Lake Club) new officers are OSV, pres.; NMK, exc. vice-pres.; VEL, vice-pres.; BLZ, secy.-treas.; WN7FSC, program chairman; and CTI, editor of *Microvolt*. ZDE received his General Class license and is working 75-meter phone with 75 watts to 6146 and 807 modulators, and SX-25 receiver and a long-wire antenna. CWD and EIF received Viking Valiants. OCX, Utha MARS Director, reminds us that inactive MARS members will be dropped. SST is working 40-meter phone with a Viking II, S-20R receiver plus Q-multiplier, long-wire and 65-foot vertical antennas. RQT was home on a visit from the Navy. NAY has moved to California. ZDB is head of the National Guard MARS in Cedar City. Traffic: W7LQE 9.

WYOMING—SCM, James A. Masterson, W7PSO—The Pony Express Net meets Sun. at 0830 on 3920, with PSO and MWS alternating as NCS. The YO Net meets on Mon., Wed. and Fri. at 1830 on 3610 kc., BHH, DXV and NMW alternating as NCS. After considerable discussion around the State and in Cheyenne it was decided that it would be to the best interest of all not to introduce the license plate bill in the legislature this session. Lack of a civil defense emergency organization and previous planning most certainly would have led to defeat. Start now joining civil defense drills, and prepare an organization that will give us something to talk about when we request our license-plate statute in 1959. DXV spent the holidays in XE-Land. UUW has left for Air Force duty in Spain. DTD is teaching code and theory to a class of 12 boys at the Wyoming Industrial School in Worland. 1957 officers of the Casper Club are AMU, pres.; HYW, vice-pres.; NNX, secy.; SZZ, treas. PZK has a new DX-100. CXU is a new call in Upton. Traffic: W7BHH 70, NMW 30, TZK 30, YKU 22, PSO 14, HX 10, YWW 7, CQL 6, AEC 4, MWS 4, DTD 3, LHW 1.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Joe A. Shannon, W4MI—SEC: TKL. PAM: K4AOZ, RM: KIX. New appointments

(Continued on page 132)

Now is the time to buy your KWS-1...

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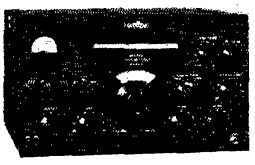
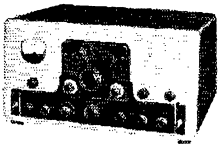
COLLINS KWS-1 TRANSMITTER — Designed for optimum kilowatt performance on AM, CW or SSB! 10 through 80 meters . . . single conversion on 80, dual conversion on higher bands. Permiability tuned, hermetically sealed VFO provides stable, accurate signal source. Upper and lower sideband. Push-to-talk or voice-operated relay provision. Excellent wave shaping for smooth keying on CW. Complete with tubes, power supplies. New Collins Gear Reduction Tuning Knob makes sideband tuning a real breeze. **$209.50** down . . . . . **$87.99** per month for 24 months.



COLLINS 75A-4 RECEIVER—An outstanding performer on 160, 80, 40, 20, 15, 11 and 10 meters. Excellent selectivity—single sideband reception is tops with no sacrifice on AM and CW. Excellent image rejection—crystal controlled converter—extremely stable VFO. Sensitivity: 1.0 microvolt for 6 db signal-to-noise ratio with 3 kc band width. Complete with tubes and new Gear Reduction tuning knob. **$64.50** down . . . . . **$27.09** per month for 24 months

Easy terms on these 4 "full power" Viking transmitters!



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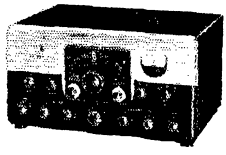
Kit — $34.95 down
$19.04 per month for 18 months
Wired — $43.95 down
$23.95 per month for 18 months



VIKING "PACEMAKER" — More than a single sideband exciter . . . completely self-contained transmitter as well! 90 watts CW and SSB (P.E.P.) . . . 35 watts AM. Extremely stable, built-in VFO. Voice controlled operation . . . instant bandswitching 80, 40, 20, 15 and 10 meters . . . TVI suppressed . . . plenty of power to drive a kilowatt. With tubes and crystals.
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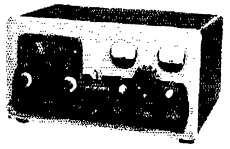
$22.27 per month for 24 months



VIKING "FIVE HUNDRED" — 500 watts phone and SSB (P.E.P. input with auxiliary SSB exciter) 600 watts CW! Instant bandswitching 80 through 10 meters. All exciter stages ganged to VFO tuning. Two compact units: RF unit small enough to place on your operating desk beside your receiver. With tubes.
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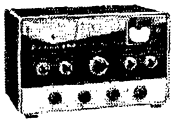
Wired — $79.95 down
$35.97 per month for 24 months



VIKING "6N2" — Instant bandswitching 6 and 2 meters. 150 watts CW, 100 watts phone. TVI suppressed. May be used with the Viking "Ranger," Viking I, Viking II or similar power supply/modulator combinations. May be operated by built-in crystal control or external VFO with 8-9 mc. output. With tubes.
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are K4AJG, K4BRS and W4PHY as ECs: K4BTO and W4DGH as OPSs: K4EOH as ORS. The Tuscaloosa Club now has a trailer for the emergency power plant and is working on 6-meter rigs. Montgomery has added two 6-meter mobiles to its AREC group. AENO, our first v.h.f. net, is operating on 50.1 Mc. BAI reports he worked VE with six watts! Conelrad monitors are going with many adaptations. K4ANB is shopping for a high-powered final. RLG had the highest c.w. score in the YLRL Anniversary Party for the third time, thereby winning permanent possession of the loving cup. Tuscaloosa auxiliary cleared over fifty dollars selling Christmas cards toward the purchase of emergency equipment. K4IUL now is Conditional Class. KN4MDW is new in Tuscaloosa. ZSQ is using a new Reyco trap antenna. WAZ has published the first issue of the new section bulletin. How about mailing him club news, individual news, pictures and dope for the swap or sell page? AENB, AENP and AENT all showed high traffic totals for December. USM has 86 countries towards DXCC. BAI made WAC and has a new Ranger. EWB moved to Florida. Traffic: (Dec.) W4COU 788, K4AOZ 227, ANB 205, W4HON 204, RLG 190, K4BRS 187 EOH 133, AJG 105, W4ZSQ 96, KIX 85, BFX 70, K4DDC 63, EOG 56, W4YRO 56, MI 37, WHW 34, WAZ 28, K4BFF 23, W4YAI 22, K4BTO 19, W4TKL 19, LSQ 18, K4BFL 16, W4DGH 16, CIU 15, USM 15, BAI 12, K4CTC 12, W4RTQ 12, WOG 11, K4APF 10, W4ZSH 9, EWB 8, SXS 8, K4ACO 7, W4HHG 7, ATK 6, CRY 6, TOI 5, ZUP 3. (Nov.) W4USM 28, BAI 11, YFN 2.

EASTERN FLORIDA—Acting SCM, Andrew C. Clark, W4IYT—Asst. SCM: John F. Porter, 4KGJ. SEC: IYT. RM: LAP. PAM: JQ. Lake Wales: DPD is the new master oscillator of K of KCs for '57. TOD did a swell job! Give a listen Sun. 7 A.M. on 3910 kc. HGO is NCS of the new C.D. Phone Net following the K of KCs on 3910 kc. GCC has a new vertical. We miss CO3RC on the traffic nets. PJU hit BPL again. K4GOX likes his homemade Conelrad monitor. New officers of the Broward Amateur Radio Club are AHZ, pres.; VCQ, vice-pres.; K4JOE, secy.; Ennis Shepherd, treas.; IEW, act. mgr.; K4CVP, sgt. at arms. Ocala: The gang is setting up the Silver Springs Radio Club with quarters and QSLs sponsored by the Chamber of Commerce. HGO has a new B&W 5100. BJI qualified for OO Class I. Naples: AZK has a new AF67 and Gonset in mobile. Miami: ES has a new Collins receiver. K4CEJ is on 2 meters. GTV is NCS of the Hialeah/Miami Springs unit of the Intra-county Net, with ZXL in charge of equipment in the Town Hall. SJZ is going mobile. WSJ is OO Class III. KGJ enjoyed a vacation in Alabama. K4AHW maintains morale skeds with KW6CA each Thurs. on 28,050 kc. at 1730. The South Miami Springs Radio Club is sponsoring a complete amateur booth at the Hobby Show with an on-the-air demonstration for the public. For details write K4CEJ. Orlando: BKC and DWI are on FPTN. The Orlando Hamfest will be held the week end after Easter. Jacksonville: The Jax Amateur Radio Society's new officers are TRN, pres.; RTJ, vice-pres.; HRC secy.; K4BGU, treas.; NKC, act. mgr. Tampa: IWM is going back to college after 30 years of Navy life. St. Petersburg: K4BNE is QRL traffic and DX. GOZ has 86 countries and needs Tennessee for WAS. FPC made BPL again. CIG has emergency power on stand-by. New Port Richey: KJ is on from a new QTH. W9FRP/4 applied for a new call. Sarasota: WHF is busy with his new OO appointment. Lake City: YNM is working on a RACES plan with EGY and K4s BOS, BKV and IQK. Traffic: W4FPC 509, PJU 504, IWM 387, ZIR 325, WS 236, DVR 211, K4KDN 200, W4IYT 148, PZT 101, AHZ 94, FHW, 85, TRN 77, K4BNE 71, W4LAP 67, WEO 54, K4ABV 38, W4DUE 31, W9FRP/4 28, W4WDX 27, LQA 26, K4GOX 25, W4BWR 24, KGJ 20, K4IWT 18, W4YFT 18, FJE 15, YNM 14, HGO 12, K4AHW 7, W4SJZ 7, EGB 6.

WESTERN FLORIDA—SCM, Edward J. Collins, W4MS/W4RE—SEC: HIZ. RMs: AXP Escambia, BVE Okaloosa. FHQ has returned home from the hospital and is doing FB. DAO/DEF has an FB new shack. MUX is back from Europe and enjoying the rig. LRC promises s.s.b. for 1957. KN4MDX is now an OES. K4IVD and K4ECP are busy on 6 meters. QK wants a commercially-built transmitter. Hi. UL is building 6-meter gear. BGG has a new 10-20 converter. GMS has moved the beam to a new tower. ZFL and HBK are fighting the DX. PTK-TTM were paid a visit by MI. JPD keeps the new beam hot. NJB listens on all frequencies. MS/RE is recovering from a recent operation. KN4IVE is QRL school. K4AGM proudly boasts 22 states on 6 meters. PQW still wins hidden transmitter hunts. HIZ and UUF keep 2 meters perking. RDC runs low power on 10 meters. K4APE sends in an interesting

(Continued on page 134)

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OO report. RKH, now OPS, sends in an FB report on the EARS group. EARS officers are MFY, pres.; RRF, vice-pres.; UXW, act. mgr. SMM is editor of *Bandspread* the club's official publication. CPE has returned home after being on the sick list. CKP expects to become DX soon. K6JDG is now local and operates mobile on 29.560 kc. K4JFL is another FB mobile in the area. K4BQY, K4BRQ and K4HXV are doing an FB job over Crestview way. K4EHI is having a hard time getting an appointment to take the General Class exam. PAA still hunts DX. EQR has built a new transmitter and is doing FB on 6 meters adding the 43rd state, Mississippi. KN4IYQ is going after Tech. Class license and then 6 meters.

GEORGIA—SCM, William F. Kennedy, W4CFJ—SEC: K4AUM. PAMs: LXE and ACH. RM: PIM. GCEN meets on 3995 kc. at 1830 EST Sun. GSN meets Mon. through Fri. at 1900 EST on 3595 kc. with PIM as NC. The 75-Meter Phone Mobile Net meets each Sun. at 1330 EST on 3995 kc. with UUH as NC. The Atlantic Ten-Meter Phone Net meets each Sun. at 2200 EST on 29.6 Mc. with YHW as NC. In December K4BSB/m, W8ZCD/m, K4GPR/m, W4AQZ/m and W4FYC/m all did a wonderful job looking for a jet plane believed down near Roberta, Ga. K4FEO did a fine job in directing the mobiles. A young couple and a baby boy were able to enjoy Christmas at home in Monterey, Calif., through the help of the Augusta Elks Club and ten amateur operators. Hams in the W4-5-6-7 districts participated in delivering messages to Elks Clubs along the way who financed the trip. The Georgia hams were AAY, YEK (who delivered seven messages and got seven replies) K4AUM and FOA. Remember the Atlanta Hamfest to be held June 2nd. The new frequency of 4RN, 1945 EST, is 3645 kc. K4AFP is kept busy at Tech. On Dec. 18th LNG contacted 2NLY on 144 Mc. Calls and reports were swapped for the first Georgia-New Jersey contact. On Apr. 28th the Dublin Amateur Radio Club will hold its Annual Picnic at Little Ocmulgee State Park. We welcome four new Novices in Brunswick, Ga. Only one has received his call, KN4LRF. Club activity is picking up in Brunswick. Santa Claus left FYC a DX-100. GCU is on the air with an 813 final. K4DNH found an s.s.b. exciter under the Christmas tree. Glad to have 5RUN, now 4POI, back in Georgia. W4UFQ now is operating CN8JD, French Morocco. K4HOU and W4PAZ need a monkey to climb the Windom antenna they are putting *up*. K4INN changed his antenna and put *in* a Rayco coil. His XYL is now KN4MEH. We welcome K4MBP, of Valdosta. K4CZL entered in the National Science Talent Search at Henry Grady High. Traffic: W4DDY 257, PIM 179, K4CSL 69, CZQ 37, W4ZD 25, K4INN 24, W4ZDP 24, K4HJZ 20, W4CFJ 8, UUH 8, K4HOU 4, AFP 2.

CANAL ZONE—SCM, P.A. White, KZ5WA—The first YL president of the CZARA was elected at the January 3rd meeting at Balboa. She is VR, whose OM, RV, is a past-president. Other elected officers are HA, vice-pres.; LJ, treas.; KJ, secy.; and BG, act. mgr. HC8GI has arrived back home in the Galapagos Islands after a two-month visit to the Canal Zone on his yacht *Symbol*. While here he gave a talk on the Islands to the KZ5s at Balboa. Jack McKaig, ex-KZ5DM, now is back on the air in Los Angeles as K6UVX/6. Bill Clark, ex-KZ5WC, is now KALO. There was an error in the report in January *QST:* It was QU who helped run the double phone patch and not AGB. WA returned from leave in the U. S. after visiting K5AGJ, KØATS, WØVNM, KØCKB, KØBFH, K6MPX, W6DYA, W6VDA, K6GH, W6SK, W6NZP, K6IGY, K6SXJ, W6ZV, W6LYG and K6MUC. Traffic: KZ5VR 119, RM 13.

SOUTHWESTERN DIVISION

LOS ANGELES—SCM, William J. Schuch, W6CMN—Asst. SCM: Albert F. Hill, jr., 6JQB. SEC: LIP. RMs: BHG and GJP. PAMs: MFP, K6BWD and PIB. *It must have been a bang-up Christmas and New Year* by the paucity of reports other than traffic. This section has the highest count for many a year and five made BPL, mostly on deliveries. The majority of traffic reports are received from the c.w. gang. Few phone net members report. Why? GYH still is pounding it out on MARS and TXN. DDE has a high count on UTL. K6MON makes BPL on 2 meters. The SCN Net had a total of 1048 messages for December. CMN burned off his feeders and set fire to the house. However, there was little damage. HJV is QRL four nets and is doing an FB job on SCN. K6COP is plugging for As in school but still is busy as OO and ORS. K6LVL is busy with school and three nets. WRT turns in a nice traffic count. K6PLW is getting a new tower and beam. WT is putting on a kw. s.s.b. rig. K6UYK is a new member of the SCN net. K6EIA and gang were

(Continued on page 136)

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active during the big fire. BUK is active with the Mission Trail net. QMN made s.s.b. WAC. K6DFM is the new president of the West Valley Club. K6EA is back on the coast and active on SCN. K6BWD is hunting DX with a new beam. K6CSR is on SCN. K6ICS is trying for WAVE. YSK was active during the fire. K6EXX has the valley gang guessing on transmitter hunts. LVQ has gone s.s.b. K6DDO made membership in the British FOC Club. K6LMW has a tri-band beam. It's been a nice year, gang. Let's make this a better one by reporting more often. Traffic: (Dec.) W6GYH 1138, DDE 1100, K6MON 636, W6BHG 407, CMN 295, WPF 260, HJY 179, K6COP 160, GUZ 128, W6GJP 84, USY 72, K6LVL 71, W6ORS 68, WRT 68, K6OZJ 58, PLW 38, W6CK 36, VSH 32, K6HOV 31, W6BUK 28, WT 25, K6EA 19, UYK 19, EXO 14, QLG 12, BEQ 10, BWD 8, CSR 8, ICS 6, LMW 4. (Nov.) K6FCY 344, DDO 30, CSR 4, LMW 4.

ARIZONA—SCM, Cameron A. Allen, W7OIF—SEC: YWF. PAM Arizona Emergency Net, 3865 kc.: ASI. PAM Grand Canyon Net, 7210 kc.: LUJ. The Christmas Party of the Arizona Radio Club in Phoenix was well attended. Guests came from as far away as Ajo. JGX has a new DX-20 and is back on the air from Sunnyslope. Welcome back, John. UYA passed away Dec. 22nd. New calls in the State are 3PBE, at Williams Air Force Base; 6AOO, at Yuma; 5YOJ, at Phoenix, and KN6TWL, also at Phoenix. YFG made a Command receiver available to HYQ to take to a blind man in Flagstaff to use. The Flagstaff gang is going to try to help him obtain a ticket. For up-to-date news listen to the AEN on 3865 kc. Tue. and Thurs. at 1900 MST. The AEN is planning on a 5-night-a-week schedule. NFL has his Valiant working OK now. Traffic: W7NFL 69, OIF 9.

SAN DIEGO—SCM, Don Stansifer, W6LRU—A special meeting of the San Diego DX Club was held January at the home of BZE, featuring ex-YU1GM and Danny, ex-FO8AD, VR1B, VK9TW and VR4AA, of *Yasme* fame, as guests. An interesting talk by Danny on the trip he took alone from England to the South Seas was enjoyed by all present. We are glad to report a good traffic outlet is now active in Fallbrook, K6SLB/6. He made BPL his first month with a traffic total of 1604. Newly-elected officers of the Palomar Radio Club are K6HZF, pres.; HLB, vice-pres.; KVE, secy.; and BLL, treas. KN6UHI and K6LKQ got DX-100s from Santa Claus. A new club has been organized in Vista with K6LKQ, pres.; NAT, vice-pres.; KVB, secy.-treas.; HAW, trustee. Code and theory classes are planned. DEY, for years in Santa Ana, is now K4KXJ in Alexandria, Va. New officers of the Ryan Club are K6JBA, pres.; FWF, vice-pres.; and Loren Cleer, secy.-treas. K6HLQ is now in the Navy. K6LJS worked two eastern states on 50 Mc. with 6 watts during recent openings. KSM won the DX Club 1956 marathon on c.w., and CHV won it on the phone. BZE, KSM, KYG, and OME attended the DX meeting in Fresno. HZN is building an electronic keyer. The Helix Club has joined with the San Diego Blood Bank, and all members and their families are now covered. UZL has moved to W4-Land. K6CUZ is now on 14-Mc. s.s.b. with a good signal. JUT has a new 50-ft. tower and a three-element 14-Mc. beam. K6KGS has a two-element 28-Mc. beam.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, Ray A. Thacker, W5TFP—SEC: PYI. PAMs: YKT and IWQ. RM: KPB, ZTG, attending Texas Tech., reports he is now mobile. KN5HTH is getting some choice DX on the Novice 15-meter band. DTA got away from his heavy traffic work to enjoy the holidays in Arkansas. KN5IAO is a new Novice in Roscoe. K5DNQ, age 15, is the only ham in Lindale. AWT reports the hams of the Monahans Area are trying to organize a club. DCQ has confirmed 22 states and Canada on 6 meters. Santa brought DFB a Q Multiplier. UYQ "hosted" the Tarrant County Disaster Net boys through the CAA electronic facilities. I am grateful to K5COD for the very complete report of activities of the Central Texas ARC in Waco. Things are happening in that area! A new ham directory is underway under the supervision of ACD. The club recently received completely new station equipment, courtesy of the Cooper Foundation. This club and the Temple ARC have decided to get together for Field Day this year. That should be a lot of fun for all! Well, the new year is with us. Hope all got their Conelrad obligation handled okey. It's time to start planning for the trip to the Convention in San Antonio. Sure hope to see lots of you folks from this section down there. Keep the reports coming! The 7th of the month is my deadline! Traffic: K5FFB 865,

(Continued on page 138)

HAM PARADISE—Some of the many FB pieces of traded-in equipment on display at Ham Headquarters, USA. Many like new, each with Verified Performance report, all bargain-price tagged at a fraction of new cost.

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73, Bil Harrison, W2AVA, 225 Greenwich St., New York City

W5DTA/5 846, K5AEX 408, W5UBW 341, KPB 326, CF 198, K5EMR 157, W5AHC 118, AYX 66, K5BKH 66, W5YKT 62, BKH 57, ASA 39, K5EUV 33, W5FCX 32, TFP 24, VEZ 24, KN5HTH 21, K5HOF, 18, W5OCV 9, AWT 7.

OKLAHOMA—SCM, Ewing Canaday, W5GIQ—Asst. SCM: James R. Booker, 5ADC. SEC: LXH. PAM: MFX. RM: JXM. New officers of the Aeronautical Center Club in Oklahoma City are K5EMY, pres.; VRV, vice-pres.; EHC, secy. New officers of the Bartlesville Club are K5AUX, pres.; EKA, vice-pres.; K5BBA, secy. The Lawton-Fort Sill Club elected LPL, pres.; K5DLP, vice-pres.; K5EGS, secy.-treas. The Tulsa and Enid Hamfests were well attended with many good prizes and fine fellowship. K5AOV is back on the traffic lanes after a visit to the hospital. BDL is on the air again from his new home. K5EVN has moved from Novice to General Class. K5BBA has made WAS with his AT-1. K5AUX, K5HZF and IER are new OPSs. AQZ is a new Class IV OO. DRZ made BPL for the first time. 1YU has a new 10-B s.s.b. exciter. EHC lost his vertical antenna in an ice storm. 1.9 Mc. and 144 Mc. are on the up-sweep for local ragchews in Oklahoma City. LWG moved to Spring Falls, Idaho, after fire destroyed his home and all his ham gear. The old Sooner Nooner Traffic Net, formerly on 3850 kc., has been reactivated on 7250 kc. daily at noon. OLZ is now operating seven nights a week. It is gratifying to see the increased interest in traffic nets. Twenty-six stations handled more than three thousand messages in December. Traffic: W5DRZ 715, K5AOV 530, CAY 356, HZF 219, W5JXM 209, MRK 162, GIQ 121, ADC 102, K5AUX 83, W5FEC 76, K5DUJ 56, W5PNG 53, ZAJ 49, FU 43, EHC 37, KY 36, MFX 36, QAC 35, PCQ 34, K5CVU 33,W5MQI 22, SWJ 19, K5CBA 16, W5KCG 15, UCT 14, GOL 7.

SOUTHERN TEXAS—SCM, Roy K. Eggleston, W5QEM—The Corpus Christi Amateur Radio Club helped in the March of Dimes Telethon. QKF, PMT and QFA are teaching a code and theory class for Novices. UUB is heard on 40-meter mobile. ONG is s.s.b. TEL visited in Corpus Christi during the Christmas holidays from the Army. RPH and his XYL visited QKF and his XYL over the holidays. LRK has moved to a new QTH. LP has a new quad on 20 and 15 meters. It's working FB. It's nice to hear FIW back on the air. MSA has a new QTH, causing QRM to EV and LOW. It's good to hear CCD, an ex-Corpus Christian, back on the air from Lake Charles, La. AQK is being heard on 10 meters with a new three-element beam. GEL and PM still are hunting 20-meter DX. GQN is now in Uncle Sam's Air Force. Be careful, Dave, they have their own way of doing things. Come on, fellows, and send us some news from all over Southern Texas. Traffic: W5ZWR 98.

NEW MEXICO—SCM, Einar H. Morterud, W5FPB—SEC: DAA. PAM: DVA. RM: RKS. The NMEPN meets on 3838 kc. Tue. and Thur. at 1800 MST. Sun. at 0730; the NM Breakfast Club meets on 3838 kc. daily except Sun. at 0700. New officers of the SBRC are RVZ, pres.; 4GBJ/5, vice-pres.; UDC, secy.; BJQ, treas. K5CXY and K5GLJ passed the General Class exam and dropped the "N." Officers of the Totah ARC are POI, pres.; SGC, vice-pres.; CIN, secy.-treas. PBV vacationed in Houston. WKW is active on 15 meters. SB is active on 75 meters. BIH has a 60-ft. tower for his 2-meter beam. BHF built a transistor transmitter, then blew the final. GPZ is on with a Viking II. DWA is back on the air. We are all sorry to lose BIW and DRA, who have moved to Houston. It is hoped that someone soon will take over publication of *CQ-NM:* several are considering it. K5CEV is the new EC for Eddy Co., replacing K5DAA, who is now SEC. We are badly in need of ECs in many other counties, so how about the clubs recommending someone for EC if your county has none. Traffic: (Dec.) W5UAR 17, K5DAA 12, W5NQG 12, BIH 5, ZU 5, FPB 2. (Oct.) W5NQG 13, DAV 6.

CANADIAN DIVISION

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCM: Aaron Solomon, 1OC. SEC: FH. Congrats to WL and his XYL on the arrival of a new jr. operator. VE1NN is operating Maritime Mobile aboard the HMCS *Magnificent* under the call VE8ND. VB has a new home-built rig on 15 and 20 meters. WR has increased power to 65 watts with a 6146 final. AM is active on 20 meters but drops down to 75 occasionally. ZZ, ADH, XR and VU report good DX conditions on 80 meters. LZ is active again after a long lapse. Don is using a 32V-2 on all bands and will be operating s.s.b. shortly with a 20A exciter. HC also has joined

(Continued on page 140)

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the swing to s.s.b. OM has 7 antennas in operation. WL reports daily 6-meter openings and has worked Gs, GIs and GDs in cross-band operation (6-10 meters). Ray also has worked VE7s and W7s and received BBC TV on 6 meters. PQ and EF also are having good results on this band. Asst. SCM OC reports daily schedules with VE7HV on 10 meters. Aaron's mother-in-law is seriously ill in a hospital in New Westminster, B. C., and HV is a surgeon on the hospital staff. Traffic: VE1FQ 137, AV 57, UT 47, DB 23, ME 18, OC 17, ADH 15, QM 11, WR 10, YB 10, WK 9, AEB 2.

ONTARIO—SCM, Richard W. Roberts, VE3NG—SEC: KM, PAM: WT. The Kingston RC has elected CAZ, pres.; AXK, vice-pres.; DJY, secy.-treas.; ATL, act. mgr. The Quinte RC's officers are BMH, pres.; BSD, vice-pres.; EHI, secy.; Norm Moore, treas. The Westsides RC's officers are IZ, pres.; DWW, vice-pres.; BBX, secy.; CWR, treas.; AIB and DBY, activities. The North Shore RC's officers are ADD, pres.; Ken Gorman, vice-pres.; BRF, secy.; DZM, treas. AMT has his DX-100 running FB now. BBH has a pair of 4/125s, QO has his DX-100 working overtime, BHW now is mobile. CSA announces news for the Toronto Area via 3765 kc. for the Ontario Amateur Federation of T.V.I. The Westside RC is talking Field Day plans already. NW now is mobile. NN, AUU and AAS are all on 10 meters now. APL has a new DX-35 for 10 meters. AVS reports receiving the WAVE and O.H. Awards. Our congrats to DPO on making BPL for the third time. BVI has a new jr. operator. FO is active on 10 meters. GG is active again from his bedside where he is recovering from a broken leg. DXT is a new EC of Metro, Toronto. BJV will be operating soon with a new rig. HZ now is on 10 meters, HE works 40-meter phone. NG and DZA work 10, 20 and 75 meters. IU is active on 75 meters again. The Ontario Phone Net may have changed frequency by now to 3770 kc. RH is going high power. DSM, BUT, CO, NG, ARF, YD, ADD and BV are all mobile on 75 meters in the early A.M. GH is running his new effort FB with a pair of 4-125s. KM's Pacemaker sounds FB. He has been working Gs with it on s.s.b. DSG has a DX-100. DMC likewise. OR has an FB signal in Toronto. CMP, in Edgar, is heard throughout Ontario. The AREC, Toronto, under the SCM and ECs, will have a big display at the Toronto Sportsman Show in March. Traffic: (Dec.) VE3BUR 264, DPO 191, NO 157, NG 135, AJR 80, AML 75, AUU 64, KM 55, DEX 50, EAM 39, TX 27, EAU 24, BJV 22, CJM 21, RW 20, APL 15, DH 14, VZ 12, IU, 6, SG 4. (Nov.) VE3EAU 16.

QUEBEC—SCM, Gordon A. Lynn, VE2GL—It is with regret that we learn of the illness of FL which now keeps him confined to bed most of the time. However, he does manage to operate the rig from his bed. His resignation from the post of EC for his district is therefore unavoidably accepted. ARJ is back on the air working 10 meters. AGP's c.w. sounds commercial with her electronic key. AGI has handled traffic for his Boy Scout troop far in the bush. ANK, AUH, AAE and AOL are mostly active on 3.7-Mc. phone. EC continues his regular schedules and handles traffic offered. ATL now reports into the Atlantic Traffic Net and reports lots of Christmas traffic. CP and DR are the most regular VE2s reporting into OSN. The time of OSN is 7 P.M. and the frequency is 3535 kc. Lets see more VE2s report in there. Traffic: VE2DR 120, ATL 95, CP 58, EC 32, FL 8.

ALBERTA—SCM, Sydney T. Jones, VE6MJ—PAM: OD, RM: XG. GS has joined the local gang on 144 Mc. using a ground-plane antenna 50 feet high. 144-Mc. activity is booming around Edmonton with DZ, EH, KC, KM, AS, WS, MJ and GS active. Sincere sympathy is extended to YE and his XYL in their recent bereavement. We are happy to report that PS is active again after his recent illness. MJ has completed a new modulation meter. EO has deserted radio for square-dance calling. YM, BT and MM are active again after trips to the hospital. OE is back in the land of the living and active on the Alberta Phone Net. HM is working on a new VFO unit between working the Northern gang and handling an unusual raft of traffic. LQ is putting the finishing touches on a new rig. EH is reported to be the first amateur in Alberta to have passed the required exam for RTTY operation. Nice going, Ted. Traffic: VE6HM 297, OD 75, YE 45, MJ 20, VE7HD 12, VE6TT 11, TG 7, PV 6, SP 1.

BRITISH COLUMBIA—SCM, Peter M. McIntyre, VE7JT—The festive season activities took over with the result that not much amateur radio activity has been reported. The DX Club formed in Vancouver still has not forwarded us any copy. After many moons the amateur licenses for autos seems to be coming but the catch at the moment is that the Attorney-General's

(Continued on page 142)

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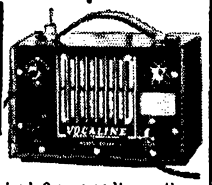

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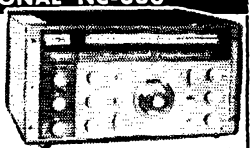

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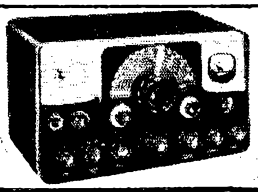

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Office will only entertain the listing of 75-meter mobiles. If any of you are mobile, with or without unrestricted telephone privileges, please let either FB or myself know. SH is on again with a new transmitter, DH is "hoop-de-dooing with good contacts on s.s.b. BF is busy but DXing. AQB is on fairly regularly. AOG is on with RTTY. ALL is back with a potent signal seemingly no worse for wear. GR is having beam trouble. Try 2-meter insulators, Phil. ARZ is going 2-meter mobile. AIO now is on with a DX-100 and a signal. ARX, Father Oscar Dietz, is one of the new amateurs who, though blind, faithfully stuck to the grind and got his ticket. Congrats. Other new calls of the VARC are AHT, APX, AUA, OC and VX, all through the classes held by XW and AQW, who should be congratulated for their untiring efforts in helping and training others to get their tickets. We think it is about time Vancouver had a National Convention. Is anyone willing to help undertake such a task? Toss the idea around, anyway, something might come of it. Traffic: VE7DH 14, ASR 9.

Tropospheric Scatter Technique

(*Continued from page 13*)

Now a word about antenna height and siting. The antenna should be aimed at the horizon, or slightly above it. Antennas at both ends of the path should be of the same polarity. For a given frequency the center of the antenna should be a certain optimum height above ground, given by the formula

$$H = 4000\frac{\lambda}{d}$$

where λ and H are in the same units and d is the distance in miles.[5] Working this out for 144 Mc. ($\lambda = 7$ feet) gives 155 feet as the optimum height, a value most 2-meter men would find hard to achieve. However, the difference between this optimum and a mere 10 feet off ground is only 6 db.

If you work with this formula, you will see that as the path length is increased the optimum height for a given frequency becomes less, and as the frequency goes higher the optimum antenna height is lower. For amateur v.h.f. work, I would suggest putting the antenna as high as possible, and clear of all obstructions. Particularly if the latter condition is satisfied, the difference in results between practical heights and the theoretical optimum may be small.

It is quite possible that at 144 Mc. and lower frequencies, the signal received at distances out to 150 miles or so may be larger than predicted. This is because the refracted signal may be as strong as the scattered signal. Hence they may add at the receiver.

Gains in antenna can be traded for transmitter power up to the point where the beam widths in the horizontal and vertical planes approach 3 to 4 degrees. Beyond this point, the antenna coupling to the reflecting mass area decreases. In essence, this means that not enough of the area is being excited, hence the ratio of the received signal is less than with a wider beam.

Effective gain is not proportional on a swap basis if the physical area becomes excessively large, either. It will probably be found that a large rhombic will not be as effective as the Yagi

(*Continued on page 144*)

[5] For frequencies above 500 Mc., change the figure 4000 to 5000.

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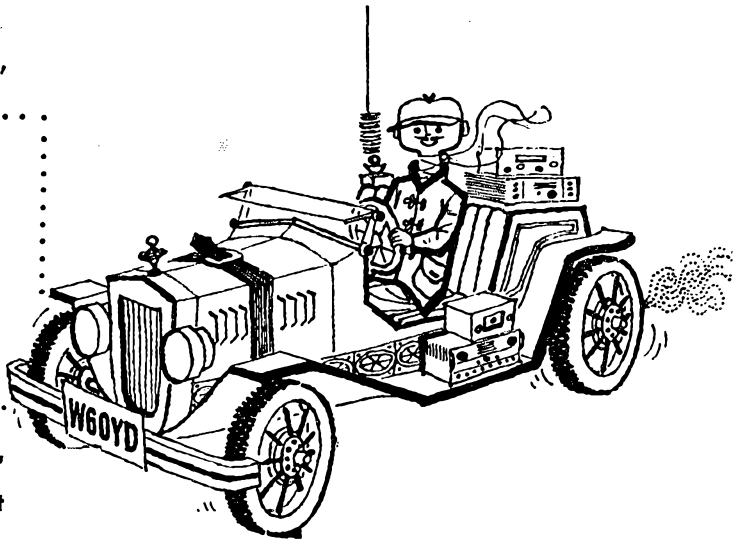

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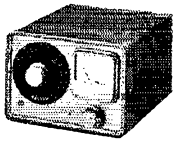

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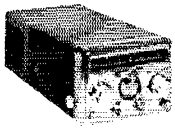

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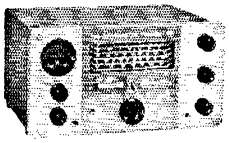

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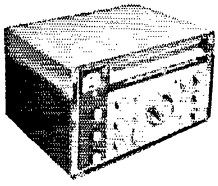

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type of array, even though the main beam gain, in the near field, is the same. This is the result of cancellation by out-of-phase components in multipath propagation, a condition that is even more marked in ionospheric scatter work.[2]

The Threshold of Discovery

There is reason to believe that beyond a 400-mile distance the signals of a tropospheric nature are no longer scatter signals in the strictest sense of the word. It is the author's belief that distances out to 1000 miles can be covered by the use of techniques similar to those presented here. A real contribution can be made in this comparatively little-known area by radio amateurs using c.w., single side band and other narrow-band transmissions. (Bandwidth can be traded for power.)

What can we expect from scatter? Depending upon the care with which equipment is set up and operated, consistent and reliable contacts should be possible out to at least 300 miles. With very large arrays (but still within the reach of the ambitious v.h.f. man), high power, and the best possible receiving equipment, consistent contacts should be made out to well over 400 miles. The beautiful part about a scatter circuit is that once it is established on a sound basis, you never lose contact because of fade-outs that ruin communication on lower frequencies. When conditions are at their worst in other types of communication, scatter signals are usually at their best.

For emergency communication, a city-to-city amateur scatter network on 144, 220 or 420 Mc. should provide the ultimate in reliability, plus maximum security. The serious traffic-minded amateurs should consider scatter. And as a means of developing interest in a v.h.f. band, in an area where it is now low or nonexistent, employment of scatter techniques may be just what you've been looking for.

Try it!

"Proxos"

(*Continued from page 16*)

The selenium rectifier CR_1 is mounted under power transformer T_1, and is secured with one of the machine screws that holds the transformer. Small rubber grommets are used between the chassis and relay K_1 to reduce vibration to and from the relay.

After the components on the cover plate have been wired, fasten the plate to the box and complete the wiring. Leads from the relay contacts are connected to the Millen 37303 terminal strip TB_1 at the rear of the box.

The "feeler" is made from a piece of stiff wire. The one shown in the photograph was bent from a piece of No. 14 tinned hook-up wire that was work-hardened by stretching it several times. Bend one end of the wire around a jar or can of suitable diameter and solder it to form a ring. The assembly can be permanently fixed to Proxos or made adjustable to accommodate knobs of different levels.

(*Continued on page 146*)

Using Proxos

When wiring is completed and checked, turn on the unit with switch S_1. The VR tube, V_1, should ignite immediately, indicating that the power supply is working. After the heater of V_2 has had time to warm up, advance control R_1 until relay K_1 closes. By returning the control slightly, the relay will open. Now grasp or touch the "feeler" with your hand and the relay will close. Carefully adjust control R_1 around this triggering point until the relay can be closed by bringing the hand near the feeler wire. If everything is working in reverse — that is, if the relay opens when the "feeler wire" is approached — reverse the a.c. power plug in the outlet.

The relay shown is a s.p.d.t., but one with other contact combinations can be used. We used the relay to turn on the transmitter oscillator while disabling all following stages. When the relay is open, the transmitter is returned to normal operation.

As mentioned by the relay manufacturer, the armature spring of relay K_1 may have to be adjusted for proper tension. Our relay had too much spring tension and produced a buzzing sound when energized. A slight twist of the armature spring with long-nosed pliers reduced tension and cured the trouble.

With Proxos on guard at your v.f.o., you have one less switch in the shack to throw. It will really pay off in operating convenience.

Multiband Antenna Systems

(Continued from page 27)

would necessitate switching the input and output leads to the filters and it would be very difficult to prevent harmonic leakage around the switch. That's why we suggest plug-in filters. It only takes a second to change the feed line to the correct filter. Incidentally, the filters described here will work with either 50- or 75-ohm coaxial cable.

Construction

Before starting construction study the photograph and Fig. 1. Each filter consists of two coils and four mica capacitors mounted in a $2\frac{1}{4} \times 5 \times 2\frac{1}{4}$-inch aluminum box (ICA Flexi-Mount 29339). However, if one wishes to save on chassis costs, the filters can be enclosed in coffee cans or any other metal enclosure that will provide good shielding.

The coils are self-supporting, and a rubber grommet should be used in the shield wall to prevent the coil wire from shorting to the chassis. A solder lug should be mounted each side of the shield wall immediately below the grommet hole. All the ground leads from C_1, C_2, C_3 and C_4 should be soldered to these lugs. The leads from C_2 and C_3 to the coil wire should be kept as short as possible and connected to the wire close to the shield wall.

Operation

There are a few important points to remember when using the filters. The coax feed line should

(Continued on page 148)

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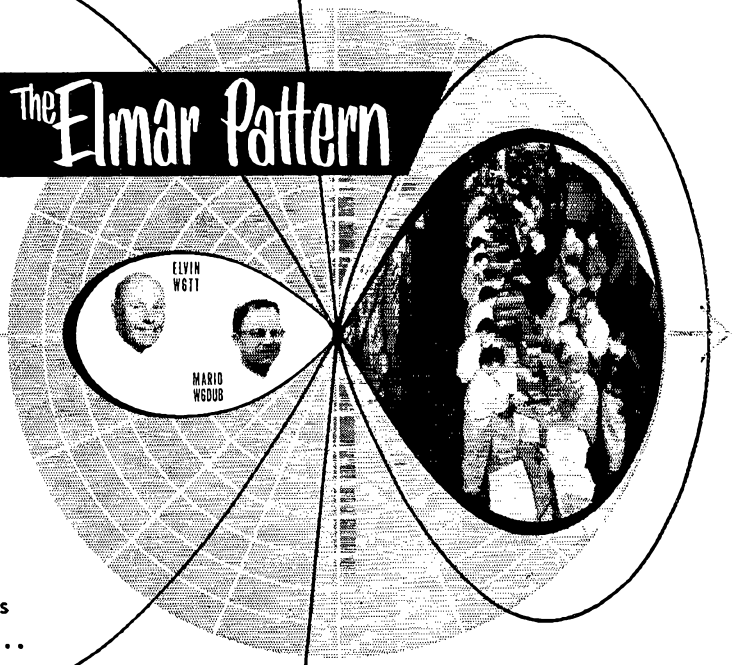

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have a low standing-wave ratio, not much more than 2 to 1. A high s.w.r. may cause excessive voltages to develop across the components in the filter, and in such a case the filter might be ruined. When changing bands, remember to *change the filter first.* Otherwise, you'll be almost sure to burn out the filter. With the component values listed in Fig. 1, the filter is capable of handling a 250-watt transmitter. One can readily see that this type of filter is the simple answer to harmonic attenuation and protection when using a multiband antenna system.

Mobile Receiver

(Continued from page 34)

settings of the slugs for L_1 and L_2, for a given antenna, are obtained when it is not necessary to readjust C_1 when tuning from one end to the other of a particular band.

After the r.f. alignments are completed, the zero potentiometer should be set to "zero" the S meter with the antenna disconnected and the receiver power on. Then the antenna should be reconnected and the receiver tuned to the strongest signal. The calibration potentiometer should then be set for a full scale indication. If a calibrated signal output generator is available, the meter may be accurately calibrated in S units. Otherwise an arbitrary S-unit scale can be made up by placing S9 at mid-scale.

Prior to installation of this mobile receiver, two different popular converters had been employed. Comparative tests were made with these converters and the mobile receiver at the same time. Readable signals on the 10-meter band were obtained with the mobile receiver which could not even be known to exist with the converter-receiver setup. Many hours of enjoyable QSOs have been logged with this mobile receiver and plans are now being made to build a fixed station receiver patterned after it.

World Above 50 Mc.

(Continued from page 58)

Starting at 1700, the periods are every half hour. The antenna is a large rhombic aimed at Washington, D. C. Call is K6QFI. Anyone hearing the signal in the Middle West or farther is asked to wire Syd collect. Address 18152 Sunburst St., Northridge, Calif. Skeds welcomed.

A well-known call in v.h.f. circles is now out of circulation. W6QKI, ex W3QKI, of long-Yagi fame, is living in Benson, Arizona, where he is currently active on 50 Mc. as W7GRA. Herb hopes to be back in the big-antenna business soon on 144 Mc.

Another and more serious casualty is W1IZY, Middleboro, Mass. Jack, one of the aurora stalwarts of W1, picked up a TB bug, and will be confined to the hospital for several months. It is reported that he is being fixed up with a Communicator, for use at the Plymouth County Hospital, South Hanson, Mass.

Hint for simple f.m.: K2ITP, Riverton, N. J., ran the plate current for his 24-Mc. overtone oscillator through the high-impedance winding of an output transformer. The secondary is connected to the secondary of another similar transformer, the primary which is in the plate circuit of his

(Continued on page 150)

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speech amplifier. The output could be choke-coupled, too, in the manner of the TVI Special in January, 1956, *QST*. With the order of frequency multiplication needed to get to 144 Mc. (6 times) there is no trouble in getting enough deviation for even the broad-band receivers. The fellows with selectivity report excellent quality when the gain is backed off to suit their pass bands.

Help wanted: G3FOO recently picked up a Gonset 6-meter converter that had been modified for other frequencies. He would like information on the original coils, in order to restore it to 50-Mc. coverage for cross-band work from 10 to 6. The converter is an old model with a 6AK5 r.f., 6AK5 mixer, 6C4 oscillator and OB2 regulator. If you have one, slide it out of the case, take down information on the coils and mail it to G3FOO, 8 Withart Ave., Bebington, Wirral, Cheshire, England.

Tape Talk on V.H.F. Propagation

You can probably go through your whole v.h.f. life without having any idea of how signals get from one place to another, but it helps to know something of the various propagation phenomena *that are responsible* for v.h.f. DX. To this end, your conductor has prepared two tape recordings for use at radio club meetings, hamfests and the like. They are available to any ARRL-affiliated club on request.

One is an hour-long typical radio-club talk, much like the writer would present if he were visiting your club in person. It contains a discussion of the various forms of v.h.f. DX, and includes samples of each, recorded from actual communication. Some of the signals were taped at W1HDQ, but others have come from all over the United States. Some have historic background; others are of the signals of well-known v.h.f. men no longer with us. They show typical examples of tropospheric bending, sporadic-*E* skip, auroral reflection, F2 DX, meteor scatter, ionospheric and tropospheric scatter, and lunar reflection.

A shorter tape, containing the same samples, but without the discussion by the writer, is also available. You may want to prepare your own talk, and use our examples (or some of them) to illustrate it. The tapes cover a period from 1940 to 1957. There are signals from 6 countries, 4 continents, and about 20 states. Bands shown are 56, 112, 50, 144 and 420 Mc.

You can have either tape for your club meeting merely by writing for it. Get your request in as far in advance as possible, so that the tape can be routed for greatest coverage.

Reporting V.H.F. Activity

A news section of *QST* like this must depend almost wholly upon reports received through the mail, if it is to be interesting and useful to most readers. It can serve its purpose as the record of what has been done by amateurs in the v.h.f. field only if you, who are doing the work, take the trouble to report regularly, and promptly.

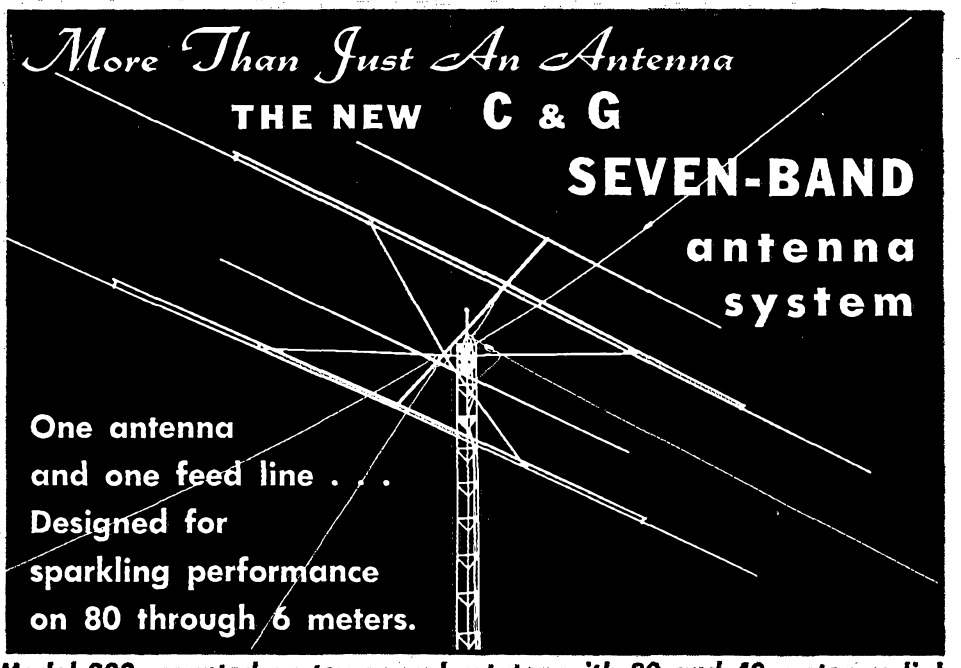
Production schedules being what they are, any event you read about *is* bound *to seem* as if it happened a *long time* ago, but the news value of *QST* can be greatly enhanced if we keep production deadlines in mind.

When? *The World Above 50 Mc.* is prepared around the 20th of the month. (January 20th, for the March issue of *QST*, and so on.) If your news is of dated nature, be sure that it gets into our hands before the 20th. You will then see it in *QST* one month later. Routine news reports that reach us after that time cannot ordinarily be included, but important news breaks often can be slipped into *QST* up close to the actual press run. If you have something hot, get it to us at once. Never let it cool off for a couple of weeks before reporting. Pictures and reports of v.h.f. events are far more interesting if they're *news*, not ancient history.

Where? With the ARRL — IGY Propagation Research Project now getting up to full steam, W1VLH and staff will shortly be moving to a separate address. We'll have good courier service between the two offices, but they are in separate towns, and material for one office that is sent to the other is bound to be delayed at least one day. Send routine v.h.f. news to the Headquarters address. Please do not include it with your IGY reports, after you start using the new PRP address in Wethersfield.

What? With IGY reporting taking quite a bit of time, a number of fellows have asked whether duplicate information should be sent for *The World Above 50 Mc.* Not necessarily, though it will expedite matters. The writer will scan

(*Continued on page 152*)



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ELECTRICAL SPECIFICATIONS AND CHARACTERISTICS CHART

	6 Meters	10 Meters	11 Meters	15 Meters	20 Meters	40 Meters	80 Meters
Model 100 Amateur Net...$ 99.95							
FORWARD GAIN	4.7db	7.6db	6.7db	5.9db	0 db	(c) 1.5db	(c) 1.5db
FRONT TO BACK RATIO	12.6db	26db	21db	17db	(a)	(a)	(b)
STANDING WAVE RATIO	1.2-2.1	1.1-1.8	1.1-1.5	1.1-1.6	1.1-1.3	1.1-2.1	1.1-2.1
NUMBER OF ELEMENTS	2	3	3	2	1	1	(b)
HORIZONTAL BEAM ANGLE	22 deg.	30 deg.	34 deg.	37 deg.	(a)	(a)	(b)
Model 200 Amateur Net...$ 149.95							
FORWARD GAIN	4.7db	7.6db	6.7db	5.9db	5.6db	(c) 1.5db	(c) 1.5db
FRONT TO BACK RATIO	12.6db	26db	21db	17db	14db	(a)	(b)
STANDING WAVE RATIO	1.2-2.1	1.1-1.8	1.1-1.5	1.1-1.6	1.1-1.6	1.1-2.1	1.1-2.1
NUMBER OF ELEMENTS	2	3	3	2	2	1	(b)
HORIZONTAL BEAM ANGLE	22 deg.	30 deg.	34 deg.	37 deg.	39 deg.	(a)	(b)
Model 300 Amateur Net...$ 199.95							
FORWARD GAIN	5.2db	8.8db	7.9db	7.8db	7.6db	(c) 2.6db	(c) 1.5db
FRONT TO BACK RATIO	12.6db	29db	26db	23db	21db	9db	(b)
STANDING WAVE RATIO	1.2-2.1	1.1-1.8	1.1-1.7	1.1-1.6	1.1-1.6	1.1-2.1	1.1-2.1
NUMBER OF ELEMENTS	3	4	4	3	3	2	(b)
HORIZONTAL BEAM ANGLE	22 deg.	22 deg.	26 deg.	30 deg.	32 deg.	39 deg.	(b)

Footnotes; (a) Standard figure 8 dipole pattern rotary
(b) Vertical cone radiator with top loading
(c) With radial guy wires

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the IGY reports regularly for v.h.f. news, so propagation information on them need not be repeated on OES reports, for example. However, the IGY project does not cover all forms of v.h.f. propagation, and we want to continue to report in *QST* any v.h.f. event that has interesting propagation angles. If there is propagation information of general interest in your IGY report, mention the fact on your OES form, or in letters relating to other v.h.f. matters. "See IGY report" will do.

Please do not send letters relating to v.h.f. activity to the writer's home address. For some reason, an increasing volume of v.h.f. mail is being routed to Canton. Send v.h.f. news, and anything else relating to ARRL matters to Headquarters. Just ARRL, West Hartford 7, is all the address you need. News will be available for *QST* at least one day sooner that way than if it is sent to my home.

The states-worked boxes: See Aug., 1956, *QST*, p. 130

OES Notes

W1FIG, Providence, R. I. — European TV heard daily in December and early January, and W6 and 7 heard frequently. Notice that after western stations fade out in afternoon, RTTY signals just below the band edge are often heard from northwest. (That's when you work the KL7's — if you can find one! — *EPT.*)

W1UHE, Tiverton, R. I. — Heard K2DZM on 220 Mc. 8 times during December. Sigs over this 150-mile path reached S6 on peaks. Working on 1296-Mc. gear and 50-Mc. s.s.b.

K2HRB, Lancaster, N. Y. — Had 2-hour QSO on 50 Mc. with W8IJG, West Richfield, Ohio, 200 miles. Included discussion of 220 Mc. plans for beacon operation. Am able to work crossband 50–220, and will soon have 200 watts on 220.

W3UQJ, York, Pa. — Experience in attempting to use 50.7 and 50.9 Mc. during *F2* DX openings very disappointing. Must everyone work only the first 200 kc.?

K4HTO, Middletown, Ky. — To help in solving local TVI problem, 50-Mc. stations in this area operate between 50.7 and 51 Mc. Look for us when band is open.

W4IKK, Rome, Ga. — New 4-250A amplifier used on 50 Mc. improved reliability of scatter work and ground-wave, but also extends sphere of influence on Channels 2 and 11 considerably. TV sets with high-pass filters still OK on Channel 2, however. Construction might interest those who don't like to building shielding enclosures. Amplifier is built inside 5 × 13 × 17-inch chassis that sets on one end. Only metal work is shelf for tube mounting. Bottom plate (now one side) completes shield. Occupies only 5 by 13-inch table space.

W4LNG, Atlanta, Ga. — Meteor scatter skeds with W2NLY, beginning Dec. 9th, unsuccessful until the 18th, when converter trouble was located and corrected. First N. J. — Ga. 144-Mc. QSO at 0630 Dec. 18th. Rig runs 500 watts to 4-125A's, feeding a 32-element array.

W5KWP, Santa Fe, N. Mex. — Have set up tentative week-end skeds with W5YMA, Los Alamos, for handling amateur traffic on 50 Mc.

W7QDJ, Clearfield, Utah — Where are the c.w. operators on 50 Mc.? Many contacts could be made under marginal conditions (most *F2* into Utah is marginal) if fellows would use and look for c.w.

W9DRN, Des Plaines, Ill. — Regular skeds on 432 Mc. with W9AGM and W9ZQT, Thursdays at 2100 CST. Monday at 2000 CST is 220-Mc. time. Everyone interested in these bands is invited to join in.

W9KLR, Rensselaer, Ind. — Aurora of Dec. 27th made 60 different aurora openings observed on 144 Mc. in 1956. Have now worked 648 different stations in 30 states on 144 Mc. Worked W1AZK, Chichester, N. H. on Quadrantids shower, Jan. 1st–4th.

W9MHP, Indianapolis, Ind. — European TV in and near 50-Mc. band, and Alaskan RTTY around 49.5 Mc. heard almost daily in early winter. First winter Es Dec. 31st and Jan. 1st. Sigs from VE1, 2, W1, 4, 5. Also hear most of these via back-scatter.

Strays

Heard by W4ZM on 10-meter phone — "What a signal, OM, absolutely solid — nothing wrong with your sigs — no side bands at all — only about one-quarter kc. wide — beautiful quality." No side bands — certainly the ultimate!

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YL News and Views

(*Continued from page 60*)

Sacramento Area YLs are invited to form a club. Those interested please contact Wanda Gluck, K6ENK, 7317 Walnut Rd., Fair Oaks, Calif.

MISCELLANY:

W6PCA is the first recipient of the YL-OM 10CC certificate, offered by the Texas YL Round-Up Net. All of Opal's thousand contacts were on c.w. . . . Evaluating what acquiring a YL Century Certificate did for one OM, (see photo W4VTO, Dec. '56 column) KN5GPG publicly declares that he's on the trail of a certificate himself "with great expectations." . . . K4GKO's little eight-year-old daughter is KN4LXL, Dolly. . . . W4TDK, Naomi, continues to conduct classes for general class license students twice a week. . . . New novice WN7FTR, Lillian, of Silverton, Oregon, is another RN for the list. . . . Certificate custodian W6KER, Gilda, reports 120 Los Angeles YLRC Lads 'N Lassies certificates have been issued to date. . . . W8ATB, Esther, is looking for YLs on s.s.b with her new 75A4. . . . Camille, W3TSC, explains why WAYLRC members hadn't seen K4BUN about for several months. Florence flew to Alaska in her own seaplane for four months' work on sand-dune problems. From Lake Minchumina Flo used her CAA rig to chat with the many friends she had made during her five years as KL7AZJ. . . . A new member of MARS, W8MDK, Ruby, still operates regularly at the Dayton AFB. . . . W3TYC, Mickey, is awaiting a change in call at her new QTH: 735 Clara Vista Ave., Santa Clara, Calif. . . . W5DRA, Teeve, editor of *CQ New Mexico* has a new Houston, Texas QTH. . . . W9STR and W9LDK are the only YL members of the Chicago Nite Owl RACES net. . . . W1ZEN W8RIR, and K9CQF have new YLCCs. . . . K6EXQ, Connie, takes over as NCS of the YLRL 10-meter net Tuesday at 1:00 P.M. EST on 29,000 kc. . . . We are sorry to report the passing on Dec. 18th, 1956, of "Cotton" Malette, W6EHB, husband of Gen, W6EHA. . . . Congratulations to DX Editor W9BRD and his XYL Carol for producing a potential new recruit for our ranks on Jan. 14th with the birth of a baby girl (third child, first girl for the Newkirks).

W/VE Results

(*Continued from page 61*)

S. Texas

W5HTG	3242
W5ZWR	1067
K5BSZ	1024

New Mexico

K5CAW	11,902

Maritime

W3LEZ/VE1	57,717
VE1EK	42,840
VE1VB	37,485
VE1KW	30,174
VE1AEE	26,916
VO6N[1]	20,944
VE1DB	14,503
VE1QN	8453
VO2S	8084
VE1FO	3591

Quebec

VE2DR	71,604
VE2YA	62,894
VE2BN	56,500
VE2AVC	42,450
VE2AQO	19,680
VE2AFC	17,670
VE2RL	10,611
VE2AJD	1845
VE2AUD	611
VE2ATL	231

Ontario

VE3DSU	91,896
VE3BXF	89,400
VE3QE	70,746
VE3DUS	61,640
VE3VX	57,224
VE3BLU	46,092
VE3BFF	38,052
VE3IR	32,400
VE3YV	31,584
VE3AVS	29,400
VE3ACB	27,675
VE3BNQ	24,552
VE3DDU	16,066
VE3DTN	15,933
VE3BYG	14,752
VE3AOE	13,446
VE3DYJ	12,152
VE3MI	11,277
VE3DH	7986
K2INZ/VE3	7740
VE3BLY	7683
VE3AUU	7210
VE3BUR	5895
VE3EGG	3434
VE3BAJ	2880
VE3BTU	2394
VE3DWN	1316

Manitoba

VE4SX	37,650
VE4CQ	11,403

Saskatchewan

VE5DZ	28,296

Alberta

VE6SX	6030
VE6WL	4864
VE6GN	360

British Columbia

VE7EH	42,952
VE7AKI	25,521
VE7QQ	21,252
VE7PD	13,284
VE7LB	13,152
VE7ALE	2277

Yukon — N.W.T.

VE8AB	17,226
VE8OW	13,356

[1] Labrador winner.

1957 EDITION

The RADIO AMATEUR'S HANDBOOK

AN INVALUABLE reference work and text for everyone—hams, engineers, lab men, technicians, experimenters, students, purchasing agents.

Distributors throughout the Nation have the 1957 Edition in stock. Better get your copy of this complete Handbook now. The demand is terrific!

In the pages of this latest edition will be found, in addition to accumulated knowledge since the first Handbook was issued in 1926, the latest proved findings and experiments invaluable to ham and engineer alike. Every field of ham radio is covered: transmitting, both c.w. and 'phone; receiving; propagation; antennas; construction; theory; charts; diagrams; circuits; transistors; miscellaneous data; procedures; station operation, etc.

For instance, the 1957 Edition carries

- **Chapters on Theory; Electrical Laws and Circuits, Vacuum Tube Principles, Semiconductor Devices, High Frequency Communication, Antennas, Transmission Lines, Modulation, V.H.F. and U.H.F.**
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- **Plus thorough treatment of such subjects as assembling and operating a station, BCI and TVI, construction practices, etc.—*and fully indexed and completely illustrated throughout. You can locate in a jiffy what you want.***

$3.50 U.S.A. Proper **$4.00** U.S. Possessions and Canada. Elsewhere, **$4.50.** Buckram bound Edition, **$6.00** everywhere. All prices postpaid.

The AMERICAN RADIO RELAY LEAGUE, INC.
West Hartford 7, Conn. • U.S.A.

How's DX?

(*Continued from page 68*)

cal editorial machinations . . . . . The question itself is adequately answered by W1s JYH KXB MDF NWO OS TW, W2s AIS ALO HHF ITD OOL PUD PWU, W3s BKZ GHD KCI MLN WJF, W4s BRB IWT, W5KUC, W6s BCX GAL GHG LHN SN VBY, W8s NOH UUS WSL, W9s KOK TWC, VE1EP and KP4KD. These contributors sing the praises of (20 c.w.) **CR4BQ, EK1AZ, ET1JJ, HZ1AB, Js** 3GNX 9CRP, **OX5JJ, PKs** 2AA 4KS 6EE, **PZ1AL, UA9CA, UA0s** KAU KTU, **UI8AA, UN1AO, UQ2AB, VP8AI, VQs** 5JTW 8AB 8AD, **VS9AU, Ws** 4BOW/**Iwo** 6BWS/**KG6** 6VKV/**I6, ZA**2D, **ZC1AN, ZK1AB**; (10 phone) **CR9AG, Js** 2GHQ 9AAI 9AAR 9ACS, **LX1BO, PZ1G, Ws** 3EKK/J2 6VDG/**KG6** 6VRF/**KG6** 8OK/**KG6, XU6GRL**; (40 c.w.) **EP1AL, OX1AA, UB5s** AL KAE, **YN1GJ**; (80 c.w.) **W8QEN/CT2** and many additional Europeans . . . . . An increasing demand for DX is pointed up by VP3JM's rush order for 10,000 QSLS . . . . . Macao's hamdom is represented by interesting photos of CR9s AG and AN, while Jeeves is depicted ceremoniously signing on with his new boss up Massachusetts way.

Correspondence

(*Continued from page 62*)

One ham after every few words would say, "TV TV." Did this mean that he liked to watch TV or worked in a TV station? The other would say a few words and then say, "Neet." Did he think that his sending was neet, or that TV was neet, or what? Is this some more novice accent?

— *R. B. Calhamer, K5DNG*

HATS OFF

2101 Oakmont Ave.
Anniston, Alabama

Editor, *QST*:

Just a short note to bring to your attention a fact that all amateur radio should be proud of. The last issue of "The Proceedings of I.R.E.," the single-sideband issue, contains many references and credits to the part that the amateur radio fraternity has played in the development of single-sideband communications. These references were conspicuous by their frequency. . . .

For those who don't know, "The Proceedings of I.R.E." is probably one of the foremost publications covering research, development, and applications of electronic devices and circuits in the country. We all should take off our hats to those amateurs who pioneered in this field against great obstacles.

— *Marc Molyneux, Jr., W4MVM*

DX-HAUSTED

525 So. Westgate Ave.
Brentwood Heights, Calif.

Editor, *QST*:

Here is my card from PX1EX, which brings me up to 260 — a goodly number and an excellent stopping place. It isn't that I'm chicken or a quitter. I'm just plain tired. I've been lucky enough in staying among the first ten for four years and I know it. I also know that the importance of fighting to stay near the top has become, for me at least, far greater than it should.

Much of the fun of hamming has drained away, the past few years, due to the grim necessity of continuous monitor

(*Continued on page 158*)

FIELD ENGINEERS:

HERE'S THE GOOD WORD—

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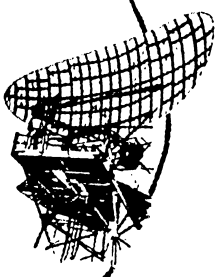
IS CONTINUING ITS RAPID EXPANSION AND NEEDS YOU!



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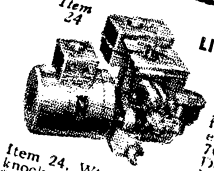

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AC Plant 700 Watts—115 v. 60 cyc. Powered by a rugged 2.2 hp. easy starting Briggs gas engine. No wiring necessary; just plug in and operate. Plenty of current for receivers, transmitters, antenna motors, emergency lights, etc. which require up to 700 Watts. Ideal for radio amateurs, Civil Defense, trailers and camps. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries.

Item 24. Wt. 75 lbs. Be prepared if war or storms knock out power lines. . . . . as above but with **$143.50**

800 Watt Plant (Item 44) same as Item 24 but with larger engine and greater capacity. **$169.95**

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We make all sizes up to 25,000 Watts. Write for information. Send 10¢ for big 1957 Catalog. Free with order.

Prices f.o.b. factory. Money back guarantee. Send check or M.O.

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EASY TO LEARN CODE

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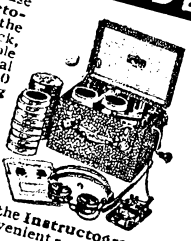

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work — thousands of hours of spinning the dial without ever touching the key. Letting old friends drift past without a call — always afraid of missing something.

There are a hundred good lads ready to move into the little vacancy I'll leave, and they deserve the chance. Perhaps some of the other oldsters who have been up there for years feel as I do and have been waiting for someone to make the break. I hope so.

The ARRL-DXCC system of checking confirmations is still the only one that means anything. Unfortunately, even among hams the honor system is not infallible, and in such a competition it must be. I would like to continue sending you my cards for certification, for my own satisfaction.

— *Bill Lippman, W6SN*

CONELRAD

RFD # 1 — Croton Ave.
Peekskill, N. Y.

Editor, *QST:*

I would like to thank you, and W3BFO, for the article, "A Simple Conelrad Alarm Circuit" (p. 49, Jan. *QST*). Until this article came out I did not know what I was going to use for a conelrad alarm but W3BFO's article saved the day.

— *Peter Chamalian, KN2UTV*

3755 S.E. 134th Ave.
Portland 66, Oregon

Editor, *QST:*

Tnx fer the simple conelrad alarm circuit. It was just what I was looking for. . . .

— *Doug Davee, WN7DRG*

IDAHO QSLs

509 Rose Street
Boise, Idaho

Editor, *QST:*

At the present time, I am in no position financially to QSL to everyone I QSO. I am also sick and tired of receiving insulting letters because I have not sent a QSL to someone I have talked to. This has happened a number of times and has made me wonder if this is now the spirit of ham radio. Has it degenerated so far that the only reason a ham holds a QSO is to obtain a card?

I'm not condemning a person for wanting proof that he has held contact with stations in all states or DXCC but I am condemning them when they forget there are other parts to ham radio besides a QSL, and when they lose their judgement and manners entirely in the search for that QSL.

I have been in ham radio since 1932 and it is only in recent years that I have seen this poor judgement and lack of manners creep up in the QSL problem. I for one never ask a man to QSL. I know I have worked all states and all continents and that is enough for me. I don't feel that I have to make it hard for someone else to obtain a certificate to hang on the wall to prove it. In fact, I haven't even sent in for the certificates, though I could.

I also know Idaho is a very scarce state for c.w. stations so I am going to make this ruling. If you want a QSL from me in the future you will have to send either a stamped, self-addressed postcard or letter. I will be glad to fix you up with confirmation under those circumstances and, except for DX stations, only that way. I hate to have to do it that way but under the circumstances it is the only thing I can do. I'll try to keep Idaho on the air for you fellows to QSL but try to cooperate with me too and please don't try giving me a rough time over a QSL because it just won't do you any good.

— *G. C. Larson, W7ASA*

SEE PAGE 109 NOVEMBER QST

Hints & Kinks

(*Continued from page 73*)

some of the old-timers used to do? The 2-inch pipe — either round or square — sells for 10 cents per foot out here in Washington, so a "50-footer" doesn't cost much more than five dollars.

The pipes slip together with enough overlap to assure good electrical contact. Three sheet-metal screws at each joint provide the necessary mechanical strength. As you can well imagine, it doesn't take very much time or effort to lash one of these jobs together.

A 50-foot "waterspout" antenna was used here at W7OE for several years before being replaced with a 20-foot job. The latter, mounted on the roof of the garage, has been in use for the past four years. All of which indicates that they *do* stand up quite well.

— *Howard S. Pyle, W7OE*

—...—

THOSE OF US who prefer *bottled* beer have some difficulty in collecting *all* of the material for the "Budget 7-Mc. Vertical Antenna," (*QST*, Nov., 1955). However, an excellent substitute for the beer cans used by W2JTJ is the 3-inch diameter aluminum waterspout available from plumbing supply shops. The tubing comes in 10-foot lengths and sells locally at a cost of 27 cents per foot.

When using the material, it is advisable to extend the crimping at the ends of the tubes so that an overlap of 12 inches or so will exist when the sections are fitted together. Aluminum sheet-metal screws should be used at each joint to add mechanical strength. The rest of the construction is in accordance with W2JTJ's article.

— *D. R. Snyder, W7ZMG*

144-MC. TVI TIP

INTERFERENCE caused by rectification in the first audio stage of either a broadcast or a TV receiver can usually be eliminated by adding a 250-$\mu\mu$f. by-pass capacitor between grid and chassis, and by lowering the value of the grid-leak resistance to something less than 3 megohms (see BCI and TVI Chapter of *The Radio Amateur's Handbook*). The most difficult phase in testing to determine the effectiveness of this preventive measure is the pulling of the chassis — particularly if the set is not one's own.

A simple method of making the initial test or making a permanent installation without "pulling" the chassis is to use a CBS-Hytron test adapter that has been equipped with the by-pass

(*Continued on page 162*)

TREMENDOUS CRYSTAL CLEARANCE SALE!

Save Money—Order in Package Quantities!

All crystals tested and guaranteed to oscillate. Please include 20¢ postage and handling charge for every 10 crystals or less. Minimum order $2.50. No C.O.D's.

PACKAGE DEAL No. 1
25 Assorted FT-243 45 Assorted FT-241A
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100 Crystals Our Choice **$8.95**
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370 KC–538 KC

35 Crystals Our Choice **$3.49**
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For operating on 80, 40, 20, 15, 10, 6 and 2 meters—on either fundamentals or harmonics.

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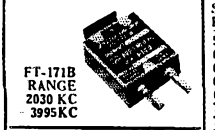
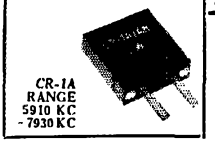
FT-243
RANGE
3655 KC
– 8733 KC


FT-241A
RANGE
370 KC
– 538 KC


FT-171B
RANGE
2030 KC
– 3995 KC


CR-1A
RANGE
5910 KC
– 7930 KC

INDIVIDUAL CRYSTALS • Indicate 2nd choice—Substitution May Be Necessary

Low Frequency — FT-241A for SSB, Lattice Filter etc...093" Pins..486" SPC, marked in Channel Nos. 0 to 79, 54th Harmonic and 270 to 389, 72nd Harmonic. Listed below by Fundamental Frequencies, fractions omitted.

49¢ each—10 for $4.00						79¢ each—10 for $6.50	
370	393	416	488	511	534	400	462
372	394	418	490	512	536	440	463
374	395	419	491	513	537	441	464
375	396	420	492	514	538	442	465
376	397	422	493	515		444	466
377	398	424	494	516		445	469
379	401	425	495	518		446	470
380	403	426	496	519		447	472
381	404	427	497	520		448	473
383	405	431	498	522		450	474
384	406	433	501	523		451	475
385	407	435	502	525		452	476
386	408	436	503	526		453	477
387	409	481	504	527		455	479
388	411	483	506	529		457	480
390	412	484	507	530		458	
391	414	485	508	531		459	
392	415	487	509	533		461	

79¢ each—10 for only $6.50

CR-1A
SCR 522-½ Pin, ½" SP

5910	7810	2030	2258	2435	3250
6370	7930	2045	2260	2442	3322
6450		2065	2282	2532	3995
6497		2105	2300	2545	
6610		2125	2305	2557	
7380		2145	2360	3202	
7480		2155	2390	3215	
7580		2220	2415	3237	

FT-171B — BC-610 Banana Plugs, ¾" SPC

FT-243 — .093" Dia. — .486" SPC				
49¢ each — 10 for $4.00				
4035	5740	6350	7506	7775
4080	5750	6373	7520	7800
4165	5773	6375	7525	7806
4190	5780	6400	7540	7825
4280	5806	6406	7550	7840
4340	5840	6425	7573	7841
4397	5852	6673	7575	7850
4490	5873	6675	7583	7873
4495	5880	6700	7600	7875
4840	5892	6706	7606	7900
4852	5906	6725	7625	7906
4930	5925	6750	7640	7925
4950	5940	6775	7641	7940
5030	5955	6800	7650	7950
5327	5973	6825	7660	7975
5360	6206	6850	7673	8250
5385	6225	6875	7675	8273
5397	6240	6900	7700	8300
5437	6250	6925	7706	8310
5485	6273	6950	7710	8316
5500	6275	6975	7725	8320
5660	6300	7450	7740	8630
5675	6306	7473	7750	8690
5700	6325	7475	7766	
5706	6340	7500	7773	

79¢ each—10 for $6.50

3735	6450	6650	8280	8650
6025	6473	7000	8350	8690
6042	6475	7075	8375	8700
6073	6500	7125	8425	8733
6075	6506	7150	8430	
6100	6525	7306	8450	
6125	6550	7300	8475	
6140	6573	7425	8500	
6150	6575	7440	8525	
6173	6600	8173	8550	
6175	6606	8175	8575	
6185	6625	8225	8600	
6200	6640	8275	8625	

SPECIAL — 200 KC in FT241A Holder—$1.25 Without Holder 39¢ ea.-3 for $1.00

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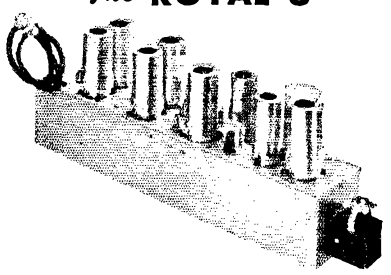
The ROYAL 8



HERE NOW! 432 MC. Crystal Controlled Exciter

The ROYAL 8 is a low power crystal controlled exciter-transmitter designed for use in the 400 mc.-plus portion of the r.f. spectrum.

Tube line-up as follows: 12AT7 carbon or dynamic speech amplifier, cathode follower output, 6CB6 quadrature f.m. modulator (produces true f.m., not p.m.), xtal osc. 70 mc., single Amperex 6K4/EC-81 doubler to 140 mc., pair 6K4/EC-81 push-pull triplers to 420; pair 6K4/EC-81 push-pull final amplifiers.

Power output measured into a dummy load is approximately 3 watts.

Units come wired and tested with tubes and crystal for operation on 432.3 mc., less power supply and microphone. Operation on other frequencies available on special order. **$129.00** Amateur Net

For more information on this unit ask for our Royal 8 catalog.

The Royal Mobile Radio System is approved for Class A Citizens Band operation. For information on this application, ask for Form 6565M.

SELECTRONIC SUPPLIES, INC.
Radio and Electronic Supplies
1320 Madison Ave., Toledo 2, Ohio, W8GDE, Mgr.
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Here it is!
The Sensational, New, AMECO
CONELRAD MONITOR

Not just a kit, but wired and tested, complete, ready for operation. Priced at a LOW **$14.95**

Completely enclosed in an attractive black case and brushed copper panel with block lettering, the AMECO Conelrad Monitor converts *any receiver* having AVC, into an effective conelrad alarm system. When the broadcast station goes off the air, a loud clear tone is *immediately* sounded in the receiver. The AMECO Monitor is a *complete* electronic audio alarm. There are no buzzers or relays.

OTHER FEATURES INCLUDE:

- **Easily installed. *No leads in radio to cut.***
- **Connectors provided so that monitor can be plugged in or out of receiver.**
- **Monitor switch allows receiver to function normally or turns on Conelrad Alarm System.**
- **Excellent as Code Practice Oscillator.**
- **Receiver completely silent during the monitoring. *No transformer clatter.***
- **Easily modified for mobile use.**
- **No potentiometers to vary. *No relays to adjust.***

AMERICAN ELECTRONICS CO.
1203 Bryant Avenue, New York 59, N. Y.

capacitor and a shunt resistor. Merely remove the audio tube, insert it in the adapter, and then plug the whole business back into the audio tube socket. Types SH-27 and SH-29 adapters are available for the 7- and 9-pin miniature tubes, respectively, and Type SH-28 accommodates the 8-pin octals.

This method of demonstrating how certain types of TVI can be remedied without appreciable bother or fuss is bound to impress the complainant and, in all probability, will result in a better understanding of where the trouble really lies.

It might be added that during the summer months this device, plus a 16½-inch open-ended length of 300-ohm Twin-Lead connected across the antenna terminals of our TV receiver, has allowed the writer to run approximately 200 watts to a 144-Mc. amplifier in a semifringe area. No TVI is experienced even with a 16-element array beamed directly at the TV antenna from a distance of about 15 feet.

— *Jack Livingston, K2POO*

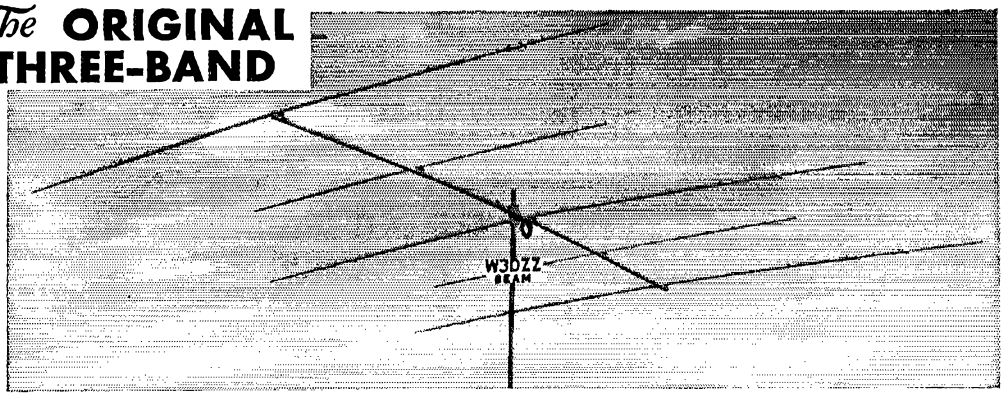
NOTES ON THE PE-101-C DYNAMOTOR

THE PE-101-C dynamotor has recently been available on the surplus market at very reasonable prices. With the increasing popularity of the new 12-volt automotive electrical systems, the 12-volt primary winding on this dynamotor makes it worth looking into.

Investigation reveals that the PE-101-C dynamotor is equipped with two *identical* high voltage windings. One of these windings gives 400 volts at 135 ma. as stated on the nameplate. Incidentally, the bottom end of this winding is grounded to the dynamotor frame. The second winding is connected in series with the first winding to give the 800 volts at 20 ma. By reconnecting the two windings, a variety of voltages and currents is possible. For example, the two windings may be connected in parallel to give 400 volts at 155 ma., or they can be connected in series and operated at 800 volts and 77 ma. If desired, the two windings may be used separately, giving two separate 400-volt power supplies at 77 ma. each. The current drawn from each winding can be varied as long as the total power drawn from the dynamotor does not exceed 62 watts. Since the above are continuous duty ratings, they may be increased by about 20 per cent for intermittent duty such as normal amateur mobile operation without danger of overloading.

— *L. R. Langley, W8DSX*

The ORIGINAL THREE-BAND



√ **NO STACKING REQUIRED**—all elements are at the full height yet wind resistance is held to a minimum.
√ **UNIQUE WINDMILL DESIGN**—permits ready access to all parts of the beam from the tower.
√ **WIDE-BAND BALANCER**—affords perfect pattern symmetry with coaxial feed line. No adjustment required.
√ **MAXIMUM GAIN**—over 8-db. gain on 20 and 15 meters, somewhat higher on 10 meters.
√ **HIGH FRONT TO BACK RATIO**—in most installations the front to back ratio exceeds 30 db. on 10 and 20 meters and 25 db. on 15 meters.
√ **RUGGED DESIGN**—Boom consists of two 12-foot lengths of 2¼" dia. tubing with .065" wall. Three-band elements are made of 1½" tubing with .058" wall. All tubing is of 6061-T6 heat-treated aluminum alloy for maximum weather resistance and strength.

MODEL FT-100 BEAM ANTENNA PARASITIC ARRAY operating on 10, 15 and 20 meters. Complete with chromate dipped hardware and aircraft type stainless steel clamps (to assure against corrosion and rust), assembly instructions and prints..... **$225.00**

MULTIBAND DESIGN FOR WIRE ANTENNAS—The W3DZZ design employs a concentric coil and condenser completely potted in Polyester Resin. Polystyrene insulation of concentric capacitor can withstand highest amateur transmitter voltages.
MODEL FT-200 TRAPS for 5-band antenna operation on 10/15/20/40 and 80 meters. (75 ohm feed line). Pair, postpaid.....**$12.50**

See your local distributor (HARVEY has it in the N. Y. area) or write to:

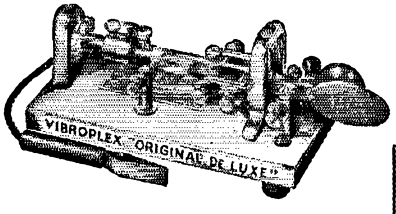
FREDERICK TOOL & ENGINEERING CORPORATION
414 PINE AVENUE, FREDERICK, MARYLAND

AN/APR-4 TUNING UNITS WANTED

TOP PRICE PAID. Also Frequency Meters TS-173, 174, 175, and 323, and other good quality surplus equipment; General Radio, L&N and other standard laboratory equipment and instruments, Weston meters, etc.; technical manuals.

ENGINEERING ASSOCIATES
434 Patterson Road **Dayton 9, Ohio**

Vibroplex Makes Sending TWICE AS EASY FOR YOU:



Easier on your arm . . . easier on your nerves . . . easier on you. That's because its semi-automatic action performs for you with an ease beyond comparison. Requires no special skill . . . there's no tiring arm effort . . . no nervous or muscular tension common to other keys. Vibroplex actually does all the arm-tiring work for you. Helps you develop a higher degree of sending skill than is possible with any other type of key. Gives you years of easy, enjoyable keying.

Five smart models standard or deluxe, priced from $15.95 to $29.95. Left-hand models, $2.50 additional. Handsome carrying case, $6.75. Take the advice of any user and order yours today. At dealers or direct. FREE folder.

You get *All* these benefits with Vibroplex:

Smoother, easier performance; cleaner signals. Freedom from nervous and muscular tension. Adjustable speed to suit your own hand. Personal touch. Trouble proof, nothing to get out of order. No more sore, tired muscles, no sending fatigue. Lifetime of easy, enjoyable keying. And many others.

The VIBROPLEX CO., Inc.
833 Broadway **New York 3, N. Y.**

XMTRS FOR 160 TO 2 METERS

TECHNICIAN – NOVICE – GENERAL or Special Freq. 500 KC. to 160 MC.

LETTINE MODEL 240 TRANSMITTER WITH MOBILE CONNECTIONS AND A.C. POWER SUPPLY

This outstanding transmitter has been acclaimed a great performer throughout the world. Air wound plug-in coils used for high efficiency. Takes any freq. from 1.6 to 30 mc. Ideal for General Class, Novice, CAP, CD, Industrial. Sold direct from our factory, ready to operate. 40 to 50 watts input, Phone-CW. Complete with 8 x 14 x 8 cabinet, 40 meter coils, xtal, tubes: 6V6 osc., 807 final, 5U4G rect., 6S17 xtal mike amp., 6N7 phase inv., 2-6L6's PP mod. Wt. 30 lbs. $79.95. 80, 20, 10 meter coils $2.91 per band. 160 meter coils $3.60.

MODEL 130 FOR 120 TO 130 WATTS — $199.50

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. xtals or Lettine VFO. Swinging link matches 52 — 300 ohm antennas. Same cab. as 240. $89.95.

VFO–$49.95—ANT. TUNER $20.00 LESS COILS

Send full amount or $25 with order — balance C.O.D.

LETTINE RADIO MFG. CO.
62 Berkeley St. **Valley Stream, N. Y.**

NEW BOOKS

Radio Electronics, by Samuel Seely, published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 36, N. Y. (McGraw-Hill Electrical and Electronic Engineering Series). 487 pages, including index. 6½ by 9¼ inches, cloth cover. Price, $7.00.

Written as a companion text to the same author's *Electronic Engineering, Radio Electronics* is, as the title implies, a treatment of vacuum-tube operation and applications in the radio and communication field. The material has largely been developed out of college courses in this subject, and each chapter concludes with a collection of problems. Beginning with an over-all survey of communication systems, the fifteen chapters carry the student through basic tube structure and characteristics, rectifiers, amplifiers both audio and r.f., tuned and untuned, oscillators, modulation, demodulation, and f.m. The concluding chapter is an introduction to information theory. There is also an appendix having a short treatment of network analysis, along with tube and mathematical data.

Philco Handbook of Tubes and Semiconductors. Published by Philco Corporation, TechRep Division, 22nd St. & Lehigh Ave., Philadelphia 32, Penna. 207 pages, 6 by 9 inches, paper cover. Price, $2.00.

Compiled primarily for use in connection with servicing and maintenance of military radio and electronic equipment, this handbook is said to be unique among tube-data manuals in the scope of components covered. Data on currently-used types of receiving tubes, transmitting tubes, cathode-ray tubes, thyratrons, klystrons, magnetrons, TR-ATR tubes, and voltage-regulator tubes are included in the tube section. The semiconductor section gives technical data on crystal diodes, both germanium and silicon types, and transistors.

A 10-page opening section on servicing and maintenance aids offers a large number of practical tips on causes of failures and things to watch out for in servicing.

RCA Receiving Tube Manual, RC-18, published by Tube Division, Radio Corporation of America, Harrison, N. J. 5⅜ by 8⅜ inches, 352 pages, paper cover. Price, 75 cents.

There may be some amateurs who have never seen this handy little book put out by RCA. For their benefit it has, in addition to characteristics and operating data on nearly 600 receiving tubes and over 75 TV picture tubes, sections on the construction of vacuum tubes, definitions of characteristics, 40 pages of applications (how tubes amplify, rectify, circuits and operating hints) and suggested receiver-type circuits for various purposes.

For those who have earlier editions, it will suffice to say that in addition to bringing the tube coverage up to date, new text material has been added on television applications. All in all, it's a very worth-while addition to the ham's book collection.

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as ail or part capital letters, be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters.

(3) The Ham-Ad rate is 30¢ per word, except as noted in paragraph (6) below.

(4) **Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.**

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) **A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously noncommercial in nature.** Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 30¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) **Because error is more easily avoided, it is requested signature and address be printed plainly. Typewritten copy preferred but handwritten signature must accompany all authorized insertions.**

(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

Having made no investigation of the advertisers in the classified columns, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QUARTZ — Direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 248 Madison Ave., New York City 16.

MOTOROLA used FM communication equipment bought and sold. W5BCO, Ralph Hicks, 204 E. Fairview, Tulsa, Okla.

WANTED: Cash or trade, fixed frequency receivers 28/42 Mc. W9YIV, Troy, Ill.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 08.30 to 17.30 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan. Tel. NOrmandy 8-8262.

WANTED: Early wireless gear, books, magazines, catalogs before 1922. Send description and prices. W6GH, 1010 Monte Dr., Santa Barbara Calif.

WANTED: All types aircraft & ground transmitters, receivers ART-13, R-118/ARC-1, R5/ARN-7, BC-610E, ARN-6, BC-788C, ARC-3, BC-342. Highest prices possible paid. Dames, W2KUW, 308 Hickory St., Arlington, N. J.

ATTENTION Mobileers! Leece-Neville 6 volt 100 amp. system alternator, regulator & rectifier, $45.00. Also Leece-Neville 12-volt 100 amp. system, alternator, regulator & rectifier, $85.00. Good condition. H. A. Zimmermann Jr., K2PAT, 115 Willow St., Brooklyn 1, N. Y. Ulster 2-3472.

CASH for your gear. We buy as well as sell. Write for cash offer or trade. We stock Elmac, Gonset, Hallicrafters, Hammarlund, Johnson, Lysco Master Mobile, Morrow, National and other ham gear. H & H Electronic Supply, Inc., 506 Kishwaukee St., Rockford, Ill.

URGENTLY need AN/APR-4 items particularly tuning units for important defense contracts. New high prices. Engineering Associates, 434 Patterson Rd., Dayton 9, Ohio.

HAM Guest Register Books, $2.00 in U. S. A. postpaid; $2.25 in Canada postpaid. Gratton George, W4PJU, Clewiston, Fla.

MEDICAL Hams! Swap Burdick EK-2 for Globe King, 500-A. C. R. Faulkner, M. D., K4AXE, 106 No. Main, Somerset, Ky.

WANTED: Receiver R5/ARN-7, MN-62A transceivers, RT18/ARC-1, AN/ARC-3, BC-788C, 1-152C, Collins, Bendix equipment, test sets, dynamotors, inverters. We pay highest prices. Advise quantity, condition, price in first letter. Aircraft Radio Industries, Inc., 15 East 40th St., New York City. Tel. LExington 2-6254.

DX'ERS Notice! Save money? Save Time? Free info. DX QSL Coop, Box 5938, Kansas City 11, Mo.

PANORAMIC Adapter ID-60/APA-10 Tech. Manuals $2.75 postpaid in U. S. A. Electronicraft, 27 Milburn St., Bronxville 8, N. Y.

MULTI-BAND Antenna. 80-40-20-15-10, $19.95. Patented. Send stamp for information. Lattin Radio Laboratories, Owensboro, Ky.

WANTED: BC-221, BC-348, BC-312, BC-342, BC-610-E, ARN-7, BC-788, ARN-6, APR-4, ARC-1, ARC-3, ART-13. All types surplus or amateur transmitters, receivers, test equipment taken in trade for New Johnson Viking Ranger, Pacemaker, Valiant, Hallicrafters, Hammarlund, National B&W, Gonset, Elmac, Telrex, Fisher Hi-Fi, etc. Write Tom, W1AFN, Alltronics, Box 19, Boston 1, Mass. Tel. Richmond 2-0048.

SAN FRANCISCO and vicinity. Communication receivers repaired and realigned. Guaranteed work. Factory methods. Special problems invited any equipment. Associated Electronics, 167 So. Livermore, Livermore, Calif. W6KF, Skipper.

WANTED: 2-way FM equipment. Phillips, 1312 McGee St., Kansas City, Mo.

SELL: New 4D32 tube, $14 prepaid. Roy Sawdey, 5255 Harper, Solon, Ohio.

WANTED: Highest prices paid for ARC-3, ARC-1, BC788, BC610, BC348, ART13, BC312, BC342 and other military or aeronautical surplus. Name your price. We pay freight and c.o.d. James S. Spivey, Inc., 4908 Hampden Lane, Bethesda, Md.

QSLS? SWLS? Finest and largest variety samples 25¢ (refunded). Callbooks (Spring '57), $4.50. "Rus" Sakkers, W8DED, P. O. Box 218, Holland, Mich.

C. Fritz for better QSLS-SWLs! Top quality! Samples 10¢. 1213 Briargate, Joliet, Ill.

QSLS-SWLS. Meade WØKXL, 1507 Central Avenue, Kansas City, Kans.

QSLS-SWLS. 100, $2.85 up. Samples 10¢. Griffeth, W3FSW, 1042 Pine Heights Ave., Baltimore, Md.

QSLS. Twenty exclusive designs in 3 colors. Rush $3 for 100 or $5 for 200 and get surprise of your life. 48 hour service. Satisfaction guaranteed. Constantine Press, Bladensburg, Md.

QSLS. Nice designs. Samples, Besesparis, W3QCC, 207 S. Balliet St., Frackville, Pa.

DELUXE QSLS — Petty, W2HAZ, Box 27, Trenton, N. J. Samples 10¢.

QSLS-SWLS. Samples free. Bartinoski, W2CVE Press, Williamstown, N. J.

QSLS "Brownie," W3CJI, 3110 Lehigh, Allentown, Penna. Samples 10¢; with catalogue, 25¢.

QSLS-SWLS. Samples 10¢. Malgo Press, 1937 Glendale Ave., Toledo 14, Ohio.

QSLS. Western states only. Fast delivery. Samples 10¢. Dauphince, K6JCN, Box 66009, Mar Vista 66, Calif.

QSLS, sharp, 200 one color, three bucks. Multi-color samples dime, refunded. Edward Green & Sons, 4422 Marquette Drive, Ft. Wayne, Ind.

QSLS. Samples 10¢. Bob Morris, W2IHM, 230 Rose St., Metuchen, N. J.

QSLS — All kinds and prices, samples 10¢ fast service. DX Card Co., Kulik St., Clifton, N. J. GR 3-4779.

QSL Samples. Dime, refundable. Roy Gale, W1BD, Box 154, Waterford, Conn.

QSLS. Samples, 10¢. H. J. Snyder, 398 Washington, Peru, Ind.

QSLS. Lower prices, faster delivery. Catalog, 10¢. Dick, K6GJM, 10558 E. Olive, Temple City, Calif.

QSLS, Glossy, Samples, 10¢. W1OLU Press, Heckbert, 30 Magoun, Medford, Mass.

QSLS-SWLS. Samples free. Bnlles, W5OWC, Box 9007, Austin 17, Texas. (We regret p.o. box error in last ad.)

QSLS, SWLs, YL-OMs (samples 9¾), Novices, Generals, want reasonably priced "tacked-up-type," different, comic, sedate, infrequent, uncommon, uninhibited, curious, peculiar, incomparable, singular, unprecedented, extraordinary, remarkable, unusual? (Whew!) Write Rogers, KØAAB, 737 Lincoln Ave., Saint Paul 5, Minn.

QSLS-SWLS. Samples free. Backus, 703 Cumberland St., Richmond, Va.

NEW! QTH cards! Proud of your call? QTH? Large call in color, QTH, Land Line. Business card quality, size. Must for Ham Gatherings. Samples 10¢. Country Print Shop, Route 2, Chesterton, Ind.

LIVELY! Original! QSLS! Catalog, stamp. WAT, Box 128, Brecksville, Ohio.

QSLS. Neat, Attractive. Samples 10¢. Wood's. Box 164, Asher Sta., Little Rock, Ark.

QSLS. Ham's "Super-Speed Specials" in 2-3-4 colors, 15 styles, 14 inks, XYL-OM, maps, Gil cartoons, real crazy. Samples dime. Robinson, W9AVH, 12811 Sacramento, Blue Island 9, Ill.

QSLS! Glossy. Samples 10¢. WIOLU Press, 30 Magoun, Medford, Mass.

QSL Special. Free sample. Nat Stinnette, W4AVV, P. O. Box 155, Umatilla, Fla.

QSLS, Taprint, Union, Miss.

QSLS: Cartoons, colors. Samples, 15¢. Also "Flashing-lites" Conelrad Monitors, wired and tested. Works any broadcast receiver, $6.50 each. Chris, W9PPA, 365 Terra Cotta, Crystal Lake, Ill.

QSLS. Samples, dime. Printer, Corwith, Iowa.

QSLS, SWLS. 3-colors, 100 $2.00, Bob Garra, W3UQL, Lehighton, Penna.

RUSPRINT Special, QSLS-SWLS, 1¢ each, samples 10¢. Rusprint, Box 7507, North Kansas City 16, Mo.

AIRMAILED! $2.85: Red-Blue QSLS. Glossies. Guaranteed. Raloprint, Ojai, Calif.

SCHEMATIC diagrams ARC-5 80-40 meter rcvrs and xmitters, 25¢ each or trade. S. Consalvo, 4905 Roanne Drive, Washington 21, D. C.

SELLING KW final, associated power supplies, surplus receivers and transmitters; variety of miscellaneous parts and tubes, useful to any ham. Reasonable. Complete station ready to go on air, Viking receiver, Matchbox, VFO, key, xtals, everything in one unit. Best offer only. Keyer modification and Q multiplier. R. S. Daggett, W1OB, 10 Maple Ridge Dr., Farmington, Conn.

RADIO magazines. Buy, sell or trade. Bob Farmer, Plainview, Texas.

COLLINS KWS-1. Purchased new, delivered late November 1956. Late series and never uncrated. $1895 cash or consider trade on retail price of $2095. WØFMK, Barnett. Telephone TE 7-3491, St. Louis, Mo.

BEAUTIFUL Nickel-plated self-inking pocket rubber stamp. Name, address and call, $1.40. For sale: back issues of QST. Howard Rapple, WØVRB, 401 N. 2nd St., Humboldt, Iowa.

CASH Paid! Sell your surplus electronic tubes. Want unused, clean transmitting, special purpose, receiving, TV types, magnetrons, klystrons, broadcast, etc. Also want military, and commercial lab test and communications gear. We swap, too, for tubes or choice equipment. Send specific details in first letter. For a fair deal write, wire, or telephone: Barry Electronics, 512 Broadway, New York 12, N. Y. Tel. WAlker 5-7000.

FLORIDA Vacationing? Ham facilities available on premises. Wigwam Village, Motel Tepees, South Orange Blossom Trail, Orlando, Fla. Johnny Southerland, Jr., W4TBH.

CLEANING House: Large quantity of parts, tubes, tools, books, magazines for sale. Stamp for list. M. Marshall, 455 Washington Ave., Dumont, N. J.

RECEIVERS: Repaired and aligned by competent engineers, using factory standard instruments. Authorized Factory Service Station for Collins, Hallicrafters, Hammarlund, National. Our twenty-first year. Douglas Instrument Laboratory, 176 Norfolk Ave., Boston 19, Mass.

ELMAC AF-67 transmitter and PMR-7A receiver with supply (6 and 12 volts) like new condx; big discount. What am I offered? Perfect condition. All letters will be answered. Trading cars. Always install new Elmac gear in each new car. W4NJE, Box 246, Lewisburg, Tenn.

SEND for this month's standout listings of Reconditioned Equipment. Also request our new "1957" Amateur Catalog. We feature all leading brands and promise you an attractive deal always regardless of your needs or budget. Check our offer first. We deal quickly, easily and always on a personal basis. Stan Burghardt, WØBJV, Burghardt Radio Supply, Watertown, S. Dak.

CASH-Carry: Globe King 500. New 4-250A and final power supply. Thordarson audio choke. 6 months' use. Perfect operating condx. $495. Write W2PFL.

FOR Sale: New or like new — Two B&W coax switches; B&W 5100-B; B&W 51SB-B; B&W L-1000 A; B&W T-R switch; 75A4, 3 Kc filter, vernier knob; Elenco X4-SSB exciter, 75m; Elenco-VFO; Elenco, mixer for 40 & 20; Gonset G66 with universal power supply; Davis — Hi-Q-500 mobile coil; 75m; Fibreglass base section; James C., 1050 power supply; Moss Electronics Genometer, AM, FM, color, signal generator; E-V mobile mike, Model 600D, micro Z match, Master Mobile; Millen S.W.R. bridge; 2 B&W balun coils; Drake solder gun; Model 900. Make offers. R. R. Lamb, 1219 Yardley Rd., Morrisville, Pa.

SELL NC-173, accessories, A1 for 6; TV boosters peaked for 6; new 150 watt Ultramodul unit, gone SSB; Millen PS network, 10A xfrmrs; approved A200 generator. Chester Benson, W9IFR, 311 So. 5th, Richmond, Ind.

SELL: Elmac PMR-6A (6 volt) mobile receiver and PSR-6 supply. In excellent condx. $80. Will ship. W8VHY, Yeoman, R. R. #4, Washington C.H., Ohio.

EXCEPTIONALLY clean Hammarlund HQ-129X for sale: $150 outright sale or trade BC-221 or LM type frequency meter and RME VHF 152A converter. Jack H. Myers, 209 Tyson Dr., Falls Church, Va.

RME VHF 2-11 receiver, like new, $75. Fred Howard, 100 Myrtle St., Norfolk, Mass.

SHAW Electronic Supply has new and used ham gear. Clyde, W9KLF, Darling at Gale, Angola, Ind.

SELL: Hallicrafters SX-71 with speaker, gud condition. Best offer over $160. Write Myron Goldfeder, W2GEJ, 2160 Bolton St., N. Y. C. 62.

FOR Sale: Sonar SRT-120P factory wired, all band, phone and c.w. transmitter: $150. Robert O. Routh, W9DJW, 117 South East St., Apt. 10, Lebanon, Ind.

SELL: 32V3, $475; 75A3 with speaker, $350. Guaranteed in excellent condx. Fred Stein, W9KPI., 203 S. Harrison St., Warsaw, Ind.

COMPLETE Harvey-Wells TBS50D transmitter, power supply and Bandmaster, VFO, $125; also Hallicrafters SX28A receiver, $125. Both in very nice condition. Cannot ship. W2JMH, Geo. A. Mahland, 23 Locust Ave., Eatontown, N. J. Tel. Eatontown 3-2166.

TV Experimenters! Used image-orthicons, $25; deflection yokes, $75; focus coils, $40. R. A. Holbrook, W4UO, 3102 Lawrenceville Rd., Decatur, Ga.

SELL: Gonset G-66 receiver with matching power supply. Both factory condition. No holes: $175, or reasonable offer. Will ship. Glen Sneary, W5RYB, 622 N. Davis St., Enid, Okla.

FOR Sale: HQ-140X with speaker, not yet a year old, $220; 40 watt modulator, $35; Adventurer, $40. K5CDD, 2400 Long, Beaumont, Texas.

ALMOST New mobile station: Elmac PMR-7 receiver, PSR-612 power supply, Elmac AF67 Transciter, coax relay, Varo allband antenna coil and Shure carbon mobile mike for $200. R. B. Cooper, W8AQA.

SALE: *QST* magazines, 1949 to 1956 inclusive. Good condition. $14.00. W4KP.

FOR Sale: Collins 32V2, in new condx, $375. W2JXP, J. Erickson, 10 Woodbury Way, Syosset, L. I., N. Y.

CASH for BC-312, BC-342, R5A/ARN7, BC-788, BC-610E, BC-939, BC-614, BC-221 and late type test equipment, receivers, etc. Amber Industrial Corporation, 75 Varick St., New York 13, N. Y. We pay freight charges. Write.

SELL: Hammarlund SuperPro 600JX-21, matching speaker, xtal calibrator, plug-in 800 cps mech. filter, like new condx in all respects: $850; Collins 35C-2 low pass filter w/connectors, $10. A. Richard King, W9EVQ, 808 Ridgely Bldg., Springfield, Ill.

SALE: Hallicrafters S38C, $30; Heathkit AR2, $22 (assembled), or best offer. Norm Dennis, K4HON, 2933 Landover, Alexandria, Va. Tel. 6-9320.

WANTED: Meissner "Signal Shifter" VFO. Must cover 160. State model, year, condition, price. W1BB.

MODULATOR Wanted: preferably including speech amplifier and power supply to plate modulate single 813 at 300 watts. K2EOZ, 4 Westlake Ave., Auburn, N. Y.

SELL: SCR-522, xmitter, receiver, and power supply. Converted. In gud condx except receiver needs alignment. Prefer local sale. $500 Phil Kantz, WN3JLD, 7336 Woodbine Ave., Phila. 31, Pa.

WANTED: TG-34-A keyer with tapes, receiver covering low, intermediate and high frequencies converted 110 volts, 60 cycles. Prefer deal in New York City area. Stanley Oresky, 231 Ocean Ave., Brooklyn 25, N. Y.

RME45 Receiver, w/spkr. Covers .5 to 33 Mc. in six bands. $75; Model A slicer with AP-1 adaptor, factory-wired, new condx, $45. W5BWH, Parsons, 3446 Holliday Rd., Dallas, Texas.

BARGAINS: Triplett meters, model 321; 25, 50, 100, 150, 300, 500, 750 Ma. $4.00; B&W, BVL 5 coils 10 thru 80 and swinging link, $10; B&W lo-pass filter, Model 75, $7.50; BC-160 transformer, 2500 VDC, $35; Thordarson T-16P04, 1130 VA, 2500, 2000 V., $30; T-16P60, 620 Va, 2000 1250 V, $20; Franklin chokes, 25/5 henry, 500 Ma., $8; 30 Henry, 500 Ma., $8; Stancor P6305, 5V, 30 A, $8. Jennings vacuum condenser C25, $10; Amperex UC 50, $15; 810's, $12 pr.; T-200's, $8 pr.; 4-250A, $20; 826's, $5 pr.; 803's, $6 pr. Francis C. Kramer WØDEI, St. Charles, Minn.

SELL: BC342N with xtal filter and noise limiter; BC344D; both excellent; each $58 cash and carry. W2TB. Tel: BAyside 9-3260. 39-20 220th St., Bayside 61, L. I., N. Y.

HAMMARLUND HQ129X, new from warehouse, $169; unused comb. tube checker & VTVM, $65. R. Long, 943 E. Broadway, So. Boston, Mass.

OPPORTUNITY: New, unused P & H LA-400 linear, only $129; AF-67, used but one month, mobile, $135; FB Novice rig McMurdo Silver 701 w/new 807 w. in final, $17; new unused power supply components, 2000 v. at 330 Ma. Thordarson transformer, chokes. G-E Pyranol capacitors, worth $130, only $89. KØEXY, P. O. Box 188, Waseca, Minn.

HRO Coils, AC 21 Mc. band spread, JE, 900-2050KC, F, 500-960 Kc., H, 100-200 Kc., like new, $18 each; RME-10B23 Preselector, almost new, $30; B&W HDVL15, HDA10, new, $5.00 each. Box 222, Highlands, N. J. All F.o.b.

SELL: Revamped BC-610E, Collins 310B-1 exciter, all reasonable offers considered. W3MWL.

WANTED: Used receivers and transmitters: Will pay cash or trade. 10% down with up to 24 months to pay. In stock: New 75A4's, KWS1's (Collins equipment shipped out of our Cedar Rapids store), Demonstrator Johnson KW amplifier with desk; Johnson 6N2, Valiant, Pacemaker, B&W, National, Hallicrafters, Elmac, Hammarlund, Gonset, Central Electronics; 10-15-20 meter Hi-Gain beams, $99.75; 10 meter, $18.95, also Mosley & Gotham. Write for Bargains in used receivers and transmitters. Ken, WØZCN, or Glen, WØZKD, at Ken-Els Radio Supply Co., 428 Central Ave., Ft. Dodge, Iowa.

FOR Sale: New tubes priced each as follows: 2/829B, $10; 2/4-65A, $15; 1/813, $7; 2/250TH, $9; 2/811, $2; 4/814, $2; 2/100TH, $4; 2/VC50 55μμfd 20,000V cond., 1-Leeds & Northrup Wheatstone bridge, in exc. condx, $35. Stan Talago, Rte #3, Bridgeport, West Virginia.

SALE: Two filters, 30 ufd 2500v., $10 each; Collins 75A3 6 Kc. filter type, F455-B60, $20. W2SSC.

LABORATORY Test Equipment for sale: Oscilloscope, audio generator, VTVM, impedence bridge, capacitance bridge, Simpson tester, Ballentine, Radio and Electronic books. Inquiries invited. Leo A. Holbrook, 199 Main St., Montpelier, Vt.

BARGAINS from WIJHJ! One RME MC-55 converter (10-80), $40, in exc. condx; Sonar SR-9, 2 meter rcvr, $30; unused 8-el. 2-meter beam and Alliance rotator, $25. Everything guaranteed! Considerable discount for a package deal! Will ship, too! Norman Schaeffer, 188 Campbell Ave., Revere, Mass.

SELL: Complete Station. Viking II, Viking VFO, NC-125: $325. No shipping. K2EQR.

SELL: 75 meter mobile xmitter with dynamotor for 12 volt system. Runs 60 watts. Carbon or xtal mike. Separate plate, grid and mod. meters. Push-to-talk. Antenna relay. Nice neat job. Professional wiring, coax output connector. $45 complete. Also will sell set Radio Specialties Co. conversion coils to convert 20 meter beam to Tri-Bander, $25. N. Thompson, Millinocket, Me.

VHF-UHF Directory is now available! Result of 2 years of extensive data gathering by W6SBZ. In published form by Two Meter & Down Club of California. 1500 VHF stations listed alphabetically by state and by call. For each station, tabulations indicate UHF bands which that station operates. Also: power, polarization, emission (AM, FM, CW, MCW, Pulse, TV, SSB). Fine for arranging DX skeds and locating VHF men when travelling. Reply card is included so changes in your station may be included in possible future editions. Yours for $1.50. W6MMU, Don Goshay, 8352 Westlawn, Los Angeles 45, Calif.

COMMUNICATOR I, 6VDC, 110VAC, in gud working condx; refinished cabinet. $125. F.o.b. Alma, Michigan. W8LTZ, Frank Tefft.

BC-348 in near-new condition, with self-contained 110 volt power supply, FT shock-mount, and matching LS-3 speaker: $65. W. M. Jackson, W4ILZ, Box 51, Savannah, Tenn.

NEW Western Electric 8 volt filament equivalents of 4-400A, $5, pair $9. S. Tucker, W2HLT, 51-10 Little Neck Pkwy, Little Neck 62, N. Y.

FOR Sale: BC610 with HT18 VFO, antenna coupler, A. C. line filter built-in, and R. F. section shielded; six caster dolly, Turner mike and stand, a 250TH, 2-100THs, modulation transformer and many other spares and extras: $500 or trade for Collins 75A4. Walter Jorgensen, WØFKB, Milford, Iowa.

SELL: Heathkit VFO, $20; Millen 90801, $50; Precision 25 watt amplifier, $30; Blonder-Tongue CA-1 booster, $32; Cornell-Dubilier TR-2 rotor, $20; Black PE-103, $20; Bassett 75M helium coil, chrome rod, fiberglass top, heavy Master Mount, $25. Want: Viking Ranger. W7POL, 913 Siskiyou Blvd., Ashland, Oreg.

SELL: Globe King 400 transmitter, coils for 80, 40, 20 and 10 meters, extra tubes for final, like new, $270. Express collect. Richard Kalman, W8GHR, 185 Sand Run Road, Akron 13, Ohio.

WANTED: Used HRO or HRO-5 with coils and power supply. Must be clean with no changes in original circuits. State price in letter. Edwin R. Bentley, KN4LDJ, Rt. 1, Box 149, Bayside, Va.

NEED Information: wish to meet hams operating fur farm, letter or radio. Work all bands. Schedules possible week-ends and evenings except Monday. W8WUN.

CENTRAL Electronics 10B, factory-wired, with QT-1 and 80, 40, 20 coils, BC-458 VFO, grounded grid linear amplifier, Astatic D-104 microphone, $200; Hallicrafters SX-71 with R-46B speaker and Central Electronics Mod. A sideband slicer with AP-1, $185; Homebuilt 75 watt c.w. transmitter, six 80 and 40 meter Novice crystals and Eldico all-band antenna tuner, $60; 5 band trap antenna with 100 feet 73 ohm coax, $20. All equipment with original instruction manuals. Will sell entire station as listed above, plus extras, for $440. F.o.b. Omaha, Nebraska. Capt. Gene D. Parish, KØDFK, 104 Travis Dr., Offutt A.F.B., Nebraska.

PROCEEDINGS I.R.E. 1939-1947 inclusive, 4 volumes bound: $49. RME HF-10 receiver, 10 meters, 11 tubes, $39; two ARC-5 6-9 Mc. receiver, $7.95 ea., Model RAX-1, 7-27 Mc. rcvr., $29; unused 304 TL, $8.90; 813's, $10, 814, $10. Want: 4-250 pi-output final, 22 revolver, test instruments. Box 921, Charlottesville, Va.

RADIO And Electrical Mechanics: Electronic or aircraft or commercial experience. Must know AC-DC fundamentals. Radio mechs. must have 2nd Class Radiotelephone license. 90% discount travel worldwide. Excellent life insurance, health and retirement plans. Steady promotion. N. Y. International Airport, rotating shifts. Write Employment Office, Pan American Airways, 28-01 Bridge Plaza North, Long Island City, N. Y.

TO Get the most dough — sell to Harjo! We're buying: BC-224 and BC-348 receivers; ARC-3, ART-13, BC-788, R5/ARN-7. Cash or trade. Quick action. Top money! Harjo Sales Co. Dept. E, 503 North Victory Blvd., Burbank, Calif.

CLEANING House! Rare bargains subject to first sale. 7" black & white electrostatic deflection cathode ray tube, $10; R9er with built-in power supply, $20; B&W CX58B butterfly cond., $12.50; Bud BC-1634A 2-gang variable, $12.50; complete set of HDVLB B&W coils (80, 40, 20, 15, 10), $22.50; 30" open rack for table top, $12.50; want: Amperex 4-250A perf. condx. for $20 or trade some above item. W6GMC. Phone EL 8-0831. Milt Smith, 614 Bradbury Rd., Monrovia, Calif.

FOR Sale: Detectron Model 27 Deluxe metal detector complete with batteries. In A-1 condx: $85. K2PDN, Pincombe, 1024 Wager St., Utica, N. Y.

BARGAINS: With new guarantee: HT-9 $99.00; SX-28 rack $99.00; HFS-p.s. $99.00; HT18 VFO $39.00; Lysco 600 $69.00; Eldico TR75TV $30.00; Meissner EX VFO $25.00; NC-57 $65.00; Millen 90800 $14.95; Johnson VFO $24.95; Viking II $219.00; Ranger $179.00; RME-84 $65.00; Gonset TriBand $27.50; Sonar SRT-120 $99.00; Globe Trotter $39.00; Scout 40 $49.00; Scout 40A $59.00; Globe Champ 165 $160.00; Globe King 275 $225.00; Heath AT-1 $19.95; Heath AR-2 $22.50; BC-779 w/p.s. (rack) $99.00; and many others. Free trial. Terms financed by Leo, WØGFQ. Write for catalog and best deals to World Radio Laboratories, 3415 West Broadway, Council Bluffs, Iowa.

SELL: NC-125, in gud condx, with speaker: $135 or best offer. KØHJJ, Scattergood School, West Branch, Iowa.

SELL: 120 Watt, phone/c.w., 3-band, VFO Bendix transmitter. Guaranteed to be in good working condition. $95. Jere Courtney, W8GUJ, Case Institute of Technology, Yost Hall, Box 70, Cleveland 6, Ohio.

NEW B&W L-1000A linear amplifier, $400; Central Electronics 20A with QT-1, $175; Eldico 10/20 VFO, $25. Rev. A. J. Tamulis, 2101 State St., Granite City, Ill.

SELL: Assembled Heathkits AR-1; VF-1; and AT-1 modified to give full 25 watts output. All in perf. condx and operated less than 25 hours: $65.00 takes all three, F.o.b. Detroit. W. E. Little, K8DLV, 14239 Mark Twain, Detroit 27, Michigan.

SALE: ARC-5 transmitter 7.9.1 Mc., $8; 1500 volt power supply, $20; Mosley 40M loading coil, $4; 813 with filament transformer, $6. Make offers. W4UYH, Billington, 11421 S.W. 40th Ter., Miami, Fla.

SELL: HRO-60T, seven coils, NBFM, xtal calibrator, spkr; B&W, grid dipper, Model 600. Asking $400, $20. Curtis Karlson, 99 Cobleigh St., Westwood, Mass.

NATIONAL HRO-M, in rack with speaker, coil cabinet and power supply. Ten coil sets for 50 Kc up, and covering 1.7 — 30 Mc. inclusive, with bandspread coils for "20" and "80." Excellent condx. Cannot ship, but will deliver up to 50 miles. $110. Ken Roberts, W1VKF, 45 Lewis St., Reading, Mass.

FOR Sale: Lysco 600S transmitter VFO c.w. & fone. Lysco Model 50 antenna coupler, $50; Heath FM-2 tuner, $15. Want Mobile converter. Albert L. Godshall, W3SDE, 532 Chestnut Street, Lansdale, Pa.

WE Will pay you a pile of cash for an AN/ARC-3. Fabulous prices for R-77/ARC-3 and T-67/ARC-3. Phone us collect on ARC-3 components at STanley 7-0406. Do you have to sell BC-788, I-152, R5/ARN-7, RT-18/ARC-1, test sets, etc.? Then contact George at Arrow Sales, Box 3007-QST, North Hollywood, Calif.

WANTED: Johnson Matchbox; will trade 3-element Hy-Lite 20-meter beam or will sell beam for $35. WØKKU, 402 W. Walnut, Chanute, Kansas.

SELL: BC-348Q, $50; AT-1, $25, both for $70 and in excellent condx. David McDaniel, Ex-KN5DFE, 16 East 17th, San Angelo, Texas.

COLLINS KW-1, $2500, in excellent condition, used in air-cleaned room. Write or phone: W. S. Potter, W3KXU, Catalpa Ridge Rd., Pittsburgh 38, Pa.

NATIONAL 101-X receiver; new tubes and condensers. Recently aligned, $75 F.o.b. Los Altos, Calif. Meissner Signal Shifter, $20. Stamped envelope for complete list of other parts and equipment. Jettie B. Hill, W6RFF, 22420 Creston Drive, Los Altos, Calif.

FOR Sale: New, used and surplus test equipment, receiving tubes and components, books and magazines. Write for complete list. Cecil Baumgartner, W3TYD, Box 343, Milton, Pa.

SALE! Tubes, meters, coils, condensers, etc. Example: New National MB-40SL, $13.50. Send for list. K. Conrad, Akron, N. Y.

WANTED: Any TB's, TM's and/or FM's on ARC-5 xmitters and rcvrs. Write to WN1MVI, Rear 14 Elm St., Woburn, Mass.

FOR Sale: SX-100, 6 months old. Best offer over $200; Viking Adventurer with 6 xtals, best offer over $30. L. B. King, 160 Jone Cts., Orange, Texas. Tel. TU 6-3317.

WILL Sell new Johnson Pacemaker and GPR-90 receiver with factory installed Crystal Calibrator. First $850 or best offer. Both perfect in appearance and operation. WØQFZ, 2318 Second Ave., Council Bluffs, Iowa.

ILLUMINATED "S" Meters for Gonset Communicators. Just plugs in to attach. Also new and used Communicators, linear amplifiers, G-66's, Super-Sixes, Elmac A-54H's, AF-67's, PMR-7's, etc. New Gonset G-77 transmitters. Special: 2-meter Communicators, brand new, $199.50. Graham Company, R. T. Graham, W1KTJ, Stoneham, Mass. P. O. Box 23, Tel. ST: 6-1966.

SELL: 600 watt fone/c.w. xmitter; pair 813's, B&W HDVL coils, 80-20-15, bandgrid circuit, pair 811-A modulators, separate final, modulator, screen, bias power supplies, Bud rack. $350. F.o.b. De Witt, Arkansas. W5BQJ, LaFargue, Jr. 214 North Adams.

SELL one homebrew TVI suppressed rig; 120 watt final, fone/c.w: Built-in ant. coupler. K5CPR, Ray, P. O. Box 65, Lutcher, Louisiana.

SALE: Heathkit DX35, $58; want Knight 50-watt transmitter. Sonny Hardy, K4HAV, Tifton, Georgia.

SALE! 150-watt Harvey Wells fone/xmitter 10-75 meters, used in last Byrd Antarctic Expedition; documentary papers, still used, $150; Hallicrafters S19R rcvr, first $18 takes it; 75 meter commercial mobile 10 watts new, with 12 volt supply, $35; California KW fone rig in relay rack, speech needs work; built after war, priced less than half cost of parts, $325; DB20 Preselector, $20; 12 volt Dynamotor 750 volt 250 Ma., $12.50; BC47A rcgr and xmitter with AC supply, 75 meter fone built-in VFO, 10 watts: $35. R. Macaluso, W2CHM, 41 Birchwood Dr., North Arlington, N. J.

FOR Sale: Hallicrafters HT31, 500 watt SSB & AM linear final amplifier, all band transmitter. List price, $395. A steal at $275. Philip Antokal, W9TUB, 6050 No. Whipple, Chicago 45, Ill.

HRO 5OR1 for sale, complete with speaker, all in standard rack and A, B, C, D coils. Excellent condx. $230 F.o.b. Westwood, Mass. D. C. Smyth, 30 Lancaster Dr., Westwood, Mass.

SELL: NC183D National receiver, in excellent condx: $295. M. Ross K2IOR, 21 Roseville Ave., Newark 7, N. J.

ATTENTION: Canadian Hams! Viking II, HQ129X receiver, crystal calibrator and HT-18 VFO for sale: $500 or best offer. May be purchased separately, $300, transmitter, $150 receiver, $50 VFO, Shipped my expense within 250 miles from Toronto. Write or call R. Rotenberg, 14 Shelborne Ave., Toronto, Ont., Can. REdfern 4434.

WANT: 800 cycle mechanical filter for Collins 75A3. Will purchase or trade for 3 Kc. filter. W1VJZ.

BC-610E, in gud condx, needing some parts, $200; Jackson 115 Tube Tester, latest roll chart, perfect, $35. Near new Eico Mod. 320 sig. Gen., $20 and batt. elim., Mod. 1050, $25. L. Brown, K6SFZ, P. O. Box 3608, Carmel, Calif.

FOR Sale: NC200 with speaker and instruction manual. In gud condx, $95 F.o.b. Garden Grove, Calif. Also Heath AR2, $18; Bud calibrator FCC90, $8. R. L. Fossett, W6PTA, 10931 Allen Dr., Garden Grove, Calif.

WANTED: Collins 75A-2 or 75A-3 receiver. Sell: Hallicrafters SP-44 Panadaptor, $48; Guardian latching relays, excellent transmitter overload relays; trip at 200 Ma., electrical reset, $1; Lambda modulation 'scope, $14; U.T.C. Multi-Match S-21 modulation transformer, $9; U.T.C. power transformer 1000-0-1000 at 300 Ma., $14; 1600-0-1600 at 350 Ma., $20. Wm. E. Rose, Jr., W9KLR, Rte. 5, Rensselaer, Ind.

VIKING Ranger, four months old. Factory-wired. $190. F.o.b. East Haven, Conn. W1ZQT.

B&W L1000A Linear 1 KW, like new, $385; SS75 exciter, $85; Collins TCS-12 with marine crystals, $35; PE103A, exc. condx, $22; German precision voltammeter (2 separate 4" meters); 5000 V., 30 amps. AC/DC, Rider Voltohmyst, $20; WE 701A tubes (12), $2.00 each; MB40SL, $9; Buck 12V generator with regulator, $10; BC-221AK modified for 10A/20A type exciters with power supply, $20; National PW-4 precision condenser, $5. Write for list. Waring, W2CFT, Box 483, Lake Ronkonkoma, L. I., N. Y.

NOVICE Code Course, to 8 WPM, $5.95; Advanced Course, 9 to 18 WPM, $4.95. Both together, $9.95. 7" magnetic recording tapes, slow speed (3¾ IPS). Our courses are unequaled. Rush your order today to Tapedcode, Box 31-E, Langhorne, Penna.

COMPLETE SSB transmitter 300 watts P.E.P., 15 through 160 Bandswitching AB1 final, 10B and VFO. All in exc. condx and commercial in appearance: $250. Send stamped addressed envelope for details. W7YKR, 207 Highland, Newcastle, Wyoming.

WANTED Good 400 to 1000 watt linear amplifier. Have 20A driver. All replies answered. VE5BD, 428 7 St. Saskatoon, Sask., Can.

FOR Sale: Like new Johnson KW with desk, $1295; Johnson KW Matchbox, $100. Used total 22 hours. Johnson Ranger, $190. Karl Lipscomb, KØCFD, 1001 West Third, Joplin, Mo.

WANTED: ARC-3, ARC-1, ART-13, BC-312, BC-342, BC-610, BC-788, O-17/ART13 LFO and other surplus. Advise what you have and price. Ritter, W4VHG, Box 5878, Bethesda, Md.

SX-42 Receiver, with speaker, in nice condx, $125; 60 ft. Tristao crank-up tower with hinged base plate, $55; CDR rotor, will take 150 lbs., with lighted indicator and cable, $17; Gonset 20M Bantam with 70 ft. of RG-8U $30.00. Tower, beam and rotor with all cables, guy wires $95, all F.o.b. John, 1116 Volz Drive, Sacramento, Calif.

WANTED: Hewlett-Packard 410B V.T.V.M. and 200 AB audio oscillator. R. Zeliff, W2LJB, 415 Prospect St., Nutley 10, N. J.

SELL: NC-125, $135; NC-173, $100; Adventurer, $40; Heathkit Q-Multiplier, AR-2; JT-30 microphone; other items. W5KKB.

WANTED: Collins 75A1, lowest price or better. K2QBV, Joel Kornreich, 102-12, 65th Ave., Forest Hills 75, L. I., N. Y.

SELLING Out: SSB 1000 and SSB 100 Eldico for $1250; GPR 90 and GSBI, both for $500, w/spkr. Equipment used only about 10 hours. New business requires evenings and spare time. W8CQI, Snyder, 2946 Oxford Dr., Springfield, Ohio.

FOR Sale: 1 KW. 60 cycle, 120 V.A.C. plant, Montgomery Ward (Onan make) in like new condx, $140. No crating. W9REQ, Carl D. Gehrke, R #1, Chippewa Falls, Wis. Park 3-3851.

SELL: Latest DX-35, $50; almost new SX-99, $100. John Bradley, General Delivery, Montclair, N. J.

WANTED: Prop pitch motor, W5NV, Carl Dodge, 5420 Pine, Bellaire, Texas.

FOR Sale: National 183-D, receiver combination speaker cabinet and table, antenna, log books, etc. $250; without cabinet, $225. Write to Frank Warner, 51 Central Square, Bridgewater, Mass.

WANTED: BC-221, BC-348, BC-312, BC-342, BC-610-E, ARN-7, BC-788, ARN-6, APR-4, ARC-1, ARC-3, ART-13. All types surplus or amateur transmitters, receivers, test equipment taken in trade for New Johnson Viking Ranger, Pacemaker, Valiant, Hallicrafters, Hammarlund, National B&W, Gonset, Elmac, Telrex, Fisher Hi-Fi, etc. Write Tom, W1AFN, Alltronics, Box 19, Boston 1, Mass. Tel. Richmond 2-0048.

WANTED: Receiver R5/ARN-7, MN-62A transceivers, RT18/ARC-1, AN/ARC-3, BC-788C, 1-152C, Collins, Bendix equipment, test sets, dynamotors, inverters. We pay highest prices. Advise quantity, condition, price in first letter. Aircraft Radio Industries, Inc., 15 East 40th St., New York City. Tel. LExington 2-6254.

UNUSED BC-429 receivers, complete w/6 tubes; 2500-47 k.c. coil and 201-398, 4150-7700 k.c. 2 band coil. Shipping weight app. 18 lbs. $2.95, C.O.D. only. George Salyers, 112 Neal Ave., Dayton, Ohio.

NEW Hobby. At present have other interests. Am selling used meters and Dumont 5" oscillograph at loss. Write for details. Shapiro, 790 Riverside Drive, N. Y. 32.

SELL: SX-71 Hallicrafters rcvr, late model, 21 mc. Bandspread, instrx manual, $149. George Maringas, W1OHC, Franklin, Mass. Phone 135-M.

FOR Sale: BC-610E with line voltage, running time and plate voltage meters, 5 amp. variac and new spare modulation transformer. New 100THS and 250TH. Best offer over $450. F. A. Jones, Sr., W8ZQC, 8154 Olmway Ave., Olmsted Falls, Ohio.

VIKING 500, $685; Meissner portable record player, recorder, radio, $65. Ritter, 1141 Garrett Ave., Niagara Falls, N. Y.

COLLINS 32V2 $450.00, 32V3 1550.00; Elmac A54 $99.95, A54H $110.00, PMR6A $89.95, PSR6 $14.95, PSR116 $14.95; Gonset Communicator $179.95, 2m Linear $129.95, 2m VFO $64.95, 30.10 $34.95, Superceiver $79.95; Hallicrafters S76 $139.95, SX71 $149.95, SX62 $250.00, SX96 $199.95, SX99 $119.95; Hammarlund SP400X $229.95; HW TBS50 $49.95, TBS50D $79.95, APS50 $29.95, DPS $24.95; Johnson VFO $49.95, Mobile $99.95; Lettine 240 $59.95; Meissner Ex Shifters $19.95; Millen 90700 $19.95, 90810 $89.95; Morrow MBR5 $194.95; National SW54 $24.95, HFS $75.00, NC57B $69.95, NC125 $139.95, NC183D $250.00, HRO50T1 $125.00, HRO $99.95. Other items available; write for latest list. Evans Radio, Box 312, Concord, N. H.

ART-13 for sale: like new. Converted to a.c. and complete with pwr. supply and manual. $300 or best offer. C. J. Lucy, W2YDO, 118 Durland Ave., Elmira, N. Y.

FOR Sale: B&W transmitter, like new, in original carton. Make an offer. Millen 90651 grid dip meter, new, in carton: $50. Ben Guzzardo, W5TIG, 4713 Cole, Waco, Texas.

2 METER Kw. amplifier using new ceramic 4X250B's. Can also be used as linear, $199.50, with tubes. Literature available. Amplex Radio Products, 1195 Westlake Dr., Walled Lake, Mich.

NATIONAL NC-300. Like new. About 20 hours actual use. $310 shipped express in original carton. Inquiries welcome. K6HBO, 686 Lovers Lane, Vacaville, Calif.

SELL: RMCA 8506-B Kc to 27 mc., $400 or trade for NC-300. W8LSA, 474 Overlook Rd., Mansfield, Ohio.

FAMOUS VHF "Lunenburg" antennas, 6 meter, 5 element, $14.95; 2 meter 6 element, $6.95. 6 meter horizontally polarized mobile antenna. Wholesale Supply Co., Lunenburg, Mass.

RUBBER Stamps for QSLS: sample imprints. C. W. Hamm, W9UNY, 542 North 93rd, Milwaukee, Wis.

COMPLETE Ham Station must go: Johnson Viking I, VFO, Matchbox, Hallicrafters SX-71 with R-46 speaker, D-104 Astatic mike, speed key and J-38. All equipment factory wired. Will give 90-day guarantee. Also SCR-522 converted, tunable w/power supply, speaker, T-17 mike. Antenna wire spare tubes, coax and miscellaneous, condensers and resistors. Must sell. Best offer takes everything. Entire lot or part. All offers acknowledged. W1UCU, Manuel Kenasco, 78 Western Promenade, Cranston 5, R. I.

MOBILES! Why be satisfied with old-style power converters involving vibrating reeds or rotating armatures with high starting currents? New, long life, efficient hash-free, transistorized power supplies available at ½rd size and weight of conventional vibrator and dynamotor types. Maintenance free 12 volt d.c. input, 500 volts, 200 ma. output, $74.95. 12 volt d.c., 115 volt 60 c/s, 100 v.a. output, $74.95. Other sizes and types. Prices on request. Write: Midwest Engineering Company, Box 2043, Kansas City 42, Mo.

TWO Meter mobile transceiver with 6 v. vibrator supply. Uses a 6AQ5 modulator, 5763 final. In exc. condx, $75; new Aerotron portable VHF transceiver. Operates on 115, 6 or 12 volts without modification. Ideal for ham, C.A.P. or CD work: $210. Bendix TA-12, 100 watt xmitter, unmodified, $45.; BC-322 xmitter, range 52-65 Mc., unmodified, $9; plate xfrmr, 4400 c.t. primary 220 $17.50. Miscellaneous, ART-13 parts. Bill Slep, W4FHV, Ellenton, Fla.

360 copies QST — 1927 to date, 130 copies CQ 1945 to date; 37 copies Radio, 1936 to 1942. Some gaps in these runs, some duplicates. Sell all or part of runs. Henry Shaw, W3FJZ, 1811 Roberta Ave., Abington, Pa.

BARGAINS: Reconditioned with new guarantee. Shipped on approval. Hallicrafters S-38, $29; S40A, $69; SX99, $119; SX71, $149; SX96, $189; SX100, $229; Viking Adventurer, $39; Viking II, $199; S40B; S85; SX88; SW54; NC98; NC183D; HROS; NC300; HQ129X; HQ140X; HQ140XA; GPR90; A54; AF67; PMRG; PMR7; HT9; HT19; Collins 75A3; 75A4; 32V3, many other items. Easy terms. Write for list. Henry Radio, Butler, Mo.

MARINE Crystals. All frequencies. Transmitting, $2.95; receiving $2.50; Specify holder pin diameter and spacing. Prepaid airmail delivery. All amateur crystals exact frequencies $1. Crystals since 1933. C-W Crystals, Box 2065, El Monte, Calif.

PERFORATED aluminum sheet .051, 5/64" OD holes, ⅛" centers, $1.20 sq. ft., cut to size. Send for listing on Beams, Aluminum tubing etc. Radcliff's, Fostoria, Ohio.

MOBILE: Dynamotor 5.6v. inp., 425 v. at 375 ma. outp. $15; 3 vibrator packs 12 v. inp. 300 v. at 100 ma., outp., $9.50 ea.; 1 vibrator pack 6 v. inp. 300 v. at 100 ma., outp., $9.50; 1 dynamotor with filter-base 12.2 v. inp. 230 v. at 90 ma. outp., $5.00. Also 10 meter mobile rig. Write. All used but in gud condx. William C. Ryder, W1JNM, 337 Barcliff Ave., Chatham, Mass.

FOR Sale: Gonset: Super Six-6, or 12 volt, $45; noise clipper, $7; Master Mobile, HD chrome spring antenna base mount, $6.50; antenna base section and whip, $5. 40 and 80 meter coils, $2.50 each; Ballantine PE-103 6 or 12 volt dynamotor with relay battery cable and heavy duty fuse holder, $25; Viking Mobile, $95; 6 v. will convert to 12 for $5 more; Elmac PSR6 vibrator supply, $17.50; Carter dynamotor 6 v. inp. 600 v. at 175 miles outp. $30. Trade considered. Cash preferred. All inquiries answered. W5CTB, R. Williams, 2487 Culver Ave., San Angelo, Texas.

NATIONAL NPW-O gear drive unit with 6 gang, 225 μμfd per section condenser; insulated sections; in gud condx, special dial, $4.50 each; guaranteed 4F27A or 4125A, $9 each; new GF-12 with tubes, $8.95. All F.o.b. Joe Harms, W1GET, Plaistow, N. H.

SALE: NC-173 receiver, $130; model A slicer, $40; both $165, Elmac A54 transmitter like new, $85; Gonset Tri-band $28; both for $110; EX signal shifter and FMX modulator, $35; Harrison antenna tuner and coils 10, 20, 40, 80, $22; ART-13 mod. and driver transformer, $10 pair. Model 12 teletype machine, $60. Tom DeBray, 2291 Harding Rd., Cuyahoga Falls, Ohio.

SELL Or swap: SP600 receiver, 25 to 60 cycles — 95 to 260 volts; SX25, Heath Q mult., Transitron T-R switch, RME DB23; many old type tubes, meters, transformers, parts from BC375E. Want Heath tube-tester, Harvey-Wells TBS50C. Free list. WØZOB, Box 273, Coleraine, Minn.

FOR Sale: 75A3 with speaker, 800 v. filter, xtal calibrator, $380. Frank Fetzer, 16 Shelley Ave., Valhalla, N. Y.

FOR Sale: Bargain! Hallicrafters HT-9 transmitter, post-war model, all tubes and coils, manual. Not in working order. $39. Local deal only and no shipping, sorry. W1DBS, Savonis, 11 Dwight Court, New Britain, Conn.

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FOR Sale: One NC-98 revr, $100, plus shipping cost. Arden Henry, Canisteo, N. Y.

SCR-522A in original case and complete, with tubes; PE-98A dynamotor, push button switches, cables and instrux manual, $35; Gonset 10-11 meter converter, $15. F.o.b. Mt. Holly, N. J. V. A. Langelo, 209 Greenwood Ave.

BC-221, xtal, chart, best offer. Mobile package, A54H, Gonset Super-Six, PE-103A, Whipload-6, all for only $100. Two sets, Hamnarlund 4-20 Trans., 4-11 Mod., $25 per set. E. M. Laughner, W3MKH, RD #2, Jeannette, Pa.

SELL: Clean 300 watt phone transmitters, 80-40-20-10, VFO-6146-PPT40's, power supplies, antenna tuner, speech, 811's modulator, TVI suppressed, 40 in. metal cabinet, extra2-813's, 2-T40's, 1-TZ40, all unused. Complete: $140 cash. K2EHM, Glenn Farnsworth, 4409 Sharon Terrace, Pennsauken, N. J.

WANTED: War surplus wind speed instrument and radio transmitter. Consisted of three cup anemometer, and radio transmitter, with allied components, mounted in case, for field use. N. K. Thompson, W1LWV, 99 Water, Millinocket, Me. Interested also in automatic weather stations, or parts thereof.

FOR Sale: Complete ham station, Viking II, VFO, NC-183D, partially complete mobile rig, Baluns, etc. Cannot ship! John Wallace, W2LCU, 18 Third Ave., East Islip, L. I., N. Y.

300 Watt Mobile Transmitter: Terrific performance. Complete with 6 volt Leece-Neville system delivery 700 watts 115 AC thru transformers. All-band, custom built, TVI suppressed; Grammer 4E27 final, 811-A Class B modulators; 3-stage dash-mount VFO cathode follower output to transmitter in trunk; remote-tuned antenna Operating in 1950 Ford. Price: $375. Also sell car $350 in deal to transmitter customer includes excellent BC946 fully converted revr., Gonset converter. Spent $400 for factory rebuilt motor, other components. Everything tiptop. No time to operate. Won't ship. S. W. Ellner, W2TC, 393 West End Ave., NYC. Phone evenings AC 2-0877 or days, LO 5-5200.

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TRI-BAND Cubical Quad. $49.95. See our ad, page 167. Skylane Products, Tampa, Fla.

SELL: For Conelrad monitors, 110 v. buzzers, compact, $1.00 P. P., also some 1922 and 1924 copies of QST. Best offer. W2EEJ.

HAMVENTION Dayton, Ohio. See Hamfest calendar this issue!

SELL: Bargain! Complete mobile station. Elmac AF-67, Morrow mobile receiver (converter and FTR). George Kravitz, 7919 20th Ave., Brooklyn 14, N. Y.

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FOR Sale: Millen power supply type 90281, $75; Thordarson Multi-March modulation transformer type T83M22-50 watt sec. max. 200 Ma., $10. Send check or money order to W2ONK, William Casby, 40 Cooper Rd., Red Bank, N. J.

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500 Watt multiband transmitter along with 3000 volt, 500 Ma. variac-controlled power supply, overload relay, meters, etc. Also 300 watt modulator and 13 watt speech amplifier. See pages 172, 247, 262 of 1954 Radio Amateur's Handbook for descriptions. Speech amplifier, modulator and power supply in one unit. Pictures sent on your request. Will trade for Viking II, DX-100 or $200 plus shipping charges. BC-659-A, $20 and 10-meter Gonset converter, $10. Paul White, W9WDU, Carleton College, Northfield, Minn.

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FOR Sale: Vibrator converter, C. D. 6 VDC in 110 VAC outp. 55 watts, $18; Policalarm, 152/162 Mc. FM, $25; Gonset FM tuner, 38/48 Mc. w/squelch, $25; Lysco 180-A 80 mtr. xmittr, $15 w/antenna coupler, $19. Wanted: Gonset Communicator #2, 2 meter, local deal only. R. Ketcham, 76 W. Cherry St., Rahway, N. J.

KW $300; complete; VFO, 813, 250TH's, Class B 304TL's, speech amplifier, all power supplies, rack-mounted; spare tubes and coils. Presently on the air. Final adapted for C or AB1 operation. K6DUE, North Hollywood, Calif.

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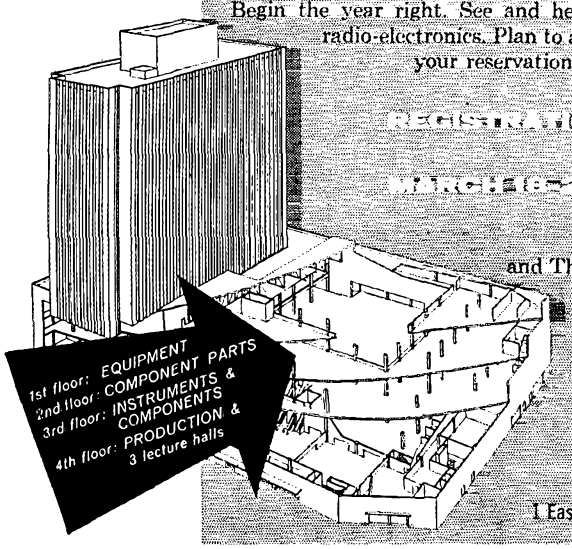

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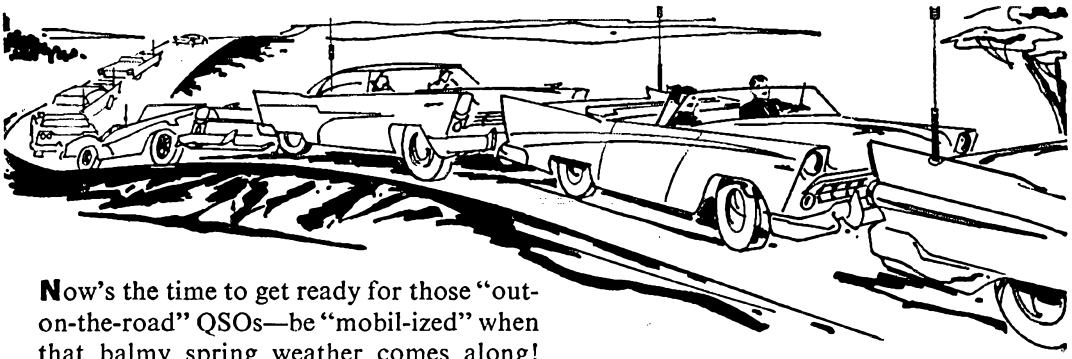

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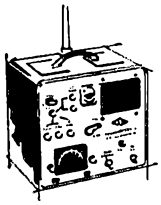

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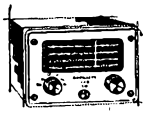

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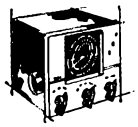

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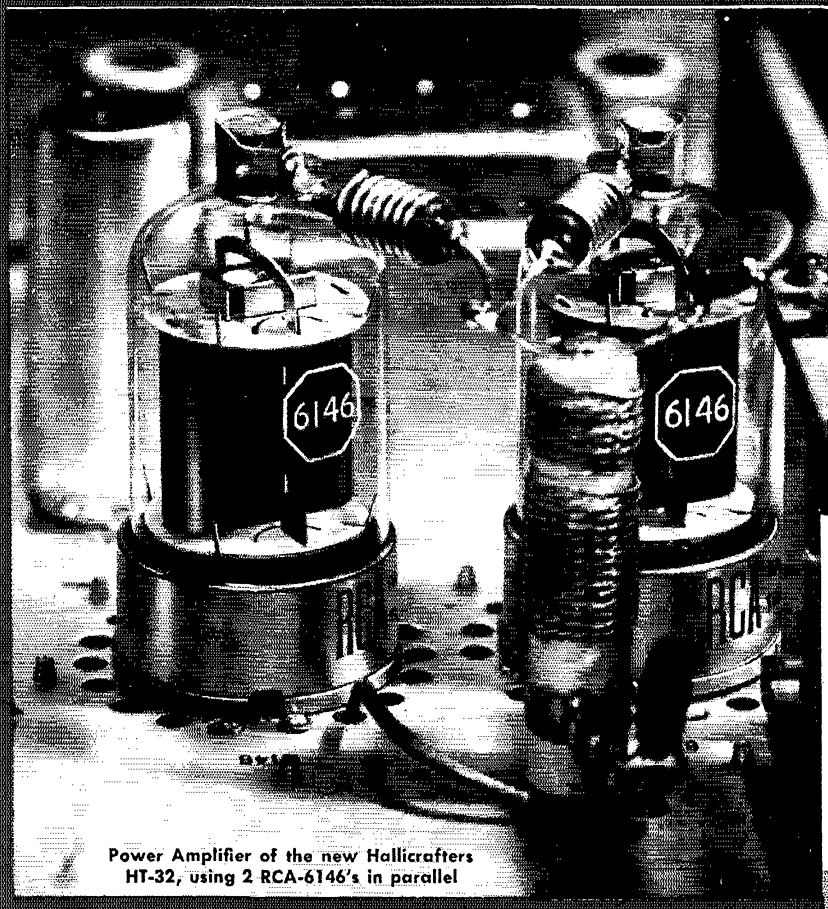

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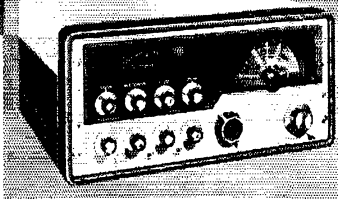

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