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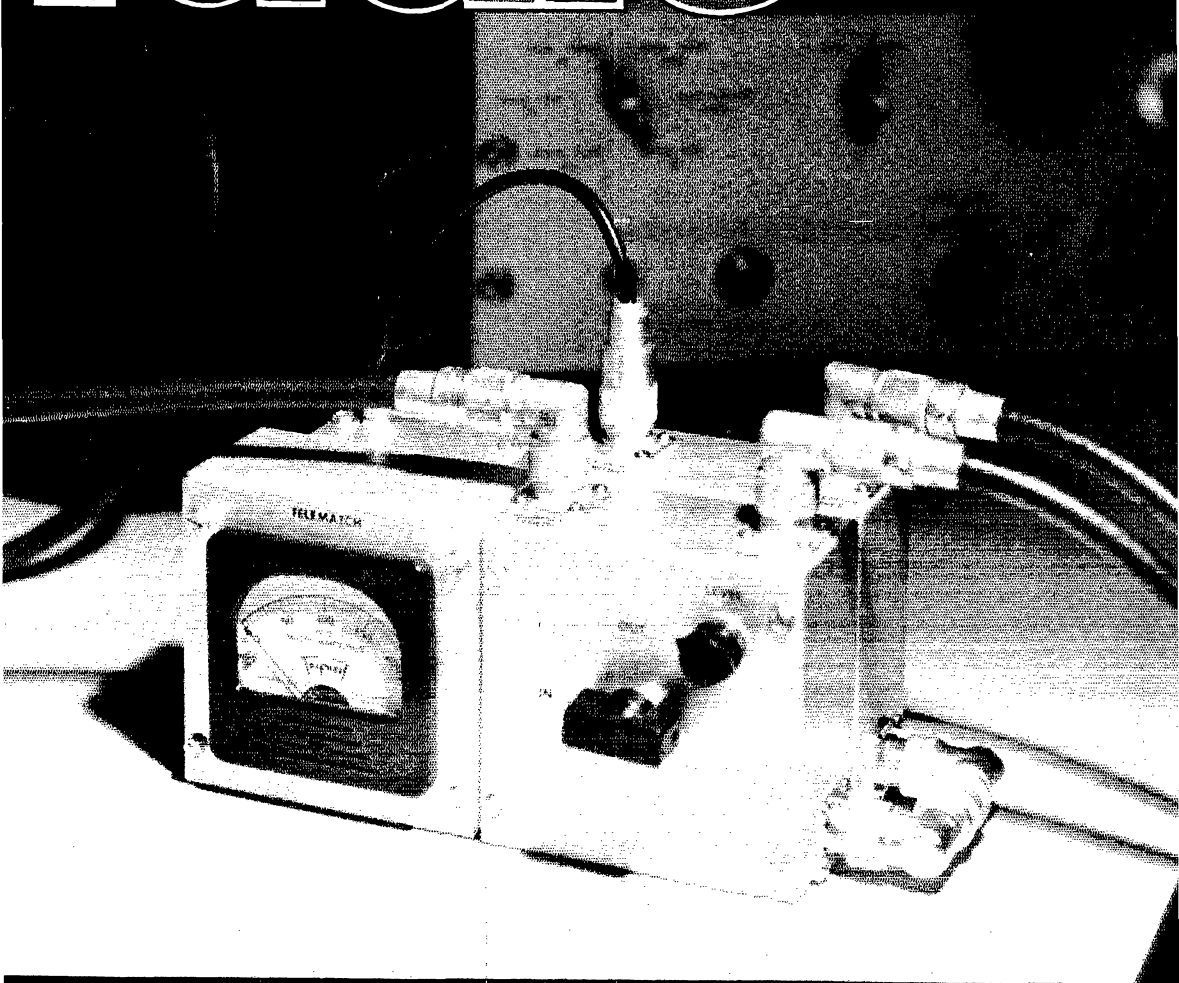

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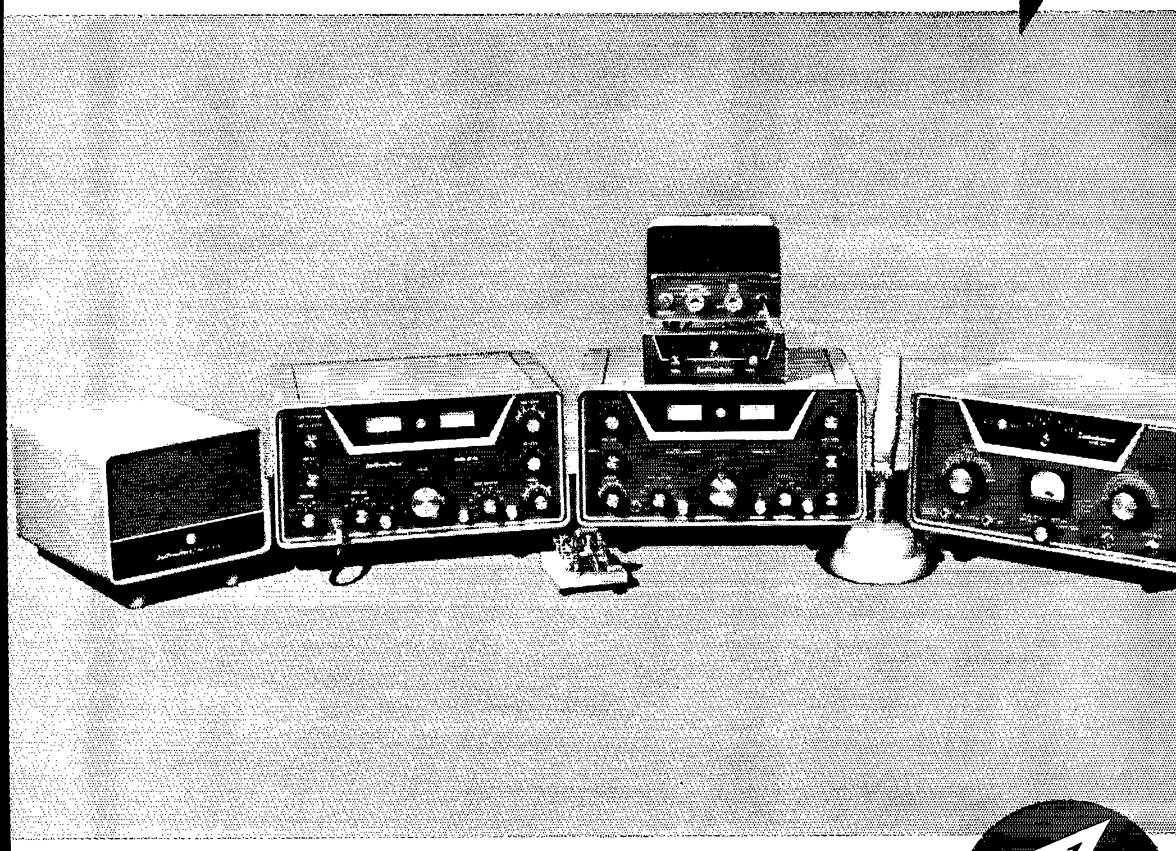

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SX-117 TRIPLE-CONVERSION RECEIVER. Exceptionally versatile and compact triple-conversion, super-heterodyne communication-type receiver. Selectivity: Variable in 3 steps, 0.5—2.5—5.0 kc. Crystal-controlled 1st and 3rd oscillators. Selectable sidebands, constant tuning rate. Sensitivity: less than 1 μv on AM, less than ½ μv on SSB/CW. T-notch for up to 50 db. attenuation to unwanted heterodyne in I.F. pass band. I.F. type noise limiter. Audio inverse feedback. **Crystals** provide for 3.5—4.0, 7.0—7.5, 14.0—14.5, 21.0—21.5, 28.5—29 mc. Four addt'l. crystal pos. for 500 kc. segments between 85 kc. and 30 mc. 100 kc. crystal calibrator included. **Size:** 15″ x 7⅛″ x 13″. Net wt. 18 lbs. Amateur net price: **$379.95.**

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Note: We thought this phrase should be a LOT bigger

*for independent operation or transceiving with SX-117

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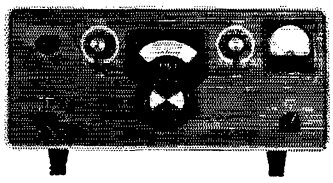
Collins 62S-1 VHF Converter can be your "Open, Sesame" to a whole new world (and beyond!) of excitement and pleasure. ☐ The 62S-1 gives you a full 8 mc of bandwidth. You can transmit and receive on 6 and 2 or HF without changing cables. All you do to get on VHF is flick the switch. You're away from the crowded lower bands. You'll be able to share in some of the new VHF adventure . . . moon bounce, Oscar III . . . ☐ You can use Collins 62S-1 to cover 49.6 to 54.2 and 143.6 to 148.8 mc (crystals for amateur bands provided). If you have the KWM-2 or S/Line, you don't need an additional power supply. One more feature . . . the 62S-1 is compatible with most equipment operating in the 14.0 to 14.2 mc range. ☐ Visit your Collins distributor and ask him to demonstrate the 62S-1 VHF Converter. See how easy it is to get more fun out of ham radio by going to VHF with the 62S-1. Now's the time to do it!



COLLINS

QST

FEBRUARY 1965

VOLUME XLIX NUMBER 2

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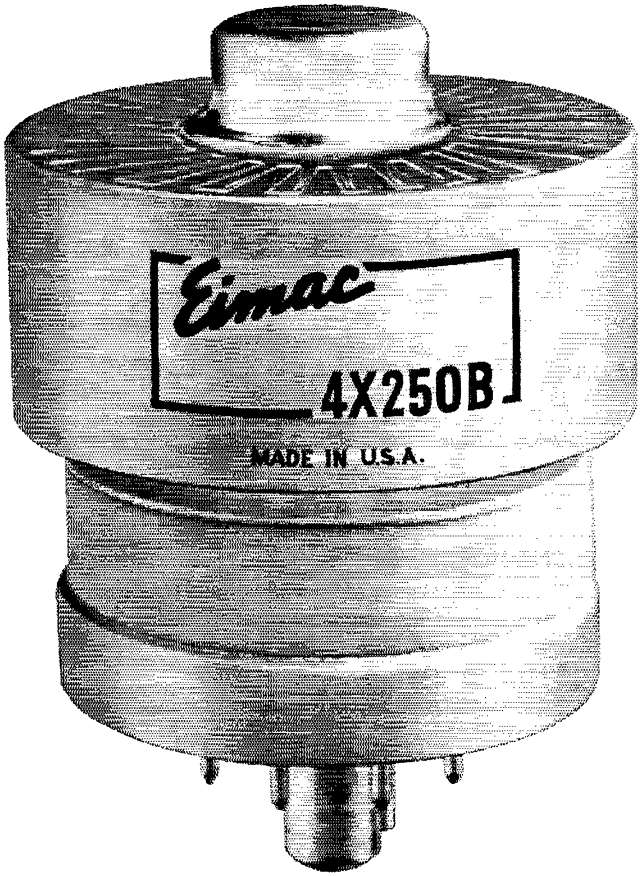
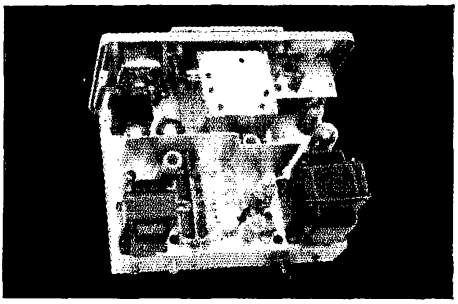
—CONTENTS—

EIMAC

4X250B tetrode chalks up 20,000 hours—and is still going strong!

Back in 1960 an original-design Eimac 4X250B tetrode was placed in operation in a UHF communications system belonging to the County of San Mateo, California. 20,000 operating hours later—February, 1964—it was removed by San Mateo Chief Radio Engineer Walter Harrington, W6MX, for test and evaluation. Returned to the Eimac laboratory, this 4X250B tetrode passed acceptance tests with flying colors—within specification in all respects and equivalent in performance to a brand new production tube! This is another example of the way Eimac designs quality tubes for power, dependability, long life. For data on Eimac original-design tetrodes to meet your needs write: Amateur Service Dept., Eitel-McCullough, Inc., San Carlos, Calif.





Some may call it "ancient modulation", some simply call it AM phone—but whatever you call it, AM still represents a major portion of today's amateur activity—and the "Ranger II" is one of today's most popular AM rigs! For AM or CW operation, for 160 through 6 meters—the "Ranger II" offers the "biggest-little" 75 watts you'll find on the air! Rated at 75 watts CW and 65 watts high-level AM, the "Ranger II" delivers communications quality audio with the necessary punch to break through today's QRM! An excellent "first" transmitter for the Novice or the new General, the "Ranger II" will drive any of the popular kilowatt level tubes and will provide a high quality speech driver system for high powered modulators without modification! What else? The "Ranger II" offers attractive styling in a compact cabinet and is available at a reasonable price.

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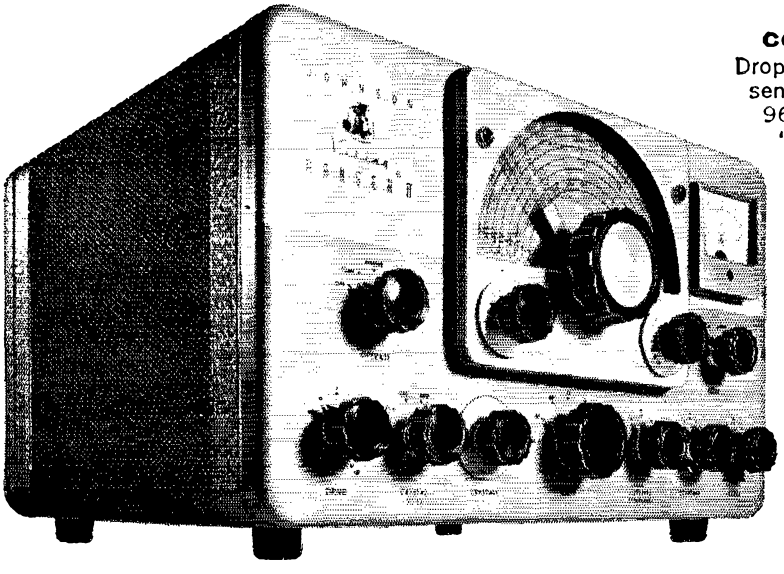

COMPLETE CATALOG

Drop us a card and we will send you Amateur Catalog 962 which gives the full "Ranger II" story, as well as detailed information on our complete line of amateur transmitters and accessories.

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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 areas shown to qualified League members. General or Conditional Class licensees or higher may be appointed ORS, OES, OPS, OO and OBS. Technicians may be appointed OES, OBS or V.H.F. PAM. Novices may be appointed OES. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

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"School's Open"—Feb. 1, 1965

The Engineering Services Department of the Technical Materiel Corporation will offer four new courses in SSB in its newly opened training center in West Nyack, N. Y.

For further information on these courses write for Field Engineering Bulletin #19B, or contact Director of Engineering Services direct.

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THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

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

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

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

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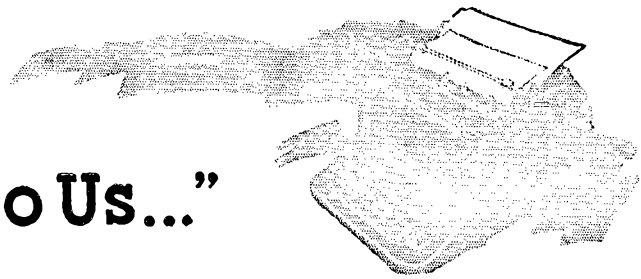


"It Seems to Us..."

FEES — AND APPROPRIATIONS

THE schedule of fees imposed by the Federal Communications Commission for license applications will shortly have been in effect for a full year. If earlier FCC estimates were accurate, some three and a half million dollars will have been collected and turned over to the U.S. Treasury. This is approximately one-fourth the Commission's total operating expense for a year.

Fees were imposed despite considerable opposition by FCC licensees — including that of the League on behalf of amateurs. An appeal to the courts was decided in the Commission's favor; although the Supreme Court now has before it a request to review the matter, no one seems optimistic about any reversal. We want to discuss briefly this month not the propriety of the FCC action, although we still disagree with it, but rather the practical results — on the assumption fees will remain an established procedure.

It is our impression a principal basis for licensee dissatisfaction is that collected funds disappear into the Treasury rather than being credited to FCC's bank account. We speculate that had the monies gone direct to FCC to be used in expansion of services — in the amateur case, particularly more field personnel for additional examinations, more extensive monitoring, etc. — the objections would have been far less vociferous. It is conceivable the League might even have supported the proposal were it to have less the appearance of a tax and more the substantive addition of services.

In a practical sense that result can still be accomplished, at least to a degree. Congress will shortly be examining requests from various governmental agencies for operating funds during the coming fiscal year. We hope the Commission's budget request will be expanded particularly in the mentioned fields of operating examinations and monitoring activity. We further hope that the Congress will be influenced by the fact we amateurs are now underwriting a substantial portion of radio regulatory costs, and that it will be somewhat more liberal in providing a needed expansion of services.

The original schedule of fees would have produced a wholly inequitable relationship between the expected income and the costs of servicing the various branches of U.S. civilian radio — broadcast, marine, aeronautical, amateur, etc. E.g., the broadcast fee expected income would have provided about half the cost of running the FCC Broadcast Bureau; the Safety and Special Radio Services Bureau (which includes amateurs and C B) expected income would have provided more than three times the S&SRS operating budget! The Commission's revised schedule partially corrected this imbalance, but the fact remains that under the present fee breakdown our S&SRS group is paying a much higher percentage of its costs to FCC as compared with, e.g., broadcasting.

The 1952 action of Congress, on which FCC somewhat nebulously based its authority for fees, specifically requires an *equitable* arrangement for federal licensees. Even the revised schedule still does not meet that requirement. The inequity can be corrected, at least in some measure, if the Congress will provide additional funds to FCC for expansion of administrative and regulatory activity among its more "profitable" customers in the S&SRS. License applications are still delayed. More monitoring and enforcement personnel are badly needed, especially for the Citizens Radio Service — and to some extent also for amateurs. In the amateur case, more frequent examinations at more field points should be provided. We hope the Congress will be disposed to grant the Commission additional monies for such purposes, and thus end the S&SRS subsidy to the regulatory costs for broadcasters.

THE NEW *HANDBOOK*

The other night we were listening to a conversation between two sidebanders. It went something like this: Sidebander 1: Bill, the dope you want is in the ARRL *Handbook*. Just a second . . . yeah, here it is on page so-and-so. I'm using one here and it works just fine. Sidebander 2: Stand by one. Okay, now, let's see. Uh . . . what page did you say, Jim? Sidebander 1: Page so-and-so, Bill. There's a picture of it at the top of the page.

(Continued on page 10)

(*Continued from page 9*)

Sidebander 2: By golly, I don't see it, Jim. You sure that's the right page? Sidebander 1: I'm looking right at it! Hey, what edition of the *Handbook* you got there? Sidebander 2: Lessee . . . it's the 37th edition, 1960, Jim. Sidebander 1: For crying out loud, no wonder! You oughta get yourself an up-to-date edition, Bill. Things have changed quite a bit in the last five years.

And so it went. Bill's ARRL *Handbook* was up to date in 1960 and is still useful for basic theory, data on old tube types, and the like. But as Jim said — things have changed.

Moral: treat yourself to the 1965 edition — newly available about the same time as this issue of *QST* — and join Jim in keeping up with changes that keep occurring in the fascinating game of ham radio. QST

OUR COVER

Despite the family resemblance, the gadget shown on the cover is not an electronic octopus. Instead, it is a device that permits an antenna to be tuned with the transmitter *at full power*, without radiating an interfering signal. For the details, see page 21. The transmitter in the background is a new half-kw. c.w. special built for the 1965 *Radio Amateur's Handbook*.

COMING A.R.R.L. CONVENTIONS

February 20 — Michigan State, Muskegon
March 26–28 — Delta Division, Memphis, Tennessee
April 3–5 — Midwest Division, Des Moines, Iowa
April 24–25 — New England Division, Swampscott, Mass.
July 2–5 — ARRL National, San Jose, Calif.
July 9–11 — West Gulf Division, Oklahoma City, Oklahoma

MICHIGAN STATE CONVENTION

Muskegon, February 20

The Michigan State ARRL Convention will be held on Saturday, February 20 at the Central Junior College Auditorium, in Muskegon. Convention activities will include manufacturers' displays of the latest amateur equipment; meetings of the Michigan Council of Clubs, ARPSC, MARS and RTTY; and the Michigan B.R., Wolverine, Teenage, Michigan Emergency, Post Office and QRM nets. There will be an initiation ceremony for the Royal Order of the Wouff Hong.

Larry LeKashman, W9IOP, of Electro-Voice, will give a talk on "The XYL's Plight in Ham Radio"; Professor Dempsey, from Grand Valley College, will present "Boo-boos In Radio And Television", including films; a magician, Ken Booth, will put on a show; and there will be a Western Style square-dance exhibition. A full day of entertainment for the ladies will include floral arranging, china and egg painting, ceramics and glass fusion.

Convention registration is $2.00 in advance, or $2.25 at the door. Meals, at extra cost, will be served at noon and in the evening, cafeteria style. Visiting amateurs will be given free parking at any parking meter in the city; in addition, the Occidental Hotel will offer reduced rates. For further information, registrations or reservations, contact the convention chairman, Willis Barlow, W8KTJ, 2827 Whitehall Road, Muskegon.

Illinois — The third annual mid-winter Ham Swap and Shop will be held at the DuPage County Fairgrounds, Wheaton, Illinois, on Sunday, February 21, 1965. A $1.00 donation is payable at the door. For more information contact: John Koranek, K9GTT, 505 East Illinois Street, Wheaton, Illinois.

New Jersey — The East Coast V.H.F. Society, Inc., will entertain its members and their many friends at its 7th Annual Dinner and Hamfest, Saturday, February 27, 1965, at the Swiss Chalet, Route 17, Ramsey, New Jersey, starting at 7:00 P.M. Tickets are $6.00 each and are available from any member or may be obtained by writing to: East Coast V.H.F. Society, Inc., P.O. Box 1263, Paterson, New Jersey.

Ohio — The Toledo Mobile Radio Association will hold its 10th Annual Ham Auction on Valentine's Day, February 14, 1965, starting at 11:00 A.M. It will be held in the new auditorium of the Lucas County Recreation Center in Maumee, Ohio. For more information write: W. E. Smith, K8LFI, 5030 Janet Avenue, Sylvania, Ohio.

Oklahoma — The Lawton Fort Sill Amateur Radio Club will hold its annual Founders Day Hamfest at the National Guard Armory in Lawton, Oklahoma, on February 14, 1965. Details may be obtained from the Lawton Fort Sill ARC, Inc., Box 892, Lawton, Okla.

OPERATOR OF THE MONTH

Have you thought back over the past month and picked out your nomination for "operator of the month?" Considerations to bear in mind include a clean signal, good keying, careful enunciation, correct procedure, judgement and courtesy. The League's Operating Aid No. 11 lists further examples. Send your vote for "Operator of the Month" to the ARRL Communications Department.

During December the following additional amateurs were nominated in recognition of their extra skills and courtesies:

W1ECH K4ZSX
W1PYY WB6FOP
WA2QJU W8UPH
WA2RBN K9ERL
W3GIL W9KSE
K3YZF W9RFS
W4GUJ KH6AFC
WA4ILG

"Quickie" Orbital Predictions for Oscar III

BY WILLIAM I. ORR,* W6SAI and ARTHUR M. WALTERS*, W6DKH

Launch of Oscar III is expected some time between the date this issue of QST appears in print and the end of the winter season. As a reminder: The input frequency of the Oscar III repeater is a 50-kilocycle band centered on 144.1 Mc., and the output is a similar band centered on 145.9 Mc. All modes of communication will be accepted by the satellite. In addition, Oscar III will have two beacons, a telemetry beacon on 145.85 Mc. and a coherent c.w. beacon on 145.95 Mc. All amateurs are requested to refrain from transmitting on these output frequencies during the time Oscar III is within communication distance. Life of the satellite is estimated to be four weeks. Use of Oscar III is discussed in "Using the Oscar III V.H.F. Communication Satellite", August, 1964 QST.

OSCAR III, the radio amateur repeater satellite, has passed final calibration and environmental tests, and will soon be launched into orbit about the earth. Many earth satellites have been launched in high orbit since Oscar II orbited in 1962[1], so it is not unreasonable to speculate that Oscar III has a good chance of acquiring a higher orbit than those of its worthy ancestors. Such an improved orbit would create a whole new set of circumstances for the observer and user of the satellite.

Regardless of orbital height, interested amateurs may experience delay in hearing that Oscar III is in orbit and in determining the characteristics of the orbit. This is because the satellite is a "piggy-back" passenger and must take, not choose, a predetermined orbit which will be unknown to the Association until after the satellite is in orbit and preliminary tracking measurements have been made. In addition, the vagaries of radio communication often make it difficult to spread word quickly of preliminary verified orbital data. In the case of Oscar II, orbital data was delayed in reaching Europe and Australia by radio because of a sunspot storm. Backup cables to these areas took as long as 15 hours for delivery. Time and Oscar III wait for no man, so it will be good insurance for all amateurs to provide themselves with approximate orbital data as soon as orbit is verified and it is known that Oscar III is travelling about the earth.

Project Oscar, by means of W6EE and W1AW, and the associated Oscar Network stations, hopes to supply orbital period, declination and height information as well as pass-time for major cities in the world soon after launch of the radio amateur satellite. This is the raw material from which "do-it-yourself" predictions may be made. In fact, once the period is determined from these broadcasts or from direct observation, the interested enthusiast can generate his own approximate predictions. Here is how you do it.

Orbital Height

Kepler's Laws provide the clue for orbital height determination from observation of the satellite period. Fig. 1 is a summary of that relationship for a circular orbit. With a period of 100 minutes, for example, the height of the orbit above the earth will be about 500 miles. A period of 105 minutes will provide an approximate height of slightly over 650 miles. If the period is as low as 85 minutes, the satellite is plunging back into the earth's atmosphere.

Once the satellite's height is determined from the orbital period, the slant range (distance to the horizon) may be determined from Fig. 2. At an altitude of 500 miles, for instance, the slant range is about 2000 miles. Two observers located east and west of the satellite path, then, who are 4000 miles apart could theoretically communicate

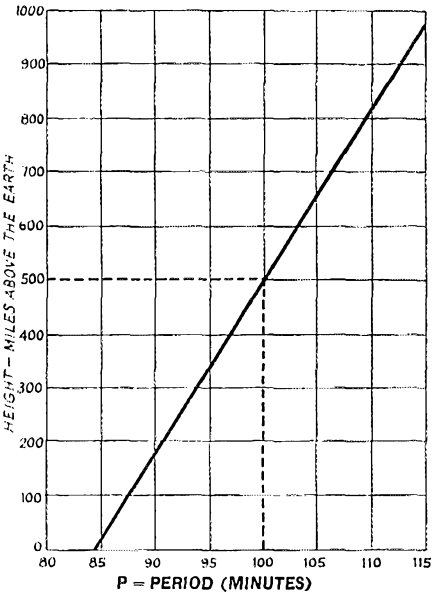


Fig. 1—The period (P) of a circular orbit provides height information as shown in this graph. A period of 100 minutes, for example, indicates a mean elevation of 500 miles for the satellite. Slight orbital eccentricities introduce little error into height calculation.

* Project Oscar Association, Foothill College, Los Altos Hills, Calif.

[1] These have been tabulated, with orbital parameters, by George Jacobs, W3ASK, in his monthly "Space Communications" column in *CQ Magazine*.

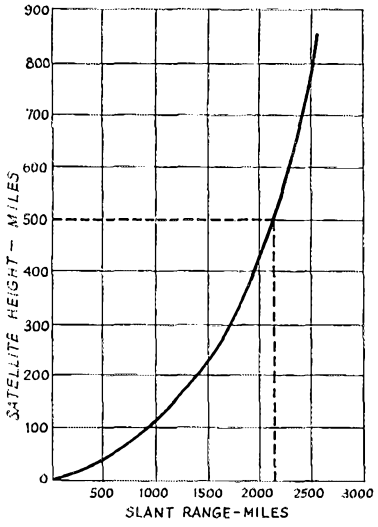


Fig. 2 — Once the period or altitude is known, the approximate slant range to the "horizon" of the satellite may be approximated from this graph. A satellite height of 500 miles, for example, indicates a "horizon range" or slant range of about 2150 miles. Operational range will tend to be less than this depending upon the terrain surrounding the ground observer.

with each other via Oscar III, as they can both "see" the satellite. This is not strictly true, as ground distance and slant range are not the same and the satellite would be so very low on the horizon of both stations that the time it would be in the common range would be but a matter of seconds.

Interestingly enough, stations located in an east-west direction will enjoy a greater possible mutual communication time via Oscar III than will stations located in a north-south direction. (This assumes Oscar III will be in a near-polar orbit.) Conversely, the north-south stations will suffer because the number of available contact periods during a given time span will be less than for those stations in an east-west direction. A study of Fig. 3, plus the examination of the satellite track on a globe, will quickly verify this fact. Even so, if Oscar III does acquire a higher orbit than Oscars I and II it will permit the satellite to remain in range of ground stations for a longer time period than that of its ancestors.

The Orbital Plane

A good way to confuse yourself as to the whereabouts of Oscar III is to imagine yourself on a stationary earth with the satellite whizzing about overhead on various erratic passages, south to north, north to south, and at impossible angles to your horizon.

A much clearer and more accurate picture may be gained by visualizing the satellite to be rotating in an orbit lying in a fixed, invisible plane about the earth, the latter revolving within the satellite orbit. As the earth rotates within Oscar III's orbit (see Fig. 4) it can be seen that the rotation will cause all areas of the world to pass beneath the satellite at one time or another, with the possible exceptions of areas near the north and south poles, which will be missed if the orbital plane is "tilted" at too great an angle. In any event, when Oscar III passes over a particular spot on the earth on one orbit, the rotation of the earth will cause the satellite to pass over a slightly different point, lying somewhat to the west of the first point, on the next orbit. In fact, each successive orbit of Oscar III will progressively cross the equator of the earth farther west by an easily determined distance, as the speed of rotation of the earth is known (one revolution in 24 hours).

Let us assume again that the orbital period of Oscar III will be 100 minutes (1.66 hours). During this time, the earth will have rotated 1.66/24 (or 0.0692) revolution while speedy Oscar III is circumnavigating the globe and has returned to the same spot in *its* orbit. The earth rotates 24/360 degrees per hour, or 15 degrees per hour. In 1.66 hours, therefore, the earth will have rotated 25 degrees and Oscar III will have completed one of its orbits, and will be over a point on the earth 25 degrees to the west of the first point.[2] To an earthbound observer, the orbit of Oscar III will have "moved" 25 degrees to

[2] At 40° N. latitude, this amounts to about 1200 miles.

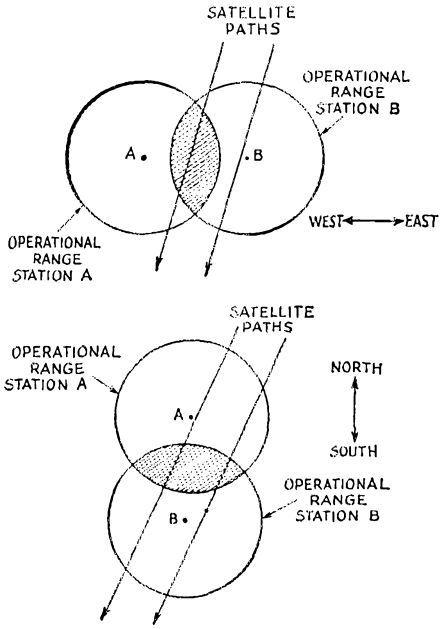


Fig. 3—The operational range of a ground station is that distance over which it can achieve entry into the Oscar III repeater. For two amateurs to communicate with each other via Oscar III their operational ranges must overlap in a common operational area (shaded). When Oscar III passes through this area, communication is possible. Stations located in an east-west direction will have longer communication time than will stations in a north-south direction, although the north-south stations will have more communication opportunities.

the westward during the time of one revolution, but in reality the *observer on earth* will have moved 25 degrees to the east during this time interval. The circumference of the earth is about 24,900 miles at the equator, and 25/360 of this distance is about 1730 miles. Thus, each period of Oscar III in its orbit will allow the earth enough time to rotate 1730 miles farther west from an equatorial observer monitoring the position of the satellite. The mileage separation between successive passes, of course, will become less as the observer leaves the equator and departs for higher latitudes. If he visited the north or south poles and if Oscar III was in a truly polar orbit, each pass would be observed directly overhead, and the successive orbits of Oscar III would rotate about like the spokes of a wheel and everything would be greatly simplified. He would observe each pass, missing none, and would quickly obtain an accurate "fix" on the orbital period.

Orbital Predictions

How to pull the proverbial rabbit from the hat once Oscar III has been heard, and determine when the satellite will be heard again, and from what direction it will come? If Oscar III travels in a near-polar orbit, an observer in mid-latitudes (U.S.A. and Europe) will hear the satellite at least twice in 24 hours, and probably four times: two groups of two passes each. Let's again assume that Oscar III will be launched at 2000 hours GMT (noon PST), attaining an orbital height of 500 miles and a period of 100 minutes. If the sequence follows that of the earlier Oscars, the new satellite will be launched on the Pacific Coast of the United States and "aimed" southward over the Pacific Ocean. Oscar III will cross "down" over the Antarctic, "come up" over the Indian Ocean and eastern Europe, pass over the North polar area, and "come down" across Alaska to a point between Hawaii and California. Thus, near the end of the first orbit in space,

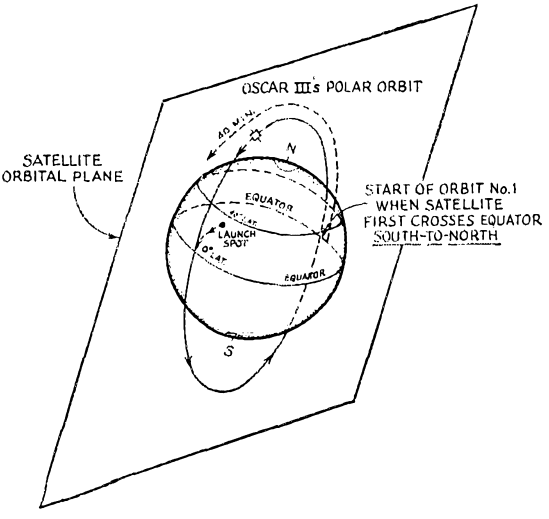


Fig. 4—The earth rotates within the Oscar III orbit, which lies in an orbital plane as shown in this simplified drawing. Remember: North-to-south passes will be over central U.S.A. and Europe about 40 minutes after equatorial crossing time on the opposite side of the orbit. South-to-north passes will be over central U.S.A. and Europe about 12 minutes after equatorial crossing time, because the observer has rotated under the portion of the orbit closer to the equatorial starting point. These times apply only to a 500-mile orbit, and to a daylight launch.

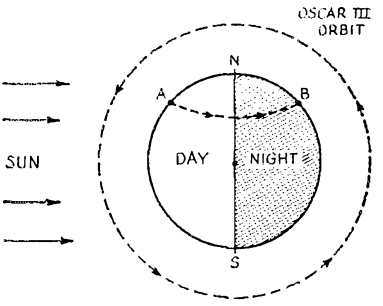


Fig. 5—Oscar III orbit remains fixed in space while the earth revolves inside it. If Oscar III is launched during daylight from California, in a southward direction, all future observed daytime passes will be in a north-south direction (observer at point A) and all night time passes will be in a south-north direction (observer at point B).

if all goes well, a W6 — KH6 QSO via Oscar III repeater satellite might be possible!

The next orbit of Oscar III will take the 40-pound package "down" across the Pacific, passing near FO8-land, the edge of Antarctica, and "up" over Africa and central Europe. The first European crossing thus occurs about 1½ orbits from launch, or about 150 minutes (2½ hours) later. As the Association will have no verification of the success or failure of Oscar III until it passes over Alaska, or off the California coast, the time allowed to flash the word to European amateurs that Oscar III is in orbit is going to be short indeed. It is hoped that some of the KC4 amateurs on the Antarctic continent will have monitoring equipment capable of picking Oscar III up on the first pass and thus giving Project Oscar a few precious moments of advance notice of the success of the satellite.

Fig. 5 shows that an observer in moderate latitudes will hear Oscar III at least twice in 24 hours. The initial hearing will be followed by a second period of reception on the opposite side of Oscar's orbit, as the earth will have rotated 180 degrees or so since the first reception period. If Oscar III is high enough, the slant range coverage will be such that two successive passes of the satellite will be heard during each period of reception. A noontime (PST) launch in a southward direction would indicate that all daytime passes of the satellite have a north-south direction and all nighttime passes (opposite side of the satellite orbit) will have a south-north direction. It

merely depends upon which "side" of Oscar's orbit the observer "sees" as the earth whirls about.

Do You Live on the Equator?

Only a small number of radio amateurs live on the equator (apart from some HC's, PY's and 5Z4's) and life becomes a little more complicated for the rest of us non-equatorial amateurs: the reason is shown in Figs. 4 and 5. To begin with, orbital periods are determined from northbound equatorial crossing points and Orbit No. 1 will start on the opposite side of the earth from the launch side, at the equator somewhere in the Indian Ocean. Moreover, an observer at some point (A) on the earth will observe Oscar III at different points on its orbit during daytime and nighttime passes. He will observe the satellite first at point A, then as the earth rotates about within the Oscar III orbital plane, he will next observe the satellite from point B, on the opposite side of its orbit. The satellite, however, will not complete an integral number of revolutions while the earth rotates from A to B. Oscar III will be short of a complete orbit by the distance from B to A. This means that the interval between a daytime pass and its nighttime "opposite" will not be equal to the interval between a nighttime pass and its daytime "opposite," since the observer at point A will have moved in the interim to point B (or vice-versa) and will be "looking" at a different point of Oscar's orbit.

However, all is not lost. The distance *BNA* may be computed and the time it takes Oscar III to make this journey may be determined. A correction factor (K) may be found that will enable the observer to predict passes from one side of the satellite orbit to the other:

$$K = 2 \times (90^\circ \text{ minus your latitude}) \times \frac{\text{period of Oscar III in minutes}}{360} \quad (1)$$

K (in minutes) at a north latitude of 40° (the center of the United States) for a 100-minute period figures out to be about 27.8 minutes. For amateurs in the northern hemisphere K must be *subtracted* in predicting a nighttime crossing from a previous daytime one. For southern hemisphere stations, K must be *added* in this operation. Added to or subtracted from what? Well, if Oscar III completes one orbit in 100 minutes (1.66 hours), it will complete about 7 orbits in a 12-hour (180-degree earth rotation) interval, so K is applied to the 7-orbit figure. Seven orbits take 700 minutes of earth-time, or 11 hours 40 minutes. Now, subtracting K from 700 minutes, we find that the following nighttime pass will occur 700–27.8 = 672.2 minutes (11 hours, 12.2 minutes) after the noted daytime pass. We will thus hear Oscar III once again some 27.8 minutes *before* it completes its seventh orbit after the orbit we first noted during the daytime period.

Predicting: Day to Night and Night to Day

To predict a daytime pass from the observed nighttime pass, the same approach is used except the correction factor (K) is *added* in the northern hemisphere and *subtracted* in the southern hemisphere.

We know Oscar III will complete 14 orbits in a day and a night, or about 24 hours, more or less. (Actually, 14 orbits at 100 minutes per orbit take 1400 minutes, or 23 hours, 20 minutes.) We will call the day and night time of 14 orbits by the term, D. Now, letting T be the time of the desired pass and T' be the time of the preceding day or night pass:

$$T = T' + \frac{D}{2} - K \quad (2)$$

is used to predict nighttime (south-north) passes from daytime passes, and

$$T = T' + \frac{D}{2} + K \quad (3)$$

is used to predict daytime (north-south) passes from nighttime passes.

All well and good. Let us assume that Oscar III is heard at 1045 GMT on a daylight (north-south) pass, and we know that the period is 100 minutes. We are located at 40° north latitude and equation (1) provides a K = 27.8 minutes. When does the next nighttime pass occur? Using (2):

$$T = 10{:}45 + \frac{23{:}20}{2} - 00{:}27.8 = 21{:}57.2 \text{ GMT}$$

When does the following daytime pass occur? Using (3):

$$T = 21{:}57.2 + \frac{23{:}20}{2} + 00{:}27.8 =$$

34:05 or 10:05 GMT,

which is 40 minutes earlier than the equivalent pass the day before. Thus, a table may be built up by a "bootstrap" operation, going from day to night to day passes, revising the figures as the time of Oscar III is checked by actual reception.

Long Range Predictions

The method discussed above may be used to predict Oscar III orbits for several days in advance, predicting from one day to the next, or from one night to the next by means of equation (4) below, obtained by the addition of equations (2) and (3):

$$t = t' + D, \quad (4)$$

where t is the desired time of the next day or night pass, t' is the time of the previous day or night pass, and D is the time of a set of day and night orbits. Using a t' of 10:45 GMT and a D of 23:20, a day-to-day computation provides a t of 10:05 GMT, which agrees exactly with the previous computations done separately with equations (2) and (3).

The Orbital Shift of Oscar III

During 14 orbits of Oscar III (1400 minutes, or 23 hours, 20 minutes) the earth will have revolved 23.33/360 = 349°. This means that if Oscar III passes directly overhead on the first daylight pass, it will pass 11° farther west (about 550 miles at 40° N) on the next day's pass, 23.33 hours later. Thus, with each successive daytime

Table I

Predicted and Observed Orbits, Oscar II, December 1961.

Day		Night Passes			Day Passes				
16	— —	— —	— 2317	(0049) 0049	— —	— —	(1024) 1023	(1156) 1155	(1328) N
17	— —	(2217) N	(2349) 2344	(0121) 0117	— —	— —	(1055) 1049	(1227) 1221	(1400) N
18	— —	(2343) N	(0015) 0012	(0147) 0144	— —	(0947) 0944	(1119) 1116	(1251) N	— —
19	— —	(2307) 2306	(0039) 0037	(0211) N	— —	(1011) 1012	(1143) 1142	(1318) N	— —
20	(2202) N	(2334) 2332	(0106) 0105	— —	(0907) N	(1039) 1037	(1209) 1209	— —	— —

Predicted times are shown in parentheses.
N = No signal heard.

pass, the satellite will shift 11 deg. west, possibly out of the range of the observer, and the *next* pass (the one to the east) will work itself into range and will be the one that is observed. The movement per orbit of Oscars I and II was less noticeable, but this day-to-day drift was still easily discernible. A complete history of such a prediction for Oscar II by IIBMV is shown in Table I.

Prediction broadcasts of W6EE will supply orbital data, equatorial crossing times, and approximate crossing times of Oscar III over many large cities of the world. *Remember longitudes given in the prediction messages are measured west of Greenwich and east longitude is not used.* Thus, for example, 165°E is given as 195°W, 90°E is given as 270°W, and so on.

Reference Material

A treasury of reference material has been included in the past issues of *QST* and the reader is referred to the following articles for more detailed information pertinent to tracking and predicting the orbit of Oscar III.

"Ground Support for Project Oscar," Garner, Wells, December, 1961

"Project Oscar Measurements and Tracking," Walters, Wells & Hillesland, July, 1961

"Tracking Information for the Oscar Satellite," Wells, Orr & Towns, September, 1961

"Eyeball and Eardrum Doppler Tracking," Norgaard, April, 1962

"Keeping Track of Oscar," Burhans & Rankins, May, 1962

"Making your Own Orbital Predictions from Doppler Measurements," Hilton, March, 1962

"Oscar III: VHF Translator Satellite," Orr, April, 1963

"Communicating Through Oscar III," Tellefsen & Gabrielson, May, 1964

"Experiments With Oscar III," Gabrielson & Tellefsen, July, 1964

"Oscar III: Technical Description," Walters, June, 1964

"Using the Oscar III V.H.F. Communications Satellite," Orr, August, 1964

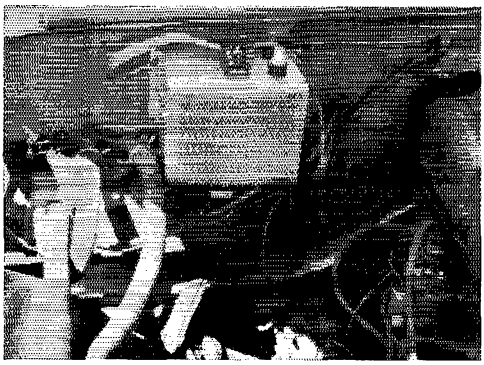
Conclusion

Once the orbital period of Oscar III is known with fair accuracy, orbital height may be determined and (knowing your latitude) a table of orbital predictions may be generated. As time goes on, the table may be corrected for maximum accuracy by actual "on-the-air" monitoring of the satellite signals. More than ever, the old saying "you can't work it if you can't hear it" applies to Oscar III. Follow these simple equations and you can hear it!

Of course, the reason behind this effort by both the members of Project Oscar and *you* is to effect two-way radio amateur v.h.f. communications via Oscar III. All actions are aimed at this unique event. Computations of orbit and prediction generations are thus but a means to an end and not an end in themselves. The life of Oscar III will be short (a matter of weeks), but this short interval, if properly used, will provide an opportunity for a new and glowing chapter to be written in the imposing record of amateur radio. *Do your part to make this dream come true!*

Acknowledgements

The material in this article has been prepared around prediction methods suggested by Dr. Giorgio Giro, IIBMV and material in "The Astronautic Chart", *Proceedings of the IRE*, April, 1960. Special thanks are given to Ed Hilton, W6VKP, Harley Gabrielson, W6HEK, and Don Norgaard, W6VMH, for their help, suggestions and criticisms. QST



The a.c. inverter installed on the fire wall of the author's car.

A.C. for Your Car

An 85-Watt Transistor Power Inverter

BY JOHN LAWSON,* W2MEX

HAVE you ever wished that you had a 115-volt a.c. source of power in your car? I have, every time I've had to modify a transmitter so that it would work mobile as well as in the home station, every time the dynamotor that supplies B+ to the final was switched on with its 55-per-cent efficiency, every time I've had to change a flat at night without the benefit of a decent light, and every time that I've realized I couldn't use the electric shaver in the car. About two years ago something was done about these problems. The following is one man's solution.

The Circuit

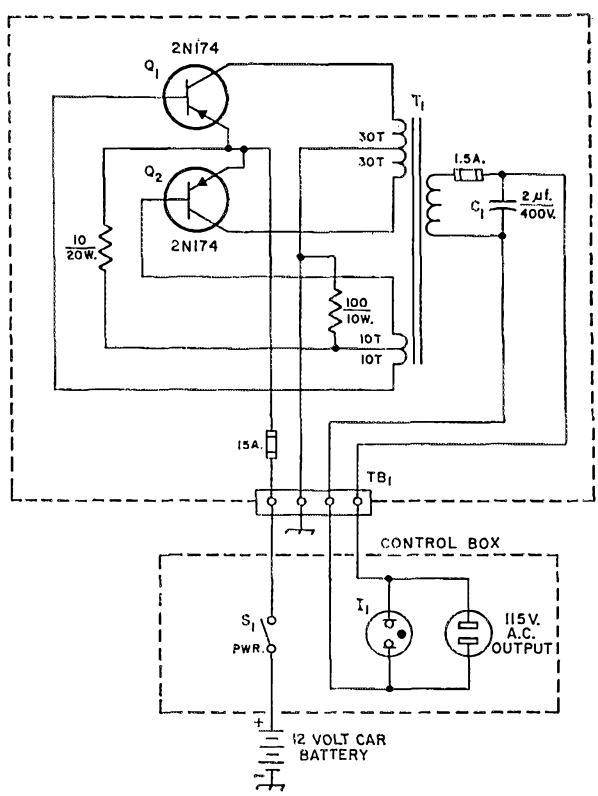
It was obvious from the start that the supply was going to have to be one of the popular transistor circuits because of the advantage of higher efficiency over rotary converters or vibrator types. The circuit appears in Fig. 1.

In operation, the transistors act as switches which interrupt d.c. through the primary of a transformer analogous to the action of a vibrator. When a d.c. voltage is applied, one transistor, say Q_1, conducts more current than Q_2. The polarity of the voltage induced in the base windings is such that Q_1 will conduct more heavily and Q_2 will tend to be biased off. When the core of the transformer approaches magnetic saturation, the induced voltage tends to zero, and the collector current decreases. The decrease in collector current causes a polarity reversal in the induced base voltages, causing Q_1 to go off and Q_2 to turn on. The cycle then repeats. The output waveshape is thus rectangular. The 2-μf. paper capacitor across the output winding was found to be the least expensive way to keep the voltage spikes at the leading edges of the rectangular wave below the V_{CE} maximum rating of the transistors.

Construction

Parts placement does not seem to be critical. A look at the photos will show how the unit is constructed. The main stumbling block was the transformer. Transistor power-supply transformers cost more than the old pocketbook could stand. Surely a less-expensive substitute could be found with only a slight decrease in efficiency. In browsing through the junk box, a variable

(*Continued on page 150*)



* 39 Gold St., North Arlington, New Jersey.

Fig. 1—Circuit of the mobile power inverter.
C_1—Paper.
I_1—NE-51 neon pilot lamp.
S_1—S.p.s.t. toggle switch.
T_1—See text.
TB_1—Four-contact terminal strip (Cinch-Jones 4-141).

Oscar III Compatability with Transmit-Receive Converters

Auxiliary Injection Unit Using Transistors

BY WILLIAM E. McKAY,* WØHRQ/W7QBR

If you're working on a 2-meter station with an eye toward using the Oscar III satellite, this little addition to a popular type of v.h.f. ham gear may be just what you are looking for. Although resourceful hams will do better, the cost of all new parts for the device is around twenty dollars. The circuit can be adapted readily to different frequency combinations.

With the launching of Oscar III imminent, many amateurs are looking to their 2-meter stations in preparation for utilizing the everyday DX capability of this active satellite. The Project Oscar committee has recommended that transmitter power be kept low, under 100 watts output, and that schedule-type operation be used. Frequency stability, calibration accuracy and the use of narrow-band emissions such as c.w. and s.s.b. will be important to obtain the maximum traffic in the 50-kc. passband of the satellite.

A v.h.f. converter used in conjunction with a low-frequency s.s.b. exciter is an excellent choice for Oscar III communications. The Collins 62S-1 is such a converter; however, separation of transmit-receive frequencies beyond 200 kc. is not provided for in the 62S-1. Since it is necessary to transmit at 144.1 Mc. ± 25 kc. and to receive at 145.9 Mc. ± 25 kc., the transmit-receive frequencies must be separated by almost two megacycles. Separate converters are used for transmit and receive in the 62S-1, with the injection system common to both. If a separate injection source was available for use with one of the converters the other injection could be provided by the regular 62S-1 system. Such an injection source was built and is described here.

Circuit

The transmit converter was selected to receive the external injection for two reasons: (1) It is more desirable to retain the full 4 Mc. receive capability and limit the transmit coverage; (2) No wiring changes in the 62S-1 are necessary if injection is provided to the transmit converter.

The transmit frequencies desired are between 144.0 and 144.2 Mc. The required injection frequency is then 144 minus 14 Mc. = 130 Mc. To keep harmonics of the crystal oscillator out of the band and to keep circuits to a minimum a crystal frequency of 32.5 Mc. was chosen. A standard Pierce crystal oscillator using an RCA 2N1178 transistor operates at 32.5 Mc. The first doubler uses an RCA 2N1177 transistor and has an output frequency of 65 Mc. The second doubler uses a Philco 2N1742 transistor the output of which is the desired 130 Mc. Link L_4 couples the output to S_{1A} where either the regular internal injection source or the auxiliary injection source is selected. Power to the auxiliary injection source is controlled by S_{1B}.

Oscillator stability is assured by Zener-regulating the supply voltage to oscillator transistor Q_1, and by using good quality components in the oscillator circuit.

Construction

The oscillator and doublers are contained in a box 1 × 1½ × 3 inches bent from light-gauge aluminum. A scale drawing of the drilling template is shown in Fig. 4. Small Teflon tie points, similar to Garlock type 69002-0500 or Cambion

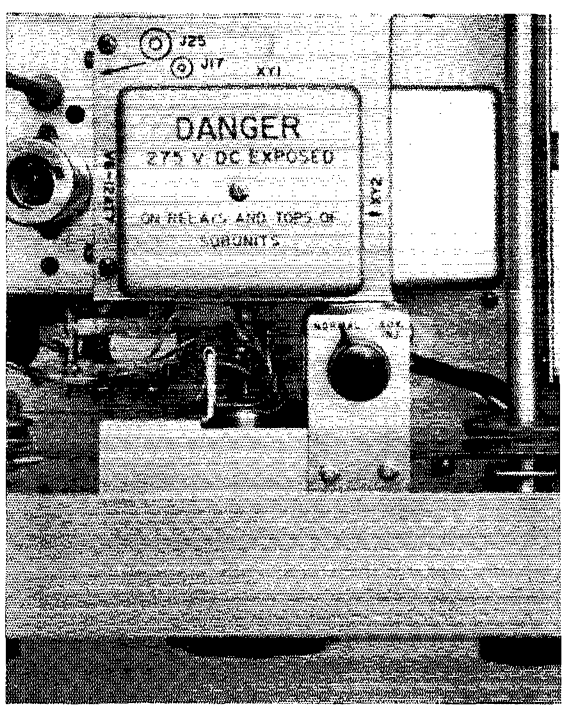


Fig. 1—The switch for selecting normal or auxiliary injection sources is mounted on the light bracket just behind the front panel of the 62S-1.

*Collins Radio Company, Cedar Rapids, Iowa

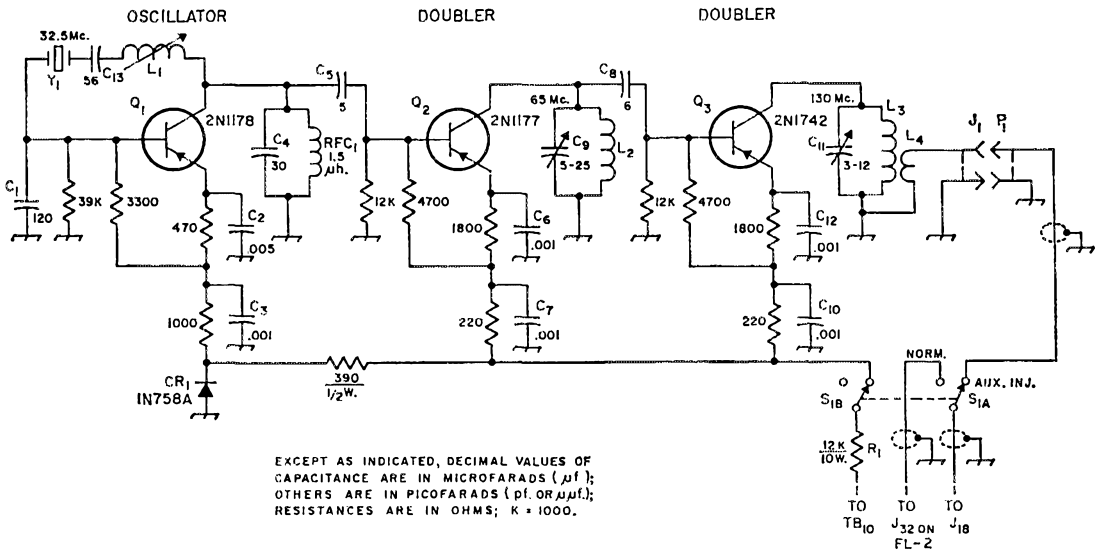


Fig. 2—Circuit diagram of auxiliary injection source. Except as indicated, fixed resistors are ¼-watt composition.

C_1—120-pf. silver mica.
C_2—0.005-µf. disk ceramic.
C_3, C_6, C_7, C_{10}, C_{12}—1000-pf. (0.001 µf.) disk ceramic.
C_4—30-pf. silver mica.
C_5—5-pf. tubular ceramic.
C_8—6-pf. tubular ceramic.
C_9—5-25-pf. NP0 ceramic trimmer (Erie type 557).
C_{11}—3-12-pf. NP0 ceramic trimmer (Erie type 557).
C_{13}—56-pf. silver mica.
CR_1—Zener diode, 10 volts, 400 mw.
J_1—Phono jack (Switchcraft type 3501FP).
L_1—Nominal 1-µh. coil, 18 turns No. 26 enam. wire on 1/4-inch diam. slug-tuned form, brass core (CTC PLS6-2C2L or equivalent).
L_2—5 turns No. 16, 1/2 inch i.d., length 1/2 inch.
L_3—3 turns No. 14, 1/2 inch i.d., length 3/8 inch.
L_4—2 turns No. 22 solid insulated wire, 1/2 inch i.d., inserted between the turns of L_3.
R_1—12,000 ohms, 10-watt wire-wound.
RFC_1—1.5-µh. molded r.f. choke (Miller 9320-12 or equivalent).
S_1—2-pole, 2-position nonshorting miniature rotary switch.
Y_1—32.5-Mc. 3rd-overtone crystal, parallel resonant, 32-pf. load capacitance, ± 0.005 per cent tolerance (International Crystal type F-605).

type 4103-1 (available through Newark Electronics Corp.), were used for supporting components. These tie points simply press into the hole sizes specified. Regular lug-type terminal strips could be substituted with no sacrifice in performance.

Wiring should be point-to-point, with lead lengths kept to a minimum. The transistors are installed last and are soldered permanently in place. The usual precaution of using a heat sink between the transistor and the solder joint should be observed. Fig. 5 illustrates the location of components within the box.

The finished unit is fastened by two small sheet-metal screws to the cover plate under the transmit-converter sub-unit (see Fig. 3). Resistor R_1 is located as shown in Fig. 3. One end of the resistor is soldered to a 1-lug terminal strip fastened by the front screw of the cover plate previously mentioned. The other end of the resistor is fastened to the extreme rear lug of *TB10*. A wire is then connected from the one lug terminal strip to S_{1B}. A wire from S_{1B} to the power-input feedthrough on the auxiliary injection source box completes the power control connections.

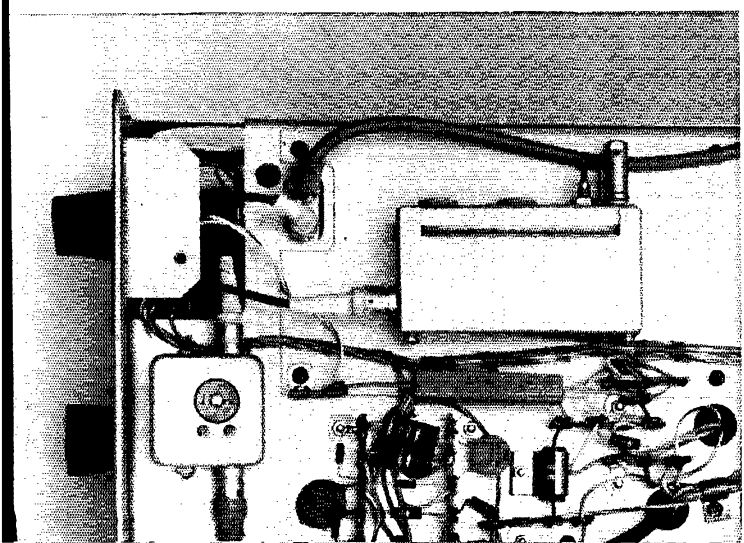
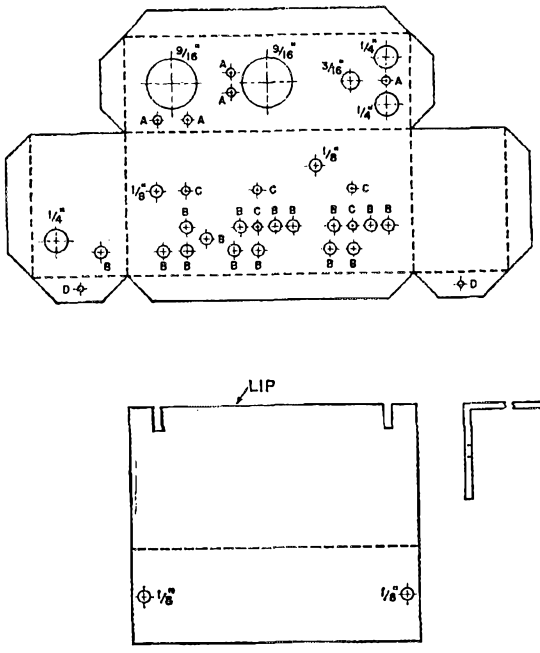


Fig. 3—Auxiliary injection source installed under chassis on the 62S-1. Two sheet-metal screws fasten the unit to the cover plate for the amplifier subassembly. Phono plugs connect the adapter into the 62S-1 transmit injection system. Resistor R_1 is visible just below the injection source box.

Fig. 4—Chassis layout and template. This is a half-scale drilling template. It can be copied in full scale and pasted on the metal. When bending is completed, the template should be on the inside of the box. *A* holes are No. 33; *B* holes are No. 27; *C* holes are No. 40; and *D* holes are No. 43 (numbers refer to drill sizes).



Switch S_1 is enclosed in a cut-off shield can (Miller S32) and fastened by a small bracket to the bracket that holds the two lights behind the 62S-1 main dial. Three ten-inch lengths of RG-174/U miniature coax run from the switch and shield can to *J32* on *FL-2*, *J18* on the injection input to the transmit converter, and to J_1 on the auxiliary injection source. Phono plugs on these cables allow each lead to be simply plugged into its respective jack.

Tune-Up

With S_1 in the NORMAL position tune up the 62S-1 at 144.1 Mc. Turn S_1 to the AUXILIARY INJECTION position and peak C_9 and C_{11} for maximum power-amplifier grid-current on the 62S-1 PA grid meter. Set the slug of L_1 in the middle of its range. If a close check of calibration accuracy is desired, switch from NORMAL TO AUXILIARY INJECTION while listening to the transmitted signal on another receiver. Tune L_1 until the signals are on the same frequency.

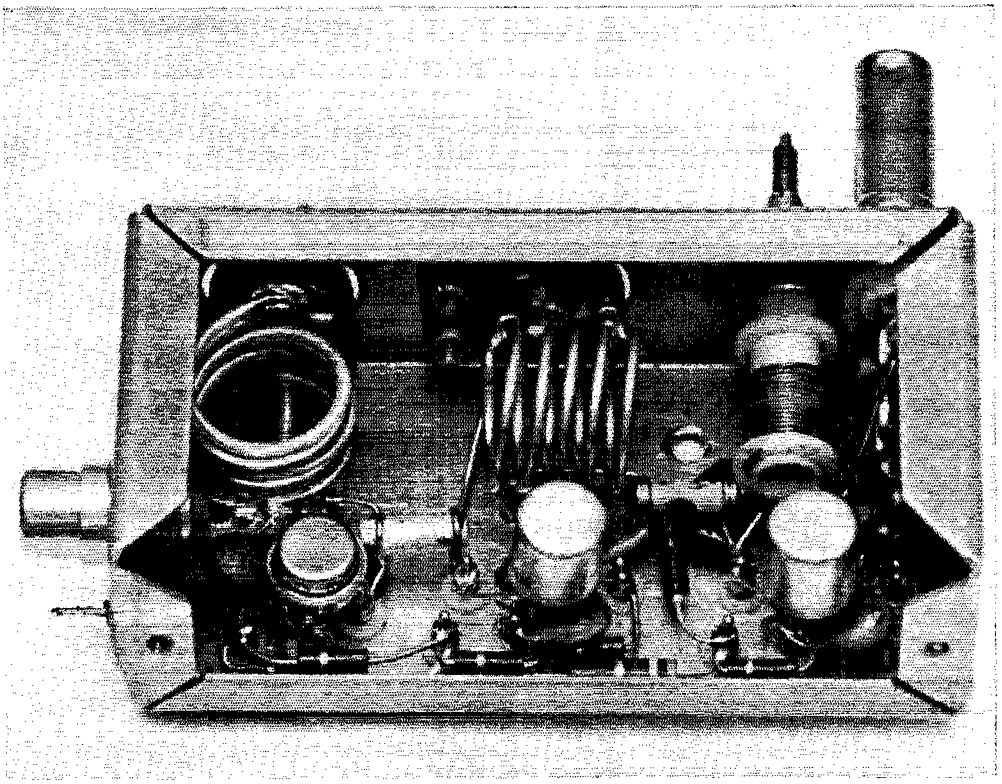


Fig. 5—Interior view (enlarged) of the auxiliary injection source. L_1, L_2 and L_3 are along the rear wall from right to left. The Zener diode, CR_1, is close to the coupling capacitor between Q_1 and Q_2. A small Teflon feed-through insulator on the left end of the box, just under the phono jack is used as the power-input terminal.

If grid drive in the 62S-1 is too high with the external injection source move L_4 away from L_3 until the desired level is reached. If insufficient grid drive is available it may be necessary to adjust *C144* located in *FL-2* just slightly to compensate for the added capacitance of the coax cable. For complete adjustment of *FL-2* refer to paragraph 4.4.6 in the 62S-1 instruction manual. This trap is used only to eliminate the 148-Mc. spurious present when operating in the 148-148.2-Mc. region.

With the switch in the AUXILIARY INJECTION position the receiver may be set to any frequency in the 2-meter band with the 62S-1 main dial and the h.f. receiver dial. The transmit frequency may be set to any frequency between 144.0 and 144.2 Mc. with the h.f. exciter dial.

Two of these auxiliary injection sources have been built and both are operating very well. Stability of the units is excellent. Using Collins "S" Line with 62S-1 a total system frequency shift of less than 100 c.p.s. for ± 10% change in line voltage was measured. Warm-up drift is virtually nonexistent in the injection source.

Thanks are due Doug Horner, WØHUF, for the photographs used in this article. QST

RECORDING OSCAR III

It was mentioned in July *QST* (Gabrielson and Tellefsen, "Experimenting with Oscar III") that it would be desirable to study the relative frequency distribution and number of stations using Oscar III at a given pass. It would also be of interest to know the relative strength and mode of modulation. Though I haven't had time to develop the following technique myself, I am sending a general description so others may not be delayed if they desire to develop it for the up-coming launch of Oscar III.

The best way to study the frequency distribution and modes of operation of a number of stations in a given band is with the use of some type of panoramic adapter or receiver. However, it would be impossible to keep track visually of a large number of signals, and it would be fine if we could record the scope pattern easily for leisurely analysis at a later date.

In my case, I plan to modify an old HE-10 receiver for variable amounts of sweep up to 200 kc. I plan to do this by bridging the r.f., mixer, and oscillator tuning sections with voltage-variable capacitors. These diodes will be driven by a saw-tooth signal taken either from an external generator or from the deflection circuit of the display scope. (A saw-tooth signal must be used, naturally, if we are to obtain a linear display on the scope.) If the driving signal is approximately 60 c.p.s. one can easily see, by taking into account the bandwidth of the receiver, that the audio output of the receiver could be recorded (along with a sync pulse) on an ordinary tape recorder. Reproduction of the scope display would involve no more than playing the tape into the vertical amplifier of the oscilloscope and locking the scope in sync with the recorded pulses.

Applying a marker signal to the receiver during a pass of the satellite would allow you to determine the doppler shift by comparing the beacon pip from the satellite with the pip from the calibrator. Since the

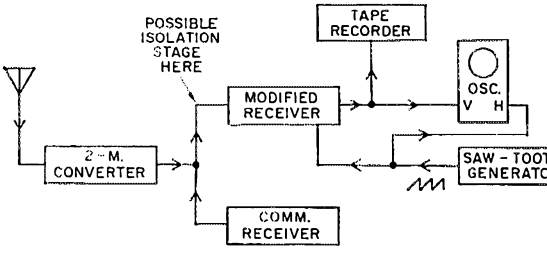


Fig. 1—Proposed equipment arrangement for recording panoramic reception of Oscar III.

Doppler shift will be much smaller than the total sweep, it will be necessary to "blow up" that portion of the sweep by adjusting the horizontal gain and positioning to facilitate measurement.

By using another receiver along with the sweeping receiver you can go about normal reception while recording the entire transmitted band. The two receivers should have different first i.f.s in order to avoid generation of beats by the h.f. oscillators. The main interference problem would be a possible buzz caused by the loading as the sweeping receiver passes through the frequency to which the communications receiver is tuned. This could be eliminated by using a broad-band amplifier stage for isolation.

Of course, you would be unable to determine the call of a station by its pip on the scope, but you will have a panoramic view of the spectrum which you can play back at will. — *Charles Flink II, W.15BMF*

(Those who now have panoramic adapters on their receivers need only record the audio output of the adapter as it is applied to the vertical plates of the adapter scope. The tape can then be played back on a regular oscilloscope. — *Editor.*)

SLOW-SCAN VIA OSCAR III

DON MILLER, W9NTP, Waldron, Indiana, plans to transmit a picture on 144.1 Mc. using the Macdonald slow-scan system (*QST*, January and February, 1961) to Oscar III during its passages in his vicinity. When processed by the translator, this will come out as 145.9 Mc. The range over which the signal might be heard will depend on a number of factors discussed in August 1964 *QST* (Orr, "Using the Oscar III Communication Satellite"). The slow-scan signal can be taken out of the audio jack of the receiver and recorded on tape with any equipment capable of responding to modulation frequencies up to 2500 c.p.s. W9NTP will appreciate receiving tapes from anyone who picks up the signal, and will decode them on his reproducing equipment. Circuits for making your own reproductions were described in March 1964 *QST* (Macdonald, "A Compact Slow-Scan TV Monitor").

W9NTP plans to transmit Oscar III tracking information for the Indianapolis area on 147.3 Mc. f.m. Amateurs in other sections who expect to be within range of the Oscar-relayed transmissions can use the prediction method given elsewhere in this issue.

The "Telematch"

Full-Power Transmitter Tuning Without QRM

BY BYRON GOODMAN,* W1DX, AND WALTER LANGE,* W1YDS

"Telematch" isn't "matching at a distance" as the name suggests; it is "tell-a-match", a method for correctly tuning your antenna and loading your transmitter, at *full power*, without causing undue QRM. The article also describes how to build a low cross-talk coaxial switch from readily available parts.

It is well known that most amateurs are noble souls who never tune up their transmitters at full power in any of the bands. What is not quite so well known is how the blazes they avoid it! All of the available publications (including ARRL) suggest the use of a dummy load for testing, but none of them tell how to transfer the delicate adjustments acquired with the dummy load to the transmitter-antenna connection without a full-power signal being transmitted on the air. The "Telematch" principle to be described enables one to correctly load his transmitter while it is running *at full power*, without sending out more than a fraction of a watt on the air. While it is readily admitted that a fraction of a watt can at times cause serious QRM, it has been established that, all other things being equal, a fraction of a watt will never cause as much QRM as 700 watts. So at least Telematch is a step in the right direction.

The amateur stations the Telematch is addressed to are those currently using an antenna tuning unit ("Transmatch", commercial "Match Box", or what you will). This tuning unit is used to present a 50- or 75-ohm load to the transmitter proper, as indicated by a Micromatch or Monimatch or other indicator that operates at full transmitter power. We have nothing to offer the other type of station, the one that omits a tuning unit for any of several *un*valid reasons.

The basic idea behind Telematch is shown in Fig. 1. Normally, with S_1 set at NORMAL, the transmitter output runs to the antenna via the antenna tuning unit. When S_1 is flipped to the TUNE position, the dummy load is connected to the transmitter and the input side of the antenna tuning unit is connected to a *sensitive* s.w.r. bridge. A small portion of the transmitter output is used to check the s.w.r. looking into the antenna tuning unit. The level for the s.w.r. bridge is adjustable, so that the same Telematch can be used over a wide range of power levels. The transmitter is tuned for normal operation into the dummy load. The antenna tuning unit is adjusted for zero reflected energy (1.0 s.w.r.) at the same time. When S_1 is returned to NORMAL, the transmitter is correctly loaded, and all current readings and capacitor settings will be the same as they would be if transmitter had been tuned *on the air at full power*.

How can one be sure? What about the dummy load? Maybe it isn't perfect.

The dummy load doesn't have to be perfect; any reasonable one will do. The important thing is to match the s.w.r. bridge to the dummy load. In other words, each Telematch is custom-tailored to a particular dummy load. Then when the antenna tuning unit is set for minimum s.w.r., it presents the same load to the transmitter that the dummy load did.

The s.w.r. bridge is a simple resistance bridge that has been in the *Handbook* for years. It is a low-level device, which is why it has not been used as widely as the more rugged Monimatch or Micromatch. However, in the Telematch application it is a natural.

Growing Pains

We had great hopes for using a simple commercial switch in the Telematch, and the first model was built with a regular rotary ceramic switch. The unit showed promise but it was not good enough by critical standards. The fault was traced to r.f. "getting in the back door" of the s.w.r. bridge, so that a composite balance instead of a true balance was being obtained. A four-pole commercial-switch version was built, with the two extra poles employed to ground the connecting link. Once again we got close to the objective but there was still evidence of a composite balance.

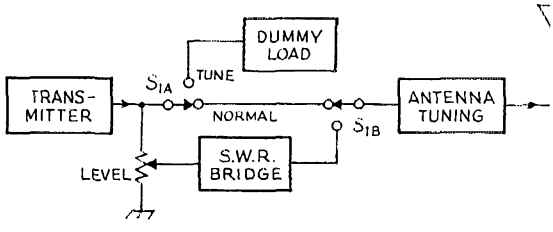


Fig. 1—Basic principle of the Telematch. The transmitter is tuned up with a 50-ohm dummy load. A small fraction of the transmitter output is used to adjust the antenna tuning unit, using the sensitive s.w.r. bridge as an indicator. The s.w.r. bridge shows s.w.r. = 1.0 when the antenna tuning unit presents a 50-ohm load.

Reconciled to the conclusion that the switch would have to be built from scratch, we cast around for suitable contact materials. Some test clips made by Grayhill looked like they might do the trick. A letter to the company was answered

* ARRL Technical Department

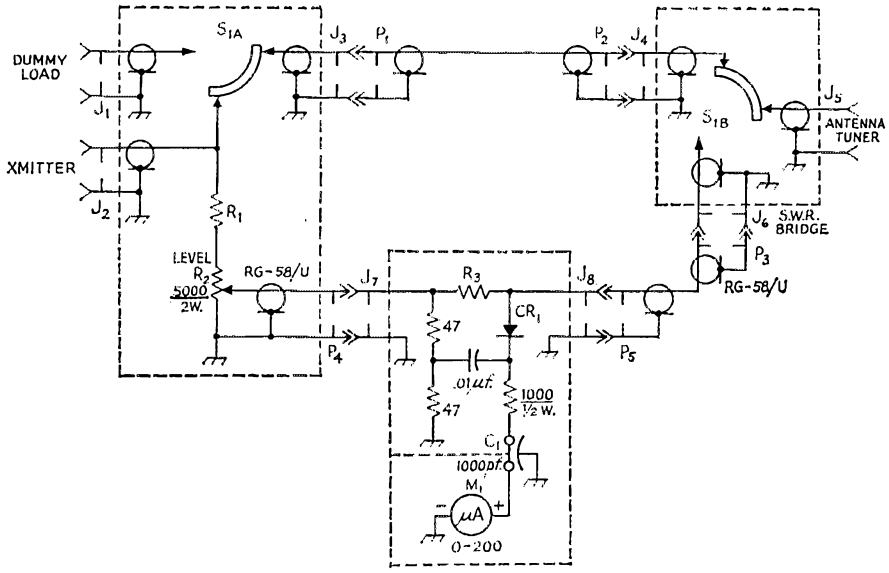


Fig. 2—Practical circuit diagram of the Telematch. Resistors are 1-watt composition unless specified otherwise.

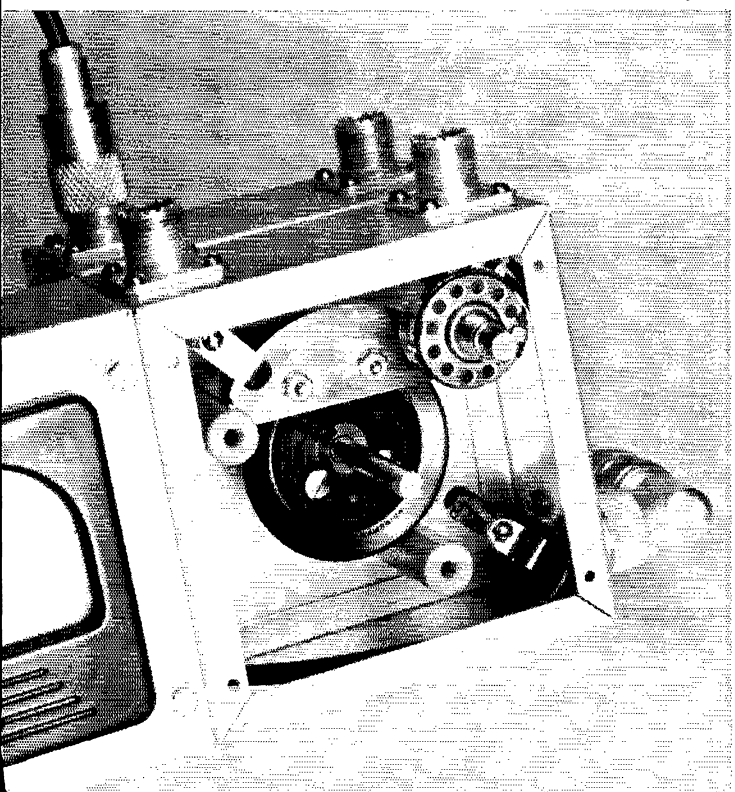
C1—1000-pf. feedthrough (Centralab FT-1000).
CR1—1N34A or equivalent.
J1-J6—SO-239 coaxial receptacle.
J7, J8—Phono jack.
M1—0-200 microammeter (Triplett Model 327).
P1, P2—M-359 90-degree adapter, connected by Dow-Key DK60-P connector.
P3—PL-259 plug with UG-175/U reducing adapter.
P4, P5—Phono plug.
R1—Not required for powers below 100 watts. Above that, approximately ten times the power plus 1000. E.g.; for 500 watts, R1 = 10 × 500 + 1000 = 6000 ohms. One-watt below 5K; 2 watts above 5K.
R2—5000-ohm 2-watt composition, linear (Ohmite CU5021).
R3—Approximately equal to line impedance. See text.
S1—Homemade switch. See text.

with the information that a larger clip, the No. 2-60, was available and might be suitable for our purposes. It was indeed, and since Grayhill clips are stocked by many of the larger mail-order houses, the most serious objection to the home construction of a switch was overcome.

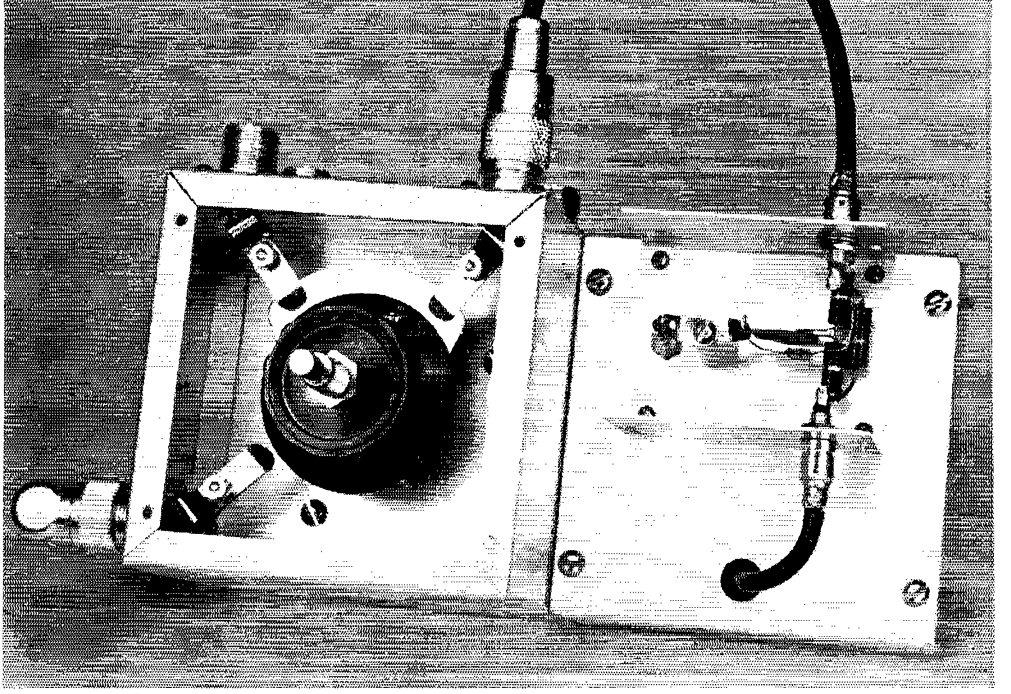
Construction

The several photographs tell much of the story of the construction. Three 4 × 4 × 2-inch aluminum utility boxes (Bud AU-1083) and one 2¾ × 2⅛ × 1⅝-inch "Minibox" (Bud CU-3000A) provide the housings and shielding. The switch rotors are made from knobs (Johnson 116-262) that have their ¼-inch holes drilled through. Segments of brass cut from dial scales are bolted to the knobs.[1] The control shaft, which

[1] The brass used for the switch shown here came from the Johnson knobs, which came from laboratory stock. Currently the Johnson scales are made from aluminum. If the older knobs cannot be found, sheet brass about 0.023 inch thick should be used.



Removing the front cover of the Telematch shows one section of the homemade switch. The ceramic insulators serve as stops for the switch, in the absence of a detent mechanism. Coaxial line (RG-58/U) runs from R2 (upper right) through meter box and out back to s.w.r. bridge (see another photograph). Brass for the switch is part of the original dial. For smooth operation of the switch, the entering edge should be chamfered with a fine file.



Rear view of the Telematch with covers removed. Shaft bushing on extension shaft has been reversed to permit assembly. In the s.w.r. bridge, the three resistors lie close to the metal. The 1N34A diode can be seen adjacent to the 0.01-μf. disk ceramic (edgewise in this view). D.c. is fed through two thicknesses of aluminum via feedthrough capacitor.

extends through two utility boxes, must be flatted with a file for the knob set screws; it was found impossible to prevent the knobs turning on the shaft if this wasn't done. The shaft is a Johnson 115-256-2 with panel bearing reversed; two 115-255 bearings are also used.

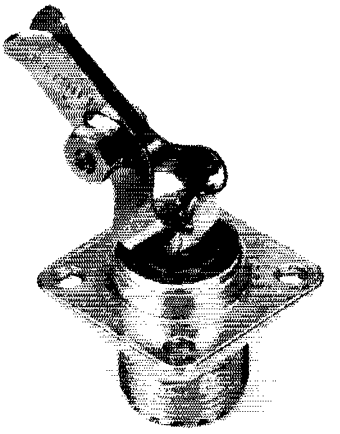
Each switch contact is made from a Grayhill 2-60 clip soldered to an SO-239 coaxial receptacle. Before soldering, a small tab on the clip should be removed (twisted off with long-nosed pliers), and the nickel plating should be scraped off where the clip is to be soldered. A 4-40 screw and two nuts are used to adjust the gap of the clip and to provide a pressure adjustment (see photograph). The clip is soldered to the receptable with the switch rotor material in place, to serve as a soldering jig.

The important thing in the s.w.r. bridge is that it show *no* reflected energy at maximum sensitivity when connected to the dummy load. This is something we can't tell anyone how to do infallibly; we can only report our own findings. We used two dummy loads in our experiments, a Heath HN-31 [2] and a Gentec,[3] and the one s.w.r. bridge sufficed for both without modification. However, the leads in the bridge had to be dressed close to the case before satisfactory results were obtained. It is quite possible that other treatment would be required with other loads and other bridge resistors. The two 47-ohm resistors across the input (Fig. 2) should be of equal d.c. value, but not necessarily exactly 47 ohms. The other resistor, R_3 must match the nominal impedance of the dummy load. The Telematch will only be as good as the s.w.r. bridge, so time spent in improving the bridge is time well spent.

Initially R_2 should be set close to the ground end. It can be advanced to maximum sensitivity when the dummy load is switched in and the antenna tuning unit is close to correct.

Experience will show the setting that can be used during normal operation (transmitter coupled to antenna) without pinning the meter. QST

[2] "New Apparatus", July 1962 *QST*.
[3] "Recent Equipment", August 1964 *QST*.



Detail of the switch-contact assembly. The Grayhill clip is modified (see text) and the compression adjustment added. Clip is soldered to connector after switch is assembled, so that proper alignment is obtained.

Basics for Beginners

The Whys of Transmission Lines

Part II — Standing-Wave Ratio and Line Losses

BY GEORGE GRAMMER*, W1DF

You have seen, in Part I,[1] that the power put into a matched line nearly all gets to the load at the output end. A small amount is used up by the losses in the line itself; this is converted into heat. We are assuming here, of course, that the line conductors are so close together that there is no radiation because of incomplete cancellation of the fields. If the spacing between the conductors is of the order of 1/100 wavelength this is a good assumption, providing the currents and voltages in the line are **balanced.** Line balance means that the current and voltage in one wire are exactly duplicated in the other, except for reversed polarity.

But what if the load connected to the far end of the line does not exactly match the line's characteristic impedance? A case like this falls somewhere between the perfectly-matched condition and the extremes of the open- and short-circuited lines. Some of the power reaching the far end of the line is absorbed by the load, but some of it also bounces back toward the input end. A **mismatch** is said to exist when the load resistance isn't the same as the line's characteristic impedance. The worse the mismatch, the greater the proportion of power reflected back.

Losses

The principal effect here, at least in transmitting, is that the line uses up a little of the power on both the outgoing and return trips. Aside from this, the power that is reflected from the load is by no means "lost". It's like the change you get when you pay for a 69-cent item by handing the clerk a dollar bill. The money returned goes back in your pocket. The reflected power on a transmission line, too, is unused: it simply subtracts from the power the transmitter put *into* the line, and the power input to the final stage is correspondingly reduced.

Even though some of the power is handed back to the generator (the transmitter) we can still put the full output of the transmitter into the antenna. This is simply a matter of the coupling between the transmitter and line. The coupling that would deliver the transmitter's output to a matched line won't do it if the line isn't matched. But by changing the coupling as required, the transmitter can be loaded just as well. A little less power will reach the load than would get there if the load matched the line properly, because of the extra line loss. But the difference on this account is too small to cause any worry, if a low-loss line is used. Even with lines which, when matched, have fairly high losses, the *extra* loss caused by mismatching isn't much if you aren't mismatched by a factor of more than 3 or so.

On a perfectly-matched line there are no standing waves because no power is reflected from the load end. On open- or short-circuited lines there are large standing waves. Along such lines the voltage and current go to zero, or very close to it, at the nodes.

When a line is mismatched, but not open- or short-circuited, there are standing waves because some of the power is reflected. But only *some* of it. The reflected voltage and current can't completely balance out the **incident** voltage and current (the voltage and current traveling *to* the load) at the nodal points unless there is just as much coming back as is going out. Since this is not the case, there are no points of zero voltage and current along the line. Instead, there will be points of *minimum* current and points of *minimum* voltage. Likewise, there will be points where the voltage and current will be maximum.

Standing Waves on Mismatched Lines

If we went along a mismatched line measuring the amplitudes of the current and voltage, without paying any attention to polarity, we would find that both vary along the line. Fig. 1 is typical of what might be measured. The points of maximum and minimum are still one-quarter wavelength apart, as in the cases discussed before. The ratio of the current at *B*, a maximum point, to the current at *A*, a minimum point, is called the **standing-wave ratio.** Measurement of the maximum and minimum voltages would give the same ratio as measurement of current.

If very little power is reflected from the load — i.e., the line is nearly matched — there is relatively little variation in the current and voltage along the line, so the standing-wave ratio — usually abbreviated to **s.w.r.** — is low. The greater the mismatch the greater the reflected power and the larger the **s.w.r.**

* Technical Director, ARRL.

[1] "The Whys of Transmission Lines", Part I, *QST*, January, 1965.

S.W.R. and the Load

It happens that the standing-wave ratio can be measured more readily than the current or voltage, or even the load resistance. So it is customary to measure the s.w.r. in order to find out whether the line is matched. There is a very simple relationship between load resistance, the characteristic impedance of the line, and the s.w.r.:

$$S.W.R. = \frac{R}{Z_0} \text{ or } \frac{Z_0}{R}$$

where R stands for the load resistance and Z_0 stands for the line's characteristic impedance. The reason for the choice in this formula is that it is customary to put the larger number on top, so that the s.w.r. is expressed as, for example, 5 to 1, rather than 1 to 5.

Actually, you don't need to know R at all in making most adjustments of load resistance. If you're shooting for no reflected power — that is, an s.w.r. of 1 to 1, meaning that the maximum and minimum values are the same — you adjust for the smallest possible s.w.r. When you have it you know you're right.

Fig. 1 shows the voltage high and the current low at the load. It could be the opposite. The drawing is for the case where the load resistance is larger than Z_0. The reverse would be true for a load resistance smaller than Z_0. The first case approaches the open-circuited line as R is made larger, and the second approaches the short-circuited line as R is made smaller.

With a mismatched load resistance, as in the cases discussed earlier, the generator sees a pure resistance when the line is some multiple of a quarter wave in length. Thus this same length indicates resonance. At all other lengths the generator will see reactance along with resistance. Table 1 in Part 1 can be used to find the *kind* of reactance, if the short-circuited column is used for loads less than Z_0 and the open-circuit column is used for loads greater than Z_0.

Resistance Only

Finally, a warning: To avoid confusing you with a lot of qualifications, in what was said above we have omitted one very important point. *The load has to be a pure resistance if any of this is to be true.*

Mostly, you will be working with loads that are "pure," or nearly so. You can't get an s.w.r. of 1 to 1 unless the load *is* a pure resistance; any reactance in it throws the whole thing off. So if you've been able to get the s.w.r. to 1 to 1 or close to it, you can take it for granted that the line behavior will be as described.

Practical Lines

Quite a few varieties of manufactured transmission lines are available. The ones that are of interest to amateurs are usually in stock at radio supply stores, since they are also used for television receivers. There are two general types. One is the parallel-conductor type we used for purposes of discussion in Part I. The other is the **coaxial line.** This also has two conductors, but one of them is a tube and the other is a wire centered in it.

The coaxial line, familiarly known as "coax" (pronounced with two syllables), obeys the same laws as the parallel-conductor line. All we have said so far applies to both types of line. However, the coax line has some distinctive features. The current is carried by the inner conductor and the *inside surface* of the tubular outer conductor. The *outside* surface is "cold" for r.f., if the line is properly used. In other words, the active part of the line is shielded from outside influences. This means, too, that there can be no radiation from the inside of the line.

Substantially all coaxial line in use by amateurs is the flexible type having a braided-wire tube for the outer conductor. Multistrand wire is often used for the inner conductor, although in some small-diameter lines a solid wire can be used without affecting the flexing. The insulation between the two conductors is a flexible solid plastic — polyethylene.

Velocity Factor

The presence of this solid insulation does two things: It increases the power loss, as compared with air insulation, and it reduces the speed at which power can go through the line. This means that the wavelength in coax cable is shorter, for the same frequency, than in air. The formula for

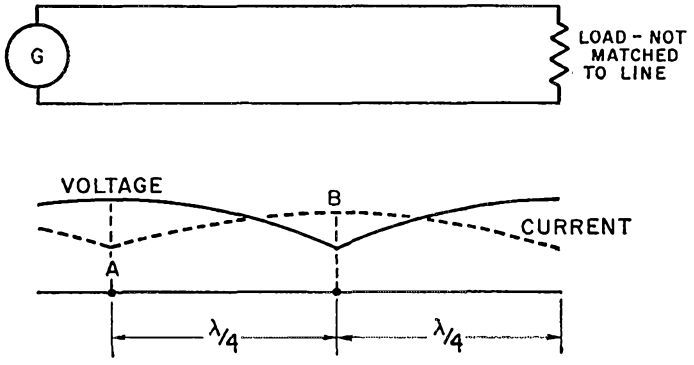


Fig. 1—The standing-wave ratio is the ratio of the current amplitude at *B* to that at *A*, or of the voltage amplitude at *A* to that at *B*.

Table I
Transmission Lines

Type	*Description*	*Characteristic Impedance, Ohms.*	*Velocity Factor*	*Matched Loss in Db. per 100 Feet*						
				3.5 Mc.	*7 Mc.*	*14 Mc.*	*21 Mc.*	*28 Mc.*	*50 Mc.*	*144 Mc.*
RG-58/U	Small coaxial	53.5	0.66	0.68	1.0	1.5	1.9	2.2	3.1	5.7
RG-59/U	Small coaxial	73	0.66	0.64	0.9	1.3	1.6	1.8	2.4	4.2
RG-8/U	Medium coaxial	52	0.66	0.3	0.45	0.66	0.83	0.98	1.35	2.5
TV Twin Line, Standard	Parallel-cond., solid insulation	300	0.82	0.18	0.28	0.41	0.52	0.6	0.85	1.55
TV Ladder Line, 1-in. spacing	Parallel-cond. air-insulated with spacers	450	*	*	*	*	*	*	*	*

* Not known. Velocity factor approx. 95 per cent. Losses very low in comparison with solid-insulation types.

wavelength given earlier has to be modified by a correction factor, called the **velocity factor,** on this account. For polyethylene-insulated solid-dielectric coax the velocity factor is 0.66. A line one-half wavelength long at 7.1 Mc., for example, would be 0.66 times 69.4 feet (a half wavelength in space), or 45.8 feet long.

Line Losses

If we should divide a line into sections of equal length and measure the power going in and coming out of each, we should find that there is the same *percentage* loss in each section. Suppose that 100 watts goes into the first section and 10 per cent of it is dissipated in heat in that section. Then 90 watts comes out to go into the second section. In the second section 10 per cent represents 9 watts, so now we have 81 watts left to go into the third section. This section loses 8.1 watts, and so on. This sort of power change is exactly what the decibel represents so nicely, so we can express line loss as so many decibels per unit length. The custom is to give the loss in decibels per 100 feet of line.

The loss becomes greater as we go higher in frequency. Losses in db. per 100 feet for the lines most used by amateurs are given in Table I. These losses are for lines that are properly matched by the load. If there is a mismatch the loss will be higher. However, as we said earlier, the additional loss isn't usually serious unless the mismatch is 3 to 1 — that is, an s.w.r. of 3 to 1 — or more. Even then it is not considerable unless the line has high loss when matched.

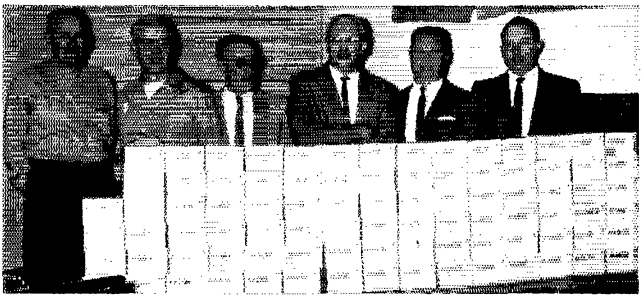
Parallel-Conductor Line

The most common type of parallel conductor line is TV lead-in, consisting of two wires separated by a web of polyethylene approximately ⅜ inch wide. It is sold under several trade names, and has a characteristic impedance of about 300 ohms. As shown by Table I, its losses are lower than the losses in coax. This is true of good-quality line, which you can be sure of getting only when you buy a well-known brand. Some of the "bargain" unbranded line is very poor, so it is best to steer clear of it.

The lowest-loss line available is the ladder type, consisting of parallel wires separated about an inch. The wires are held apart by small rods of polyethylene at intervals of a few inches. Thus most of the insulation is air, which has negligible loss.

There are many other types of line, both coaxial and parallel-wire, than those listed. Some have different characteristic impedances, and a few varieties have lower losses or greater power-handling ability. However, the types mentioned are easy to get, and are satisfactory for most amateur installations of medium power. QST

Strays



The Oldsmobile people have donated more than 33,000 free cards for members of the Central Michigan Amateur Radio Club (Lansing), some of whose officers are pictured here.

Left to right are K8ZNP, W8BQD, W8WWT, W8FSZ, W8VPC and K8BGZ.

Hints and Kinks For the Experimenter

V.L.F. CONVERTER WITH UNTUNED INPUT

THE problem of obtaining coils for use in v.l.f. reception can be solved by not using any inductance whatsoever in the input circuit! Surprisingly good results can be obtained from the simple converter described by K1PNK in "Hints and Kinks," March 1963 *QST*, with the input coil omitted and with a 0.01-μf. capacitor from antenna to ground acting as a sort of low-pass filter. The modified circuit is shown in Fig. 1.

Since the v.l.f. spectrum is repeated on both the high- and low-frequency sides of the crystal frequency, stations strong enough to cause direct feedthrough can often be eliminated as a source of interference by tuning the receiver to the opposite side of zero beat. The 3-Mc. crystal shown in Fig. 1 is a good choice from the standpoint of feedthrough because not too many high-powered signals are present in that portion of the spectrum. As with most transistor circuits, best performance is obtained when the alpha cutoff frequency of the transistor is several times the crystal frequency. Intermodulation, due to overloading of the receiver by the converter oscillator, can be minimized by keeping the supply voltage to the latter as low as possible, consistent with reliable oscillation.

With an antenna of about 100 feet in length, NAA pushes my HQ-129's S meter past "S9." British GBR on 16 kc. is received weakly but consistently, as is WWVL on 20 kc. At higher frequencies, the input capacitor attenuates signals somewhat, but performance remains adequate at 500kc. — *Clifford J. Bader, W8NNL*

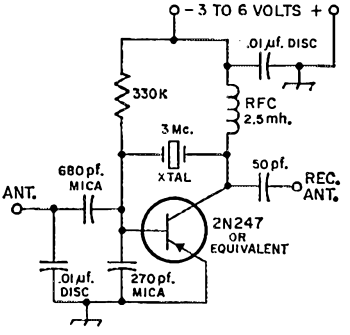


Fig. 1—Diagram of the untuned v.l.f. converter. The resistor is ½ watt. Transistor Q_2 can be most any high-frequency p-n-p transistor.

COMPACT COIL FORMS

INEXPENSIVE double-slug TV-type i.f. coil forms may be halved to provide single-slug forms for compact construction.— *Bela V. Foldesy, W6HCI*

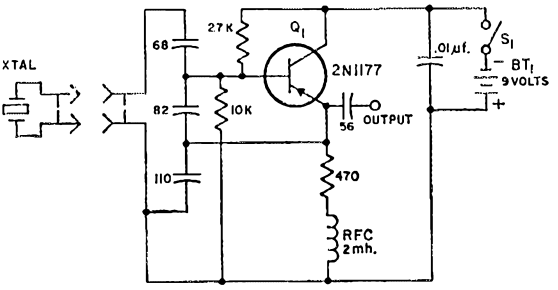


Fig. 2—Crystal test oscillator. Unless specified otherwise, capacitance is in pf., resistors are ½ watt. S_1 is an s.p.s.t. toggle switch.

CRYSTAL TEST OSCILLATOR

THE circuit shown in Fig. 2 was circulated among MARS members recently. It will oscillate with any good crystal having a fundamental frequency between 3 and 20 Mc. No tuning is necessary. The output is sufficient to be heard in a receiver or to be measured with a frequency meter.

The transistor, Q_1, shown in Fig. 2 is very inexpensive. Other p-n-p types may be used, such as the 2N1178 through 2N1180, or the 2N1742. The transistor may be wired in the unit or mounted in a socket. If a socket is used, the device can also be used to check the oscillating ability of different transistors.

The 9-volt battery, BT_1, is the type made for pocket transistor radios. For the best stability, all of the capacitors, except the 0.01 μf., should be silver micas.

During testing, overtone crystals will oscillate on their fundamental. This will be about ⅓ the marked frequency for crystals up to 50 or 60 Mc., and ⅕ that of the marked frequency for crystals marked above 60 Mc.

With a little care, the parts for this unit can be mounted on a 1½ × 2-inch piece of electronic pegboard, such as the Vector Terminal Board type 32AA9, and the whole works squeezed into a Bud CU-3016-A (4¼ × 2¼ × 1½-inch) Minibox. — *William L. Smith, W3GKP*

ANOTHER USE FOR OCTAL TUBE SOCKETS

WHEN breadboarding transistorized circuits, mount the transistor through the center hole in an octal socket and use the pin connections on the socket for tie points. In fact, this arrangement makes for a good permanent mount for transistors in the finished product!

— *Peter A. Franke, K2LTC*

What ARRL Means to Me

BY KERMIT A. SLOBB,* W9YMZ

During its 50th anniversary year of 1964, the League conducted a Golden Anniversary Essay Contest on the subject which titles this article. W9YMZ's entry won second place — a desk pen trophy and a cash award. In subsequent issues *QST* will publish the other winning essays.

THE question at this national amateur radio convention is. . . what does the ARRL mean to you? Let's ask this man right here. Sir? Have you heard the question?"

"The ARRL means nothing to me. I'm a c.w. man and the ARRL devotes entirely too much time in *QST* to phone."

"The ARRL means nothing to *me*. I am a phone man, and the ARRL takes up too much space in their magazine *QST* talking about single sideband."

"And you, sir?"

"The ARRL means nothing to me, either. I'm a sidebander, and the ARRL does entirely too much yakking about radioteletype."

"The ARRL? Radioteletype is what I love, and you should read that *QST*. . . nothing but ads!"

"Don't ask my opinion of the A-double-R-L. All I ask from a magazine is lots of advertisements so I can keep up with the new gear. And what do I get? Contests!"

"ARRL? Don't believe in 'em. My forte in amateur radio is contests. I love 'em. . . OM-YL, Sweepstakes, you name 'em. But all that *QST* is filled with is news about the FCC."

"Are you asking me what the ARRL means to me? Well, buddy, I'll tell you. All I ask of an organization is to keep me posted on the rules and regulations of the FCC, and this ARRL does nothing but fill its magazine with junk about building new equipment!"

"In answer to your query, my greatest thrill in amateur radio is the joy of building, the smell of a hot soldering iron, the snip of sidecutters through new wire. The ARRL has absolutely nothing in *QST* about building, only those long lists of DX hounds."

"The ARRL did you say? Nothing. I love DX, chasing those rare ones is my specialty, and *QST* is filled every month with garf about v.h.f. Who wants to work next door?"

"I'd be glad to comment on the ARRL. In my opinion, they spend entirely too much time in their magazine talking about what happened fifty years ago. V.h.f. . two meters. . that's my dish!"

"What does ARRL mean to me? Forget it, Mac. With my two-letter call on this lapel pin you can see I'm an old-timer, and I like what *QST* says about the good old days. But they take up too much space plugging them dad-ratted beginners and novices. Don't they?"

"Gee, I don't know much about ARRL. I'm a novice and everything in *QST* is great. Except all that talk about high-priced equipment."

"ARRL? Atrocious! I have a full-time man servicing the tens of thousands of dollars worth of equipment in my rotating ham shack and *QST* magazine ignores me and prints columns and columns about YLs."

"My husband says I shouldn't be quoted, but I do think the magazine from cover to cover is nothing but propaganda about their organization. See!"

"Well, I'm a Section Communications Manager now, and I would like to run for director. My group spends entirely too much time on messages and traffic."

"Me, I'm a traffic man, earned over a hundred BPL certificates in the past five years alone, but my complaint is about all that time devoted to QSLs."

"My entire time is devoted to handling QSL cards for the eleventh district, so I haven't much time for other aspects of amateur radio. And my only complaint is about the tremendous amount of space wasted on mobile gear in *QST*."

"Mobile is the greatest. . . it's those guys with all their talk about emergency communications that bug me."

(*Continued on page 136*)

* 1605 Oakwood Rd., Northbrook, Ill. 60062

W9YMZ (center) receives an engraved desk pen set, in recognition of his winning second place in the essay contest, from Central Division Director Philip Haller, W9HPG. The presentation was made at the 1964 meeting of W9DXCC whose chairman, Steve Hritsko, W9SFR, is at left.

Operating the Teleprinter

Codes, Speeds, Keyboards and Loop Circuits

BY IRVIN M. HOFF,* K8DKC

This second article of a series on RTTY by K8DKC describes the signal generated by the Teletype machine and used by it in printing the received message, and tells how to hook up a "local loop" for giving the machine a workout without radio connections. It also discusses keyboard arrangements and other features of different models of teleprinters. The next article will take up the receiving demodulator.

Teletype Codes

In order to transmit information electrically, codes have been devised to convert the alphabet into electrical pulses. Around 1832, Morse proposed the code that has since been known simply as "Morse Code." It involved dots and dashes which were obtained by holding a key down and releasing it. This is called a "binary" (meaning two states) code. The Teletype codes that we are concerned with also are binary.

Either of two systems can be used: (1) "Neutral" keying, where there is current in the line with the key down and no current when the key is up; and (2) "Polar" keying, where there is a change in the polarity of the current with keying — during key down the current flows in one direction in the line and with key up the direction is reversed, without change in the current amplitude.

Both systems are used in the process of setting up an amateur station. We shall discuss this aspect in greater detail later when looking at receiving demodulators (converters) and frequency-shift keyers for transmitters.

The system now known as Continental Morse is based on the dot: one dash equal to the length of 3 dots, one dot length between elements of the same letter, 3 dot lengths between letters of the same word, and 7 dot lengths between words. It has been shown[1] that the *average* length of letters is 9 dots, but the *actual* length ranges from 4 dots for the letter "E" (counting the space between letters) to the equivalent of 22 dots for the number 0. Such a system is called an "uneven length code." As one can easily imagine, it is very difficult to construct an automatic reader to work efficiently on such a variety of characters.

To overcome this, the "5-unit" code was devised. Five consecutive pulses in a binary system (where any pulse may be either "plus" or "minus") give 32 possible combinations ($2^5 = 32$). Since all pulses occupy the same length of time, this is called an "even length" code.

With such a code some form of timing is necessary so that each of the impulses may be properly received, identified and interpreted at the receiving station.[2] The early machines required great precision in the adjustment of the motor speed at both ends in order to remain in synchronization. The "start-stop" system now in use provides the necessary timing, although recently some systems have reverted to the synchronous method. (These systems are of little interest to the amateurs, since the FCC rules clearly state that a normal start-stop system must be used.)

The fact that the 5-unit code has only 32 characters available has posed a hardship on the alphabets of some countries, and in any event has limited flexibility. Many other codes are in service using more units than five. For example, the stock ticker and the teletypesetter machines each have their own separate 6-unit codes. However, the FCC rules for amateurs spell out use of a machine using the 5-unit code.

In regular teleprinter practice, a "start" pulse is added in front of the 5 units of information and a "stop" pulse is added at the end, making a total of 7 pulses. This is called a "start-stop 5-unit code." For the 60-word-per-minute-speed amateurs are allowed in this country, normal pulses are 22 milliseconds in duration. The stop pulse is 31 ms., which is 1.42 times as long as a regular information pulse. Thus we have a total time of 163 ms. for each character typed, as shown in Fig. 1. This gives a total of 7.42 pulses per character in the American system. This has at times been erroneously referred to as a

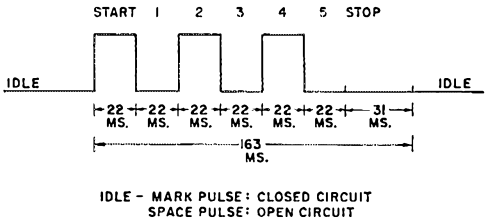


Fig. 1 — Standard 5-unit code consists of six 22-millisecond intervals followed by one 31 ms. long, occupying a total time of 163 ms. The first and last intervals are "start" and "stop" pulses, respectively. The drawing above shows the mark and space intervals for the letter "Y."

* 1733 West Huron River Drive, Ann Arbor, Michigan 48103.

[1] J. W. Freebody, *Telegraphy*, published by Sir Isaac Pitman & Sons, Ltd., London.

[2] E. F. Watson, "Fundamentals of Teletypewriters," *Bell System Technical Journal*, October, 1938.

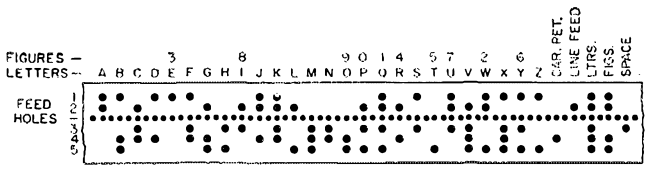


Fig. 2—Teletype letter code as it appears on perforated tape. Start and stop elements do not appear on tape. Elements are numbered from top to bottom, and dots indicate marking pulses. Numerals, punctuation signs, and other arbitrary symbols are secured by carriage shift.

There are no lower-case letters on a teletypewriter. Where blanks appear in the above chart in the "FIGS" line, characters may differ on different machines.

"7.41-unit" code. It is not. The 7.41 is correctly defined merely as the character interval expressed in units of normal pulse length.

The length of the stop pulse helps to control the ease with which the machine stays in correct synchronization should a noise burst or other interference cause it to miss a correct start pulse. In various systems this stop pulse is of different length. In the Western Union system, it is only a regular 1-unit length of 22 ms. In the International system, it is actually 1.50 times longer than normal. In certain military applications where special cryptographic codes are used, a 2-unit (44 ms.) stop pulse is employed; in these systems correct synchronization of the sending and receiving machines is essential because if one letter is missed, the entire transmission must be repeated.

In speaking of the speed of the system, it does not tell the correct story to talk only in terms of words per minute. Instead, engineers have introduced the term "baud." A baud is a unit of keying rate and the baud rate is found by dividing the shortest pulse length into unity. In this case, $\frac{1}{0.022} = 45.45$, usually rounded off to 45.5 bauds. This is the system required for use by American amateurs. The International system uses pulse lengths of only 20 ms. with a stop pulse of 30 ms. This is a "50-baud" system and may not be used by American amateurs under present FCC regulations.

Western Union machines also use a 45.5-baud system, although their stop pulse is only 22 ms. rather than the more usual 31.

Printing Speeds

Fig. 1 shows the construction of a typical character. You will note the stop pulse is 31 ms. long, so this system uses a total time of 163 ms. to complete a character. If we divide one character's time into one minute we get the total number of characters possible in that minute. Since there are 60 seconds in one minute,

$$\frac{60}{0.163} = 368 \text{ characters per minute.}$$

This is more often called "368 o.p.m." (for "operations per minute").

One word is usually thought of as 5 letters plus one space, to total 6 characters. Thus

$$\frac{368}{6} = 61.3 \text{ w.p.m.}$$

This is normally rounded off to be called a "60 w.p.m." machine.

Table I lists various speeds used throughout the world. You will notice that all speeds use the standard 5-unit code. Although the International machines go 66.6 w.p.m. they are not compatible with the American Western Union machines which go 65 w.p.m. The normal 61.3-w.p.m. machines are, since they both use 45.5 bauds.

With a 60-w.p.m. machine all *characters* are sent at the rate of 60 w.p.m., but the actual transmission speed achieved depends on the typing speed of the operator, when using the keyboard direct. With punched-tape transmission it is possible to operate at the normal speed continuously.

Since this is a start-stop system, the actual shaft speed of the motor is faster than the 368 o.p.m. In fact, with the 1-unit stop pulse used by Western Union, one gets 390 o.p.m. The shaft speed actually is made greater than that figure to allow for correct synchronization.

Table I

Some of the Teleprinter Speeds in Current Use

W.P.M.	*Bauds*	*Signal Length*	*Unit Code*	*Stop Pulse*	*O.P.M.*	*Character Interval*
65	45.5	22 ms.	5	1.0 (22 ms.)	390[3]	7.0
62.5	45.5	22 ms.	5	1.27 (28 ms.)	375	7.27
61.3	45.5	22 ms.	5	1.42 (31 ms.)	368[1]	7.42
57.2	45.5	22 ms.	5	1.96 (43 ms.)	342[4]	7.96
66.6	50.0	20 ms.	5	1.5 (30 ms.)	400[2]	7.5
62.5	50.0	20 ms.	5	2.0 (40 ms.)	375	8.0
75	56.9	18 ms.	5	1.42 (25 ms.)	460	7.42
100	74.2	13.5 ms.	5	1.42 (19 ms.)	600	7.42

[1] Standard American system used by amateurs.
[2] Standard International system.
[3] Standard Western Union system in U.S.A.
[4] Often used by U.S. government agencies for crypto transmissions.

(Editor's Note: In some instances the figures above are mathematically inconsistent to a minor degree. The author assures us, however, that they are the ones actually used in the industry).

Motors

There are two types of motors available: synchronous for regular 60-cycle 115-volt house circuits, and governor motors which may be set independently of the incoming a.c. frequency — and, in fact, run from 115 volts if needed. These latter motors are set by use of a special 87.6-c.p.s. tuning fork, and are to be avoided since one must obtain the fork, make periodic checks for speed accuracy, put up with replacement of carbon brushes, accept the r.f. interference — which invariably destroys weak incoming signals — and put up with frequent nearby television interference caused by the brushes arcing.

With either type of motor, gears are used to turn the shaft of the printer and keyboard at 420.5 r.p.m. This is correctly synchronized down to the 368 o.p.m. by clutches. Thus very accurate speed control is maintained with the sending station.

Synchronous motors are obtainable for around $10 used, but since they run at 1800 r.p.m. and the governor motors run at 2100 r.p.m., different gears must be used when replacing a governor motor. When buying any Teletype equipment, attempt to learn whether it has a synchronous motor. Nevertheless, if the price is low enough, even equipment with governor motors obviously would be worthwhile for purchase.

How the Keyboard Works

When you hit a letter on a regular typewriter no electrical pulses are generated — the letter struck is directly connected to the type bar which then strikes the paper. On a teleprinter it doesn't work this way. It may be difficult at first to realize that the printer and keyboard are actually two entirely separate devices operated from a common motor. The two wires coming from the "keyboard distributor" (device generating the appropriate electrical pulses) can be hooked in the same circuit as the actuating magnets on the printer, in which case the combination operates much like a normal typewriter. However, this *need not be*. For example, you can keep the printer on an incoming signal and concurrently use the keyboard on a different circuit to operate a tape punch. This feature is one of the most difficult for a newcomer to assimilate, as at first it seems quite impossible that one could use the keyboard for other purposes while the printer is running from an incoming signal!

We already stated that in a 5-unit system it is possible to have only 32 characters. As there are 26 letters in the alphabet, this leaves only 6 more that can be used. Or so it would appear. Since there are more numbers than 6, something had to be done.

As a result, we "shift" into upper case for many of these remaining functions, such as numbers and all punctuation. A newcomer's typical reaction is that it seems strange you can't get at least a period or comma without all this extra work. This is readily explained by the keyboard arrangement:

26 keys for the letters in the alphabet
1 key for space between words
1 key for carriage return
1 key for line feed
1 key for up-shift ("Figures" key)
1 key for down-shift ("Letters" key)
1 blank key (seldom used)

total 32 keys.

And that is why *all* punctuation must be done after up-shift to the "Figures" position. Unlike a normal typewriter, where you merely let go of the shift when you are finished, you must tell the teleprinter to come back down. The "Letters" key provides this information. (The "Letters" key is also used to remove mistakes when cutting tape. More on that later.)

Table II — Various Keyboards

Lower Case	*Upper Case*			
	American Communications	*Western Union*	*CCIT No. 2*	*Bell Systems (TWX)*
A	–	–	–	–
B	?	?	?	5/8
C	:	:	:	1/8
D	$	$	Note 4	$
E	3	3	3	3
F	!		Note 1	1/4
G	&	&	Note 1	&
H	#	#	Note 1	#
I	8	8	8	8
J	'	Bell	Bell	'
K	(	(	(	1/2
L	)	)	)	3/4
M	.	.	.	.
N	,	,	,	7/8
O	9	9	9	9
P	0	0	0	0
Q	1	1	1	1
R	4	4	4	4
S	Bell	'	'	Bell
T	5	5	5	5
U	7	7	7	7
V	;	;	=	3/8
W	2	2	2	2
X	/	/	/	/
Y	6	6	6	6
Z	"	"	+	"

Carriage Return (Note 2)
Line Feed (Note 2)
Letters (Note 3)
Figures
Space
Blank

[1] Available as wished by each government.
[2] For page printers.
[3] Also used for erasure of errors.
[4] To operate the answer-back unit.

Types of Keyboards

In the United States we use four basic keyboard configurations. In each, the identical placement is used for lower-case letters. Only the upper-case ("Figures") symbols are varied. The four are:

1) *Bell System business keyboard*. This system is used by most business firms, and is quickly identified by having fractions such as 1/2, 3/4, etc., over certain keys. Many of the machines made

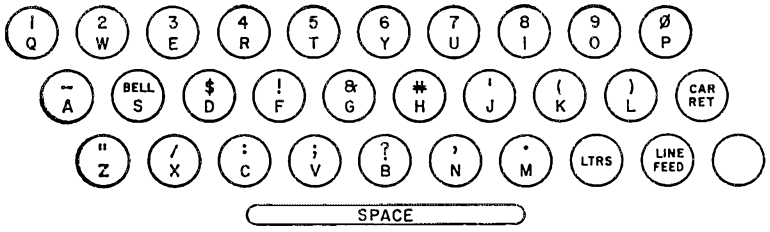


Fig. 3 — Communications-type keyboard. The keyboard resembles that for a regular typewriter, but has only three rows instead of four.

available to amateurs have this type of keyboard. Conversion to communications type is possible.

2) *Weather type.* Many of the upper-case symbols pertain to cloud coverage, wind direction, and other specialized symbols. Again, these can be converted to communications type.

3) *Western Union.* This keyboard fairly closely approximates the American communications keyboard except that the bell sounds from upper-case "J" rather than from upper-case "S," as in all Bell System machines. If you have a machine of this nature it will also run at 65 w.p.m. (390 o.p.m.).

4) *Communications type.* This is the "standard" amateur keyboard and is shown in Fig. 3.

The FCC stipulates that we should use a keyboard conforming to CCIT No. 2 insofar as letters, numerals and slant bar go. You can use anything you want for the remaining "Figures" case. The "standard" American communications keyboard shown in Fig. 3 meets this requirement.

Many machines when obtained do not have the "slant zero" (Ø) which the FCC regulations stipulate. Many owners of these machines use the letter O rather than going into upper case for regular zero, as it appears to them to be the same and is "easier." However, the change to the proper symbol is not difficult.

Unshift on Space

Commercial stations frequently send groups that include many numbers. They want to stay in upper case throughout these number groups. However, a machine of this type is a nuisance to an amateur, because if a false "Figures" symbol is received, the machine will go into upper case and print those symbols rather than the letters it should print. It will stay this way until the local operator somehow gets the machine back into lower case or else, finally, a "Letters" character comes along which accomplishes the same thing.

Most Teletype machines are equipped with a mechanical lever which can be changed to give "unshift on space," so that each time a space bar is touched between words it automatically returns the carriage to lower case, if it happens to be in upper. Then one would not remain accidentally in upper case for more than one word.

Wiring

There are so many different types of machines available that publishing wiring diagrams would be pointless. Usually a classified ad for an instruction book for the particular machine in question will provide the information.

Many machines taken out of service have had the electrical wiring altered over the years for a particular subscriber. Often the machines come with a red jack and black jack dangling from wires about three feet long. The red jack is for the printer and the black jack is for the keyboard.

However, there are only six wires that need interest you:

2 for the selector magnets on the printer

2 for the keyboard contacts

2 for the motor, which are intended for 115 volts a.c.

Actually, all electrical wiring and all terminal strips not connected directly to the above six wires can be removed. This greatly simplifies later maintenance when needed. However, most amateurs just locate the needed connections and never bother to clean out the superfluous wiring intended for wire use on the Bell System. In my case, I use a 2-foot piece of "Ham-M" rotor cable, which is 8-conductor, having two heavier than the rest. I attach an octal plug to one end with its protective cap; the two heavy wires attach to the motor, two others go to the selector magnets and two more to the keyboard contacts. This leaves two extra for other uses, such as remote transmitter control from the printer. This adapter dangles from the machine a few inches. Then extension cords having octal plugs on them can readily be used so the machine can be placed at any convenient point in the room, and all machines are readily interchangeable. Such a system may or may not appeal to the newcomer, but it is one example of a versatile system.

Polar Relays

Polar relays were used in original land-line equipment as isolating devices. Many early amateur converters were designed to utilize the polar relay. However, for a number of years such relays have not been used by either the advanced amateur or most commercial operators. Since they are mechanical they are a constant source of difficulty; they are hard to maintain in optimum condition, being affected by temperature changes as well as by humidity, and wear. They also generate high-frequency r.f. hash because of arcing at the contacts while in transit, and require "bias" voltages which make it difficult to keep the relay properly balanced for mark and space operation. The newer mercury-

wetted types, which have only one coil (no "bias" winding) and through capillary action "make-before-break", are much better, but the writer discourages the use of any keying relays.

Mark and Space

The earlier Morse writing machines used a pen attached to a mechanical arm. On dots and dashes the pen would make a mark on the paper in ink. Between the marks would be spaces where the pen wrote nothing. This soon became known as "mark" and "space," and we keep the same terminology for RTTY. "Mark" is the condition in which the circuit to the printer is closed and current keeps the selector magnets closed. "Space" occurs when this circuit is opened momentarily and the selector magnet releases. "Marking" is equivalent to "idle"; the motor runs, but otherwise the machine is quiet.

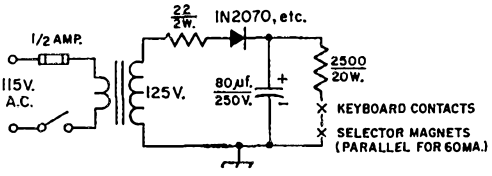


Fig. 4 — Local loop circuit. This can be used for checking machine operation or typing practice. The transformer should deliver 50–60 ma. at 125 volts (Stancor type PA-8421 or equivalent).

The Local Loop

A "loop" is nothing more than a closed circuit in which current circulates. A "local loop" is one in which the entire circuit and voltage source is located in the immediate vicinity of the particular machine. It is used for machine adjustment or test purposes, primarily. Other "loops" are those for receiving and for transmitting.

Fig. 4 shows a typical local loop. The large dropping resistor allows high voltage to be used initially to close the selector magnets quickly and yet keep the maximum current in the circuit from exceeding a particular amount — that is, 60 ma.

Selector Magnet Current

There are two identical selector magnets. They have about 100 ohms d.c. resistance and may be hooked in series or in parallel. In either case, each coil should have 30 ma. current through it — thus the choice of 30 ma. or 60 ma. "loops." (You will hear conflicting reports about running 20 ma. rather than 30. Even the Teletype Corporation hates to say which of these two is correct. They prefer the 30-ma. designation but Bell Telephone has been using the 20-ma value in certain series circuits.)

At any rate, with the magnets in parallel the total resistance is 50 ohms. Thus if we use 60 ma. the voltage drop across the magnets is only 3 volts. However, because of the inductance of the selector-magnet coils such a low voltage would not close the selector magnets quickly enough. Since the ability of the machine to copy signals which have been distorted in transmission rests on the portion of the 22-ms. pulse that is available for sampling, we try to get the selector magnets closed as quickly as possible when a current pulse is received. To effect this, rather high voltages are employed in the loop circuit. Some military circuits use up to 300 volts, but a more typical voltage is 120 volts d.c. Voltages considerably less than this can be used, but with some loss in protection against distorted signals.

When operation is at a fixed value of high voltage with a current-limiting resistor, the current can build up considerably faster in a parallel circuit than in a series circuit using the same coils, because the inductance is much smaller. This becomes particularly important when using transistor keyers rather than vacuum tubes, because the available voltage is lower. The 60-ma. loops are also better when several machines are used in series at the same time, and also when the transmitter is keyed directly from a printer rather than from a separate keyboard.

Holding Magnets

The older machines built prior to World War II had "pulling" magnets, which are characterized by a spring, with thumb screw adjustment, connected to the armature of the magnet. The newer types are "holding" magnets and have no such spring. One should try to get the "holding" magnets if possible, as there are no adjustments to be concerned with. The letter "H" is usually stamped on the range-adjustment plate, which is graduated from 0–120 points.

Range Selector

"During transmission over long distances, telegraph signals may become distorted quite badly; thus mark or space pulses may be considerably shortened or lengthened from their correct values. It is essential that the receiving system be capable of receiving and interpreting these signals without error. To accomplish this, the receiving distributor is arranged so that it is sensitive for the reception of the selecting impulse only for a very short time at the middle of each impulse. The exact location of this sensitive period is adjustable in each receiving distributor so that it may have maximum tolerance for receiving distorted signals." [2]

This adjustment is called the "range selector," and it is assumed that the operator will occasionally check the accuracy of the setting. You can check the adjustment quite easily. The selector has a movable arm which is locked with a thumb screw and moves in an arc over a 0–120 scale. With one hand, quickly type the letters "RY" alternately while adjusting this arm with the other hand. As you approach 10–15 points the machine will no longer print accurately. Remember this setting. Advance the arm toward the

other end of the scale while still typing "RY." At around 100 points the machine will "lock up" and stop printing. Remember this last setting that produced good print, and then place the arm midway between these two settings. The easy way is to add the two settings together, divide by 2 and set for that point. A total range of 80 or more points indicates an excellent system and a machine in good adjustment. With this setting, one can get good copy on at least ±40 per cent distortion.

If the incoming signal has really horrible distortion it is possible that an improvement could be obtained by deliberately misadjusting the range-selector arm. Such a method is discouraged. Some receiving converters can make this correction either automatically or manually.

Actually, the sending station should be told that his signal is badly distorted — sooner or later somebody else will tell him, and certainly if your own signal were poor you would appreciate being notified to that effect.

Receiving International Speeds

Since the International machines normally run at 50 bauds, the pulses are 20 ms. rather than 22 ms. This means that the stop pulse for each character comes some 12 ms. too soon for American printers. By deliberately setting the range selector to sample the initial part of the first pulse instead of the middle, it is possible to copy an International station if conditions are good and the signal is not distorted. However, we should like to point out that such a system is strictly a compromise approach and will give second-rate results. If you really want to copy 50-baud International transmission, a much better solution is to use a "regenerative repeater." These repeaters have an adjustable control for allowing copy of such signals without making any adjustment on your own printer. Regenerative repeaters are sold at the present time on the surplus market for about $40 from several sources. They have many other advantages as well.[3]

Answer-Back

The newer machines have an automatic "answer-back" feature that can be triggered by the operator who pushes an appropriate key; or they can be triggered automatically from the other end, usually by hitting an upper-case "C" key on the Bell System machines ("D" on Western Union). Amateurs disconnect the automatic feature so an erroneous upper-case "C" will not trip it off.

The answer-back can carry any predetermined 19 characters you wish. My unit says "THIS IS IRV K8DKC" and is preceded by a space so I can repeat the message continuously. The answer-back makes a nice means to break into a QSO. The Models 28 and 32 have this optional feature, but the earlier machines, such as the 14, 15, 19, and 26, did not have it.

[3] I. M. Hoff, "Regenerative Repeaters," *RTTY Bulletin*, April, 1964.

Automatic Carriage Return

The Models 28 and 32 have optional automatic carriage return. If the sender neglected to send a carriage-return signal, or it was mutilated in transmission, you would normally "pile up" at the end of the line and lose the information. The "auto c.r." feature eliminates this by automatically returning the carriage and turning up a new line when the end of the line is reached. Kits are available for under $20 to convert the 15, 19 or 26 machines to this feature. It is most worthwhile. The 14, of course, has no need for it.

Non-overline

Many times a false carriage-return signal is received, allowing the printer to print on top of the information it has just typed. This wipes out both the old and the new, and of course is most frustrating. It can easily be prevented by a minor modification of the printer.

If the normal carriage-return function is disconnected entirely, nothing happens when a carriage-return signal is received. The carriage-return lever then can be connected to the line-feed mechanism so that when a line-feed signal is received, it trips both the line feed and the carriage return. K3NIO developed this system and has used it quite successfully. Combined with auto carriage return, it prevents loss of information caused either by accidental carriage returns or the absence of carriage returns. This then gives a machine that allows one to not be present and yet get all the information. It is particularly beneficial during tests on weak signals.

The Teletype Corporation can supply Model 32 machines (new) with automatic carriage return and non-overline features. After once using a machine so equipped, you would never be satisfied with an "ordinary" printer again.

Removing Errors

When using tape equipment, errors can be removed by backing up the tape the appropriate number of spaces and then striking the "Letters" key over the incorrect letter or letters. This punches all five holes in the tape and you then continue as though you had never made an error. When the machine comes to this point in the tape, it does not print anything on the page at all. Thus perfect copy can be transmitted even though the operator has made several actual errors.

If you hit a wrong key while sending with the keyboard, it is customary to space, type several "XXXXX" keys, and then continue. This indicates that the word preceding the "XXXXXs" should be disregarded.

RYRYRYRY

This combination is used for a test, as the "R" key contains the 2nd and 4th pulses, and the "Y" key contains the 1st, 3rd and 5th pulses. Thus all pulses are checked alternately. The "Letters" key contains all five pulses but no

printing is done, so the RYRYRYRYs are used for testing.

Typing

Sooner or later you are going to be faced with the fact that to operate on RTTY you must use your fingers. A few of us had prior experience with typewriters and had already mastered touch typing, but the majority of fellows know little or nothing about regular typewriters. In fact, I am certain that quite a number of amateurs have hesitated to get on RTTY merely because they have no typing ability. This in itself is no problem — everybody has to start sometime, so don't think you represent an unusual case. What *is* strange, however, is that so very little progress has been made by many of the fellows already on RTTY.

The touch system is not at all difficult to learn, but involves doing it — like learning c.w., it is not something you are born with. Although the majority of amateurs follow the "hunt-and-peck" method, using only two or three fingers, there is no reason to be satisfied with such a crude system. You will never enjoy RTTY as you could if you spent even a few minutes attempting to learn the correct use of all nine fingers. (Yes, all *nine* — the left thumb is never used at all, normally.)

The RTTY keyboard is much easier to learn than a regular typewriter. We suggest training yourself to send "THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS BACK" without looking at your fingers or the keyboard, before actually putting a station on the air.

Table III

	Left Hand				Right Hand			
Fingers →	5	4	3	2	2	3	4	5
Top Row	Q	W	E	R T	Y U	I	O	P
Middle Row	A	S	D	F G	H J	K	L	CAR. RET.
Bottom Row	Z	X	C	V B	N M	LTRS	LINE FEED	BLANK

Table III is a chart for the placement of the fingers. The left little finger is placed on the "A" key as an anchor and the right little finger is placed on the "Carriage Return" key as an anchor. You will notice the left index finger and the right index finger each have six letters to use and the other fingers have only three each. The right thumb does all the spacing between words.

With this chart it should not take long for you to type at least as fast as you would with only two fingers via "hunt and peck," and in short order you should quickly exceed that speed. Hook up a local loop to the printer and just sit down and teach yourself the touch system. All it takes is practice!

One note concerning my article, "The Teletype Machine," that appeared in the January 1965 issue of *QST*: Footnote 2 on page 15 should read: *Florida RTTY Bulletin*, published by Fred W. DeMotte, W4RWM, P.O. Box 6047, Daytona Beach, Florida.

(The third article of this series will appear in an early issue. — *Editor.*) QST

Strays

W1NY (left) receives a plaque from K1IJU, president of the Hampden County Radio Association, honoring him for his many contributions to amateur radio*

K4UBF (ex-W8OPX) is currently involved in the design and construction of a unique wheelchair which will be able to negotiate stairs. The patent application included 37 drawings and 65 pages of explanation.

—•••—

While W8LBI was in a round-table QSO which included WA8FCZ, he got a phone call from the post office asking for the address of WA8FCZ. This is a fine coincidence, for otherwise the improperly addressed QSL card would have gone to the dead-letter office, but can *you* count on such luck? No! Better file your call letters and address with the post office, so that incompletely addressed QSLs don't go astray.

—•••—

Raytheon has available a new tube characteristic card file called Fast-Fax, which has the dope on the more common tube types. It is available through Raytheon distributors at $3.95.

—•••—

K9IXS would like to compile a list of high school amateur radio stations. Send them the dope on your school, and include a 5c stamp for your copy of the list. K9IXS, Elkhart High School, Elkhart, Indiana, 46514.

Some Fine Points in Traffic Handling

Part IV: Handling Traffic by Radioteletype.

BY GEORGE HART,* W1NJM

Radioteletype was devised for the purpose of putting communications in writing. Therefore, why shouldn't it be used by amateurs as an ideal traffic handling medium? This is a discussion of some of the special problems involved.

A GROWING number of amateur operators are using radioteletype in their daily operation, and RTTY is becoming more involved in handling record traffic, a use to which this mode is admirably suited. While basic message forms and procedures apply to RTTY just as they do to voice and c.w., there are many special procedures used in RTTY. Most of them arise from the fact this mode automatically converts the intelligence from signal to paper. No intermediate mental conversion is needed, as in other modes.

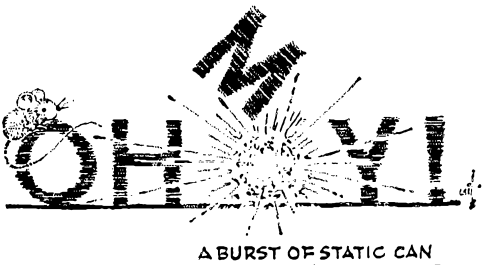
This doesn't mean, of course, that handling traffic by RTTY does not require one to use his head. On the contrary, the use of a proper and standard procedure is just as important here as it is with other modes — and as in other modes, a standard form is required. The differences arise mainly in having the knowledge and skill to operate a teletypewriter (quite a bit different from an ordinary typewriter, as we shall see) so that messages transmitted will, when printed automatically at the other end, be identical with messages received by any other mode, and be readily transferrable from one mode to another.

Some RTTY Basics

RTTY is basically an operation of machines, of which the page printer, the tape reperforator and the transmitter distributor are common to most RTTY stations. The keyboard of the page printer consists of three banks of keys instead of the four on your typewriter, and the machine prints only capital letters; thus, the shift is used for numerals and figures instead of capitalization. One has to get used to shifting to print figures instead of letters, and on some machines to *shifting back* to get letters again. Different machines have different features, just as typewriters do, but the "feel" of a teletypewriter is entirely different and requires some practice. In RTTY, differences in the sending and receiving machines can cause all kinds of discrepancies in the printed copy unless suitable precautions are taken by the operators at both ends.

Collaborator Bud Knight, W6CAL, compares 60-speed RTTY pulse combinations to a bucket brigade sending buckets down the line at a rate fast enough so that 368 buckets (six buckets per word) would pass any point each minute. Maximum information is conveyed when each bucket is full, but a certain number of empty buckets have to go along to convey spaces and non-information functions such as FIGS, LTRS, carriage returns (CR), line feeds (LF) and the like. While they are required, they have the effect of "diluting" the information rate.

Noise acts upon the brigade like shots, capable of spilling buckets, the rate of spilling depending on how far above the noise level the signal is. For any set of conditions, this rate averages a certain number of spills (errors) per unit of time. So if we use a format that includes many non-information (empty) buckets, it will take longer to send the same amount of information and give QRM, QRN, QSB or what have you more time to spill buckets, so the copy will be not only slower, but worse.

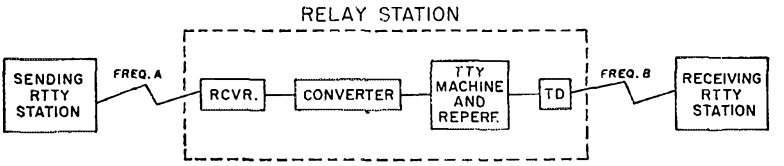


A BURST OF STATIC CAN WIPE OUT A WHOLE LETTER

On the other hand (and let's drop the bucket brigade analogy for a moment), a non-information function that is not received can result in a teletypewriter failing to carriage return so that it keeps right on hammering away at the right-hand stop, or failing to line feed so it starts overprinting, or failing to shift so typing is done in figures when it should be letters or vice versa. So the problem resolves itself into using as many non-information functions as are required in normal conditions, but not over-using them. In marginal conditions, one would be more careful in this respect than in normal conditions, just as one sends slower and repeats oftener if required on c.w. or phone.

Although RTTY may be transmitted manually — that is, typing on the keyboard at one end and receiving on the page printer at the other — it is a rare typist who can maintain the steady maximum of 60 w.p.m. of which most teletypewriters are capable. This speed is achieved through use of tape, which is punched in advance and fed

* National Emergency Coordinator, ARRL.



One of the advantages of RTTY is its ability to relay automatically. The diagram above shows how a properly-equipped RTTY station can be used to relay by using the received signal to operate the teletypewriter and reperforator to punch a tape containing the incoming message which is then fed into the transmitter-distributor for transmission to the destination station.

into the transmitter distributor (TD) for transmission. An incoming signal can cause a tape to be perforated as it is simultaneously being printed by the page printer, so a message received can be relayed simply by feeding the reperforated tape through the TD.

RTTY Message Handling

The above suggests some very important advantages of RTTY in message handling, particularly the constant 60-w.p.m. speed (when tape is used) and the possibility of automatic relaying. There are also methods, known as "autostart," by means of which a transmitted RTTY signal can actuate a receiving station (or several of them) by turning on its machine, printing the traffic, then shutting down the machine so that a receiving operator doesn't even have to be present.

It can readily be seen, however, that RTTY is best employed when there is a considerable volume of traffic between two points, preferably between two stations. Given the stack of traffic at one point and the capability of transmitting it at a steady 60-w.p.m. to the other point, then there are two principal problems: first, collecting it at the transmitting point and second, distributing it from the receiving point. Usually, some degree of versatility will be required on the part of operators at both ends in utilizing modes other than RTTY both in collecting and distributing.

Assuming the availability of traffic at both ends, a number of arrangements can be made for handling it. One already mentioned is automatic relaying, in which an incoming signal perforates a tape which feeds into the TD which actuates a transmitter on a different frequency and relays the traffic to another point within seconds after being received. Such a setup could be used, for example, on a transcontinental circuit with the relay being half way between, when direct reception between transmitting and receiving points is not good enough; or, if necessary, a number of such relays could be utilized with the loss in time being only the few seconds it takes between reperforation and retransmission multiplied by the number of relays.

Although "break-in" is not normally feasible on RTTY, a variation of it can be made available, given the equipment, by establishment of "dual contact" between stations, one by RTTY another by phone or c.w. The phone or c.w. channel can then be used to ask for fills or tape re-runs in case garbling is so bad that this becomes desirable. Thus, while the tape is going through and the receiving printer is chattering away, the two operators can discuss the quality of reception, have the tape stopped in case of interference or fading garbles and part of it run over, or anything else. This is even better than c.w. break-in, but it does require separate transmitter, receiver and antenna facilities.

"Duplex" can also be used, if you have the equipment and enough separation, either in frequency or physical distance or both, between your receiver and transmitter. This consists of sending and receiving at the same time and will require two machines at each location. Naturally, enough separation will have to be present to prevent your transmitted signal from blocking the one you are trying to receive. Where a circuit is so full that there is necessity for both sending and receiving at all times, a "duplex" circuit can handle twice as much traffic as a "simplex" one.

There are many other variations used in commercial and military practice that are possible also on amateur circuits, but generally speaking amateurs do not at present possess the equipment or the facilities, or even the need, to put them to use.

RTTY Traffic Nets

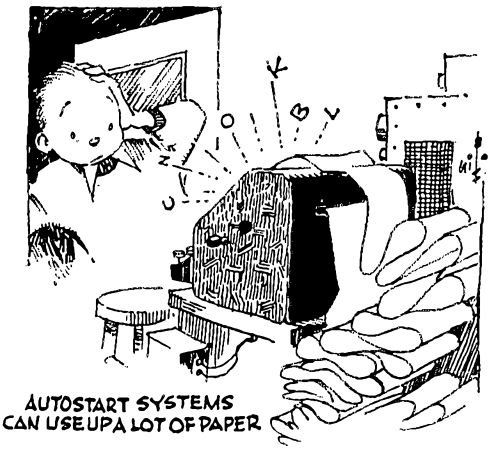
There are at present not a great many RTTY traffic nets, but we expect there will be more of them in the future as use of the mode increases, as it seems destined to as more machines become available to amateurs. Consequently, all we have to go on for net procedure on RTTY are first, the procedure used in amateur nets using c.w. and phone, second, the procedure used in commercial and military RTTY circuits, and third, the procedure used by those few amateur RTTY circuits which do exist. Out of this, we have come up with an RTTY procedure, leaning most heavily on the third of the three factors mentioned. We don't claim perfection for it and don't expect complete agreement among the teletypers, but let's hope we can use it as a basis for standardization.

The NCS opens the net with a call-up and test tape which he runs for about three minutes; such tape might print the following: CQ CQ CQ RATTS NET DE W6CAL W6CAL W6CAL QND QND QNZ QNZ . . . This is followed

by about thirty seconds of uninterrupted carrier on the "mark" frequency for zero beat purposes. This is very important on RTTY because the tuning tolerance is considerably less than other modes received by ear. Then comes the call-up. This may vary considerably from net to net, but one should bear in mind that its purpose is to gather the clan and to instruct them on reporting procedures as briefly as possible. If the net is close-knit and there are not likely to be visitors who don't know the procedure, the call-up can be kept very short, such as: CQ CQ RATTS NET DE W6CAL QNI QNI KKK. If it is an "open" net, as most are, brief instructions such as the following may be included: CQ CQ CQ RATTS NET DE W6CAL W6CAL RTTY STATIONS ARE INVITED TO QNI FOR TRAFFIC AND BULLETINS ON THIS NET OPERATING AT 0400 GMT MONDAY THURSDAY AND FRIDAY. MESSAGES SHOULD BE LISTED BY DESTINATION AND PRECEDENCE AND PRETAPED FOR IMMEDIATE TRANSMISSION IF POSSIBLE. TRAFFIC WILL BE DISTRIBUTED ON THIS NET OR RELAYED VIA THE ARRL NATIONAL TRAFFIC SYSTEM. CQ RATTS NET DE W6CAL QNI QNI KKK.

Stations then check in and list their traffic, much the same as in a c.w. net. For example: W6CAL W6CAL DE K6DYX K6DYX QNI MONTEREY QTC. . . . When all stations appear to be checked in, NCS directs stations with traffic when and on what frequency to transmit it. Usually the net frequency is used, but when there is to be an exchange of several messages, or a batch, they are directed to QNY. (Incidentally, use of Q signals and other c.w. abbreviations is encouraged on RTTY). NCS identifies by sending his call by c.w. (not required to send the other station's call) at least once every ten minutes, otherwise identification exchanges include both his call and that of the station he is calling or in contact with.

With RTTY as with phone, use of a "squelch" on the receiver is practical, and thus a pre-set frequency may be used for continuous monitoring. On v.h.f., RTTY setups use audio frequency shift keying (a.f.s.k.) in which a steady carrier is modulated by an audio tone which shifts its audio frequency just as f.s.k. shifts its radio frequency. Thus a receiver on "squelch" can be activated by the carrier, which can also, with an "auto-start" system, actuate the teletype machine so that any station may transmit messages to other stations even though no operator is present at the latter. The technical details of such a system are outside the scope of this article.[1] Suffice it to say that such a setup is readily feasible with RTTY and is actually in use by some stations, presenting an advantage definitely not available by any other mode. Of course it is not practical on h.f. because there is so much "skip" and so much crowding that any signal, teletype or otherwise, might actuate the equipment and waste roll after roll of paper. On some portions of the v.h.f. amateur spectrum, however, the use of "intercom" communication with "autostart" is practical. This type of setup is not really a net and has no NCS until or unless traffic becomes heavy, at which time a station may assume the role of NCS until things quiet down, after which monitoring with squelched receivers can continue.



Extended use of this type of RTTY presents all kinds of intriguing possibilities in traffic work, as an adjunct to regular station equipment on h.f. Examples: (1) A station may take traffic, say from the section net and shoot it across town by v.h.f. RTTY for immediate relay via another local station to another h.f. net. (2) In emergency operation, when several different stations are each monitoring a different h.f. emergency net, they can transfer traffic rapidly from one net to another through use of such a v.h.f. crossover. (3) For "command" purposes, such a system automatically records every conversation so that there can conveniently be a record of exactly what is said and by whom, far superior to voice circuits in which the content of communication either has to be remembered or laboriously written down by hand. (4) The chattering of an RTTY machine, while it can be distracting, is not nearly as much so as two simultaneous speakers on voice circuits; that is, when two circuits are being operated in a single station, it is better to have one RTTY and one voice than to have both voice.

RTTY Message Format

There are a number of differences between message formats and transmission procedures using the three principal modes of emission — c.w., voice and RTTY. We have already discussed the first two in a previous article.[2] We'll now discuss any *differences* brought about by the use of RTTY, bearing in mind the desirability of standardization of the printed (or written) message.

On phone and c.w., what is actually transmit-

[1] For technical information on RTTY, we refer you to K8DKC's series of articles starting in *QST*, January 1965.

[2] October, 1964, *QST*, pp. 88–90.

ted doesn't always appear on the copy — for example, the many procedural signs (prosigns) used on c.w. and the pro-words used on phone. On RTTY, use of signs and symbols that do not appear on the printed page are restricted to what is available on the keyboard. Every combination of teletype pulses is used for some motion of the teletypewriter carriage, although some of them are not printing motions — for example, space, line feed, carriage return, and the shifts for letters and figures. Nearly every other pulse combination results in a printed letter or figure on the page. The problem is to adapt the format generally used by teletype to use by other modes, and this in turn means the elimination of prosigns that would not be transmitted on c.w. or phone. So any consideration of RTTY message format should meet the following requirements:

(1) Contain all the elements of the standard ARRL format.

(2) Be readily transferrable to phone or c.w. with a minimum of required changes.

(3) Provide uniformity and a practical degree of ease in composition.

(4) Allow the receiving and relaying operators to double check the information which is most critical to accurate delivery.

(5) Resist the effects of poor conditions, atmospherics and QRM.

(6) Employ techniques which are the least susceptible to variations in machines and random errors.

(7) Provide adequate spacing on tape between messages sent manually or from tape to allow the separation of messages recorded on reperforated tape.

(8) Use the minimum practical number of lines on the page so the receiving operator will not have to chase messages down the back of his machine to detect errors — especially when a large volume of traffic is being handled.

(9) Provide adequate, but not excessive, separation between messages on the page for ease of reading.

Quite an order. We thought there wouldn't be much to discuss on this matter until W6CAL started acquainting us with some of the problems involved. Our biggest concern was standardization, his was the best form for RTTY. We think the following sample best meets all the requirements involved:

RYRYRYRYRYRYRYRYRY . . . . . (just a short length of test tape so receiving operator can tune you in for optimum copy, required only before the first message if more than one.) NR 28 R W6CAL CK 25 NORTH HOLLYWOOD CF 0157Z NOV 1 TO JOHN J BROWN 1234 TEMPLE ST EL CAMPO CF TEL 987-6543
BT
DID YOU ASK HOW TO INCREASE TELEPRINTER SKILL QUERY THE
BEST WAY IS REGULAR TOUCH TYPING PRACTICE ON LOCAL LOOP
AND ON AIR X REGARDS
BT
SGD AVERY JONES
CFM BROWN 1234 TEMPLE ST 987-6543 AVERY JONES AR AR

Note that the preamble is identical to that which would be copied by c.w. On c.w. the CK is sometimes omitted, but it can be sent, so no harm in its appearing on the TT printer.

In the address, we balked at the inclusion of the word TO because we thought there was no RTTY reason why this should be included when we discourage it on c.w. and do not write it down on phone. However, on RTTY this short word is a tipoff in case the line feed or carriage return function is lost, enabling the receiving operator to identify the beginning of the address or perhaps even to line feed or carriage return manually before the address actually starts, if he is on his toes. Teletypers transferring a RTTY message to a c.w. circuit will just have to remember not to send the TO when transmitting the message.

The necessity for spacing between the parts of the address poses a problem. Considering everything, if you agree that such separation is necessary (and we old time traffickers have found that it is), the easiest, quickest, most economical way to indicate it on RTTY is to send an extra letterspace.

Always LTRS to unshift a machine before changing lines when the machine is in FIGS at the end of the line (some machines won't CR or LF when in FIGS). One CR, one LF and two LTRS is the standard method of changing lines; the latter provides time for a sluggish machine, or one that "bounces" at the left hand margin, to come to rest before the printing pulses start.

The message should be preceded by not less than ten LTRS, so it is easy to tear between messages on reperforated tape and still leave an adequate leader for insertion in a TD. This advances the tape but makes no printed symbol on the page.

Don't send space to unshift the receiving machine after sending numbers, because the receiving machine may not be set up that way; send LTRS to unshift.

It is customary on phone and c.w. to spell out all punctuation, except to use STOP or X for a period and QUERY for a question mark. Teletypers often use different abbreviations, such as PD for a period, CMA or CMM for a comma, CLN for colon, PRN for parentheses, etc., per military usage. We think PD is an especially bad abbreviation because about 50% of c.w. operators, not being used to it, copy it as AND. STOP has its disadvantages, too. We think the best compromise is X. As for other punctuation, in the text or elsewhere, *avoid it* wherever possible. Nine times out of ten, no punctuation is necessary except a period (X) now and then. *Originators please cooperate!*

This is important! Whatever the originator uses for punctuation is carried through in the same form to delivery. Standardization on this has to be effected by the originator.

Note that the text contains ten words to a line, with an extra space between the fifth and sixth words. This makes it easy to "check the check" to be sure it is correct, and even though it might waste a line here and there, in general we feel it is worthwhile. When ten words exceeds one line we carry over to the next line, indenting

five spaces. Luckily, this doesn't happen often.

The signature line begins with SGD, for the same reason that we begin the address line with TO. It is not sent (neither is SIG *and don't you forget it!*) when transferred to a c.w. circuit.

After the signature line on teletype comes another line not usually included by other modes. Certain types of copy are more subject to error caused by sudden noise or fading than others. In common words and text it is often possible to fill this in or correct it if printed wrong, but unusual names or numbers can easily be garbled on RTTY, so teletypers use a CFM line after the signature line to repeat such things as unusual names, street numbers or addresses, telephone numbers, etc., in any part of the message, in the order in which they were sent. Just make sure the CFM line doesn't change something that was right the first time!

Since much traffic on RTTY is reperforated as it is received (this makes relaying very simple and convenient), the making of changes because of improper format or procedure is decidedly inconvenient. Therefore, frequently an operator will add an "operator's note" manually after the CFM line to point out changes that should be made in the message prior to delivery — for example, a correction of the check, separation of parts of the address, anything else in the message that needs changing before delivery. "Operator's notes" are a pain in the neck on phone and c.w. They are more convenient on RTTY where they can be printed with the message without operator exasperation. Where an operator's note becomes lengthy or cumbersome, let's throw out the reperforation and perforate a new tape; but don't forget relaying operators *never* make changes in message content, only in form if it is incorrect.

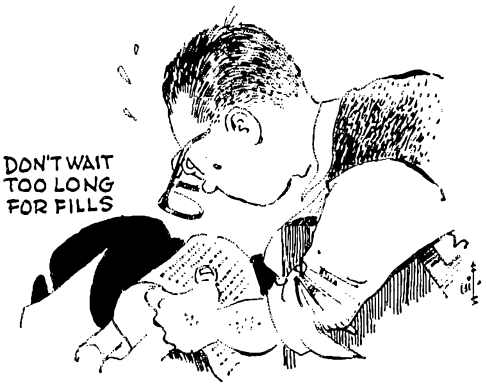
After the AR, send two carriage returns and four line feeds, to leave space between messages. Then send at least ten LTRS, so there will be space at the end of the reperforated tape. If another message follows send ten more LTRS before starting it, so the tape for this one can have an adequate leader. More than four line spaces separation between messages is a waste of paper.

When handling a high volume of traffic, sending five messages at a time is about right. The receiving operator can lift the paper for about that length to scan what has been received; more than that and he has to crawl over the back of his machine.

RTTY Traffic Handlers

The number of RTTY enthusiasts handling traffic is small at the present time, but we suppose the percentage who are interested is just as high in this field as it is among amateurs of other modes — and should be higher, because of the characteristic adaptability of RTTY for record communication purposes, which indeed is what it was originally devised for. It is probably the coming thing in amateur volume traffic handling.

Nevertheless, for a good many years to come we expect most of our traffic will continue to be handled by c.w. as the basis of amateur radio communication, and that proficiency in code will always remain desirable. The necessity for technical (not to mention mechanical) knowledge and skill is, generally speaking, greater for the RTTY enthusiast than for the amateur primarily interested in c.w. results, but the amount of operating skill required is all on the c.w. side. Somewhere in between is a desirable middle point of versatility. An amateur who becomes interested in handling traffic by only one mode and persists in using that mode to the exclusion of all others is far less valuable as a traffic man than one who has the ability and willingness to use two or more modes.



Traffic is traffic, and logically the mode used to handle it should be selected strictly on a practical basis. That is, we should select the mode to suit the need, within availabilities. On this basis, we would think that RTTY would be ideal for point-to-point long haul circuits carrying heavy loads of traffic, and definitely useful for local v.h.f. "intercom" circuits (using a.f.s.k.) with squelch receiving and perhaps "autostart" techniques. Where the preferred mode is not available, of course we use what *is* available, and often we find that more than one mode is available for a single purpose so we use both or all of them.

But one thing we cannot escape: if we are to have an integrated national traffic system we have to have liaison between and among all interest groups, and this means a corps of operators with versatility enough to use more than one or several modes. There are probably many such operators. Will they kindly step forward and offer their services? QST

MEMBERSHIP CHANGES OF ADDRESS

Four week's 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.

Experience—
Technique—
Finesse—

BY JOHN G. TROSTER,* W6ISQ

. . . nr 46 rst 569 de G6QB qrz contest?"

"G6qb g6qb g6qb g6qb g6qb g6qb. . . take ya to the second show, Marge. . . gimme a hour or so. . . want ta work some of these DX fellas in the contest. . . g6qb g6qb g6qb g6qb g6qb g6qb g6qb de w6isq w6isq w6isq w6isq w6isq w6isq w6isq w6isq k k."

" . . . nr 49 rst 569 de G6QB qrz?"

"G6qb g6qb g6qb g6qb g6qb g6qb . . . boy, when I said '*work*', I wasn't foolin' . . . g6qb g6qb g6qb g6qb g6qb de w6isq w6isq w6isq w6isq w6isq w6isq w6isq k."

" . . . nr 51 rst 569 de G6QB qrz?"

"Hmmmmmmm . . . g6qb g6qb g6qb g6qb g6qb . . . pfffhhheeeeeewww . . . g6qb g6qb g6qb g6qb g6qb de w6isq w6isq w6isq w6isq w6isq k."

" . . . nr 53 rst 569 de G6QB qrz?"

"Q6qb G6qb g6qb g6qb g6qb g6qb . . . I'm gonna have to go into training . . . hummpfffhhh . . . g6qb g6qb de w6isq w6isq w6isq w6isq w6isq k."

" . . . nr 54 rst 569 de G6QB qrz?"

"I'm catchin' up . . . g6qb g6qb g6qb g6qb g6qb g6qb de w6isq w6isq w6isq k."

" . . . nr 55 rst 569 de G6QB qrz?"

"G6qb g6qb g6qb g6qb . . . think I'm closing in now . . . g6qb g6qb de w6isq w6isq w6isq k."

" . . . nr 56 rst 569 de G6QB qrz?"

"Ha once again now . . . g6qb g6qb g6qb g6qb de w6isq w6isq w6isq k."

" . . . 6LDD nr 57 rst 569 G6QB qrz?"

"I'm gainin' on him . . . g6qb g6qb g6qb de w6isq w6isq w6isq k."

" . . . WA6SBO de G6QB nr 58 rst 569 G6QB qrz?"

"Maybe my antenna blew down . . . g6qb g6qb g6qb de w6isq w6isq w6isq k."

" . . . K6OHJ de G6QB nr 59 rst 569 G6QB qrz?"

"I'm poopin' out . . g6qb g6qb de w6isq w6isq k."

" . . . W6WB de G6QB nr 60 rst 569 de G6QB qrz?"

"They said this was fun . . . g6qb de w6isq w6isq k."

" . . . W6EBG de G6QB nr 61 rst 569 de G6QB qrz?"

"I'm bushed . . . g6qb de w6isq k."

"W6ISQ de G6QB nr 62 rst 589 de G6QB qrz?"

"Well, for . . . and I only called . . . and signed . . . and . . . wonder how come he kept goin' back to all them other fellas all that time when he was given them a S6 and . . . me . . . a . . . S7? Maybe if I . . . "

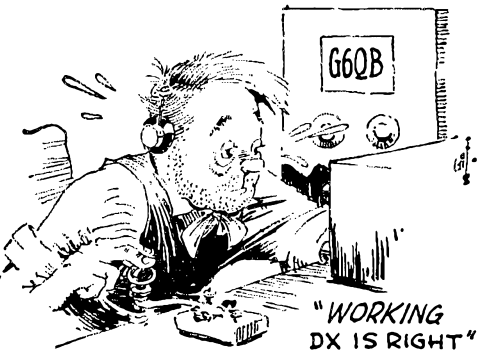
" . . . nr 82 de YV1DP qrz test?"

"Back to *work* . . . yv1dp yv1dp yv1dp yv1dp yv1dp yv1dp yv1dp yv1dp yv1dp de w6isq w6isq w6isq w6isq w6isq w6isq k."

" . . . nr 85 rst 579 de YV1DP qrz?"

"Oh well . . . yv1dp de w6isq k."

" . . . W6ISQ de YV1DP nr 86 rst 589 de YV1DP . . . "



"Well now . . . things is pickin' up . . . maybe . . . zs1rm de w6isq k."

"W6ISQ de ZS1RM nr . . . rst . . . "

"I say . . . oa4pf de w6isq k."

" . . . W6ISQ de OA4PF . . . "

"Naw, Marge . . . why doncha watch a good . . . well, anyway, watch a TV show . . . gotta *play* this DX contest a bit more . . . I'm hot as a 6L6 in a kw. final . . . workin' 'em right and left . . . ohhhh, I dunno . . . years and years of experience . . . and technique . . . and finesse . . . and . . . ahhhhh . . . TALLY-HOOOOOOOOO . . . lu8baj de w6isq . . . oz5s de w6 . . . sm6rs de . . . 4X4ju . . . "

QST

* 45 Laurel Ave., Atherton, Calif.

Strays

Because of the death of Bill Bradley, K4YPY, any correspondence concerning his article, "Updating the I-177 Surplus Tube Tester," *QST*, November 1964, p. 21, should be sent directly to ARRL Headquarters instead of to Bill's home address.

—···—

Recently a number of items were stolen from a residence in the city of Miami, Florida. Among the items stolen was a Collins 75A-4 receiver (Serial 1249). If anyone has information on this item he should contact Sargent D. D. Massingill, Burglary Detail, Miami Police Department, 1145 N.W. 11 Street, Miami, Florida.

• *Beginner and Novice*

Using the Lightning Calculator

And Some Information on Small-Diameter Coils

BY LEWIS G. McCOY,* W1ICP

ONE tool that has been around for over thirty years, but one that many amateurs are not aware of, is the ARRL Lightning Calculator, Type A. The Type A Calculator is a real "must" for any amateur who likes to construct his own gear.

What will it do for you? Let's quote from the first sentence of the instructions that come with the calculator: "The Lightning Calculator is a device for rapid, accurate and simple solution of problems involving frequency, inductance and capacitance."

Of course, there is a lot more to the story than just that bare statement. Suppose you have a variable capacitor in your junk box that has a range of 10 to 100 pf., and you want to make a coil that, with the capacitor, will tune to 80 meters. The formula for inductance is:

$$L = \frac{25{,}330}{F^2C}.$$

When you work this all out it is still necessary to determine the coil size to provide the necessary inductance. We won't even show you that formula because it is a real beauty. Just let's say you would fill up a couple of sheets of paper working it all out. However, with the calculator it only takes a few seconds to find the correct size.

* Technical Assistant, *QST*.

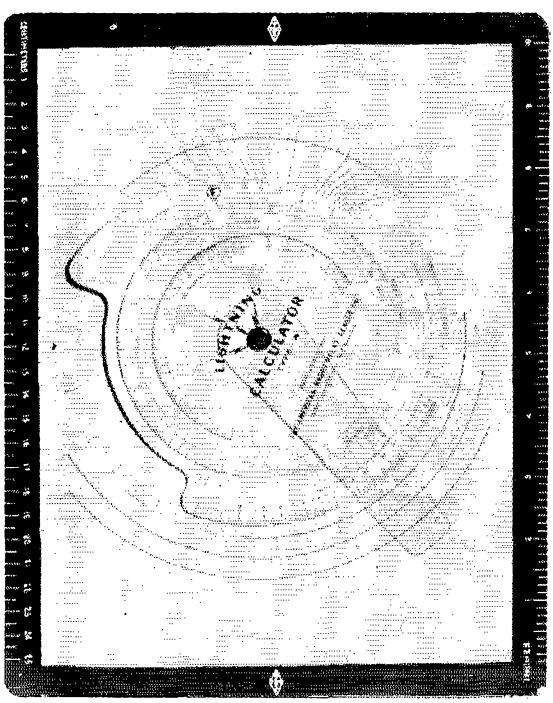


Fig. 1—The Type A Calculator makes problems in inductance, capacitance and frequency very simple to solve.

Using the Calculator

Fig. 1 is a photo of the Type A Calculator and Figs. 2 and 3 are close-ups of the scales. Let's assume we have that junk-box variable with its range of 10 pf. minimum and 100 pf. maximum, and we want to make a tapped coil that will tune both 80 and 40 meters. We have some No. 22 enameled wire and a ¾-inch-diameter coil form.

On one of the scales, Fig. 1, you'll see an F, which designates frequency. Just below the F is a rotatable scale that has a frequency range from 400 kc. to 150 Mc. Step 1 is to rotate this scale so that 3500 kc. falls directly under the F. We want our coil to hit 3500 kc. with our variable near maximum capacitance — say, 90 pf. The next step is to swing the clear plastic hairline so that it intersects 90 pf. Looking at Fig. 3, we see that with 90 pf., a coil of 22 μh. is required to tune to 3500 kc.

The next question is determining the coil size. Holding the two rotating scales and the hairline, swing them around together to the point where the hairline intersects the marking for No. 22 enameled wire. Looking back at Fig. 2, we find that a ¾-inch-diameter coil form requires a coil length of 1½ inches. How many turns of No. 22 wire are required for this length? Easy. In Fig. 3, we find that No. 22 enamel runs 37 turns per inch. We need 1½ inches, so that comes out to 37 plus ½ of 37, 18½, or a total of 55½ turns. Earlier we said it takes only a few seconds to set up the calculator, and after using one a few times you'll agree.

Another thing we can find quickly is the tuning limits of the circuit, with our variable going from minimum to maximum capacitance. We said the range of the variable was 10 pf. to 100 pf., but we always should allow for stray capacitance in an actual installation. These strays are usually about 10 pf., so let's make the actual range 20 pf. to 110 pf.

Holding the F scale and the wire scale fixed, swing the capacitance/frequency scale to 110 pf. and then look up at the F marker. The lowest frequency for our circuit will be about 3100 kc. Now swing the capacitance scale to 20 pf., our minimum. We find the highest frequency is just below 7500 kc., so the range of the circuit is 3100 kc. to 7500 kc.

However, let's assume we want to tune the

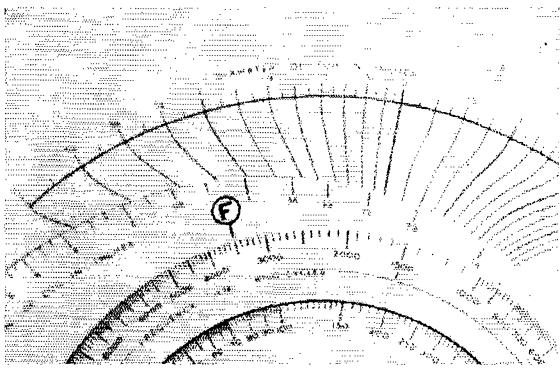


Fig. 2—This close-up of the calculator illustrates the simple problem explained in the text. The top scale gives the coil diameter and the rotating scale immediately below provides the length information. Note the F set over 3500 kc.

40-meter band with more capacitance, say, 90 pf. for 7000 kc. The next problem is where should the coil be tapped for 40 meters? Swing the frequency scale so that 7000 kc. is under the F mark, place the plastic marker over 90 pf., and then, holding both scales, swing them around so that the plastic marker bisects No. 22 wire. Looking up at the top of the calculator we find that for our ¾-inch-diameter coil we need ½-inch winding length. The No. 22 wire is 37 turns per inch, so ½ inch would be 18½ turns. We tap our coil at 18½ turns and it then meets our requirements.

Fig. 4 shows a coil winding on a ¾-inch form to illustrate our example. Actually, we are being a

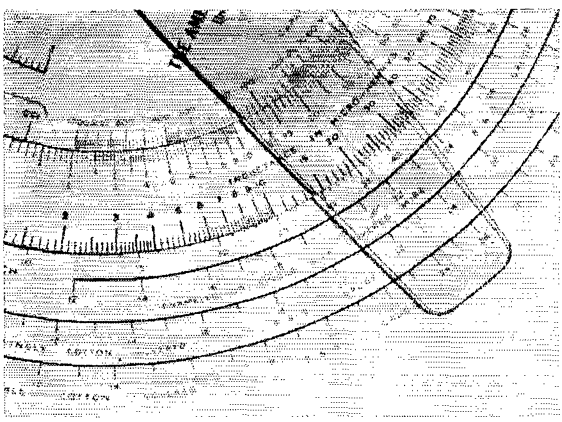


Fig. 3—The upper scale here shows the capacitance, and immediately below is the inductance. The hairline indicator is set over 90 pf. and bisects 22 μh. and No. 22 wire on the scale below.

little sneaky here because we want to say something else about the coil form illustrated.

Recently, while watching the XYL put up her hair in plastic curlers, we happened to notice that the curlers appeared to have other possibilities, at least as far as amateur radio was concerned. Upon checking we found that nearly all supermarkets have a large display of plastic contraptions used by the fair sex to make themselves fairer. Several items showed promise in use as coil forms, feeder spreaders or insulators. The form shown in Fig. 4 is sold under the trade name of Goody Rollers(!). In any event, if you are looking for some cheap coil forms, these cost 59 cents a dozen and can be obtained in several different diameters.

We've already given you the frequency range on the Type A Calculator. Here are the other ranges: capacitance, 3 pf. to 1000 pf., inductance, 1 μh. to 1500 μh., coil diameters, ½ inch to 6 inches, coil lengths, ¼ inch to 10 inches, and wire sizes, No. 0 to No. 36.

Coil and Wire Sizes

One thing the calculator won't do is show you what size wire or what size coil (length and diameter) is optimum.

In practice, the coil or form size will usually depend on the space available where the coil is to be installed. Actually, the principal consideration often is that the wire or coil should handle the required power without burning up. In these days of low-drive low-duty cycle requirements even this may not be a serious consideration.

Table I shows wire sizes that will usually be adequate for the power levels shown. If you want a coil that has good *Q* (and this is the usual case) use the largest core size and coil

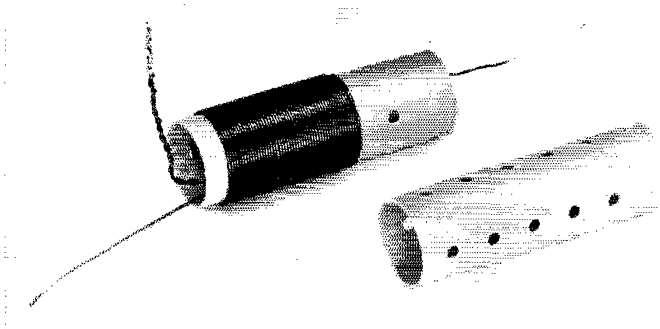


Fig. 4—This coil illustrates our example explained in the text. As mentioned, these forms are plastic hair curlers available in nearly all supermarkets.

Table I

Power Input	*Band (Mc.)*	*Wire Size*
1000	21–28	6
	14–7	8
	3.5–1.8	10
500	28–21	8
	14–7	12
	3.5–1.7	14
150	28–21	12
	14–7	14
	3.5–1.7	18
75	28–21	14
	14–7	18
	3.5–1.7	22
25 W.* and Recv.	28–21	18
	14–7	24
	3.5–7	28

* Wire size limited principally by consideration of Q.

diameter that is consistent with the available space, without jamming the coil up against other components, and make the coil length one to two times its diameter. This may mean spacing the wire turns, but usually a satisfactory arrangement can be made. That's one nice thing about the calculator — it's easy to find several different combinations of turns, length, and diameter.

Coils for Small-Diameter Slug-Tuned Forms

Many pieces of gear that are described these days use small slug-tuned coils having diameters of ½ inch or less. The calculator won't handle any sizes smaller than ⅛-inch diameter. To give the reader a complete picture, we checked out the more common types of small forms and have included this information in the graphs in Figs. 5 through 8.

It would be practically impossible to list all the various types and sizes of slug-tuned coils available so we have concentrated on ceramic forms only, and diameters of ½, ⅜, ¼, and 3/16 inch. The useful winding length on these forms is

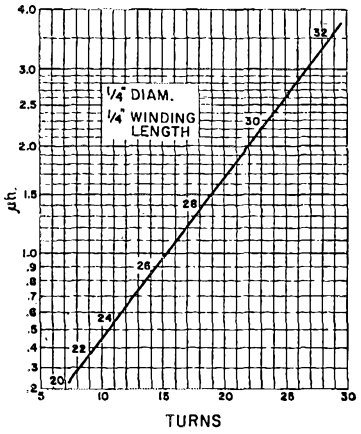


Fig. 6—Graph for ¼-inch-diameter forms, ¼-inch winding length.

dependent on the length of the slug in the form. In the graphs, Figs. 5 through 8, you'll note that two dimensions are given, the diameter of the coil and the winding length. All of the inductance figures given in the graphs are based on the slug being completely out of the winding. Screwing the slug into the coil will, of course, increase the inductance. Coils wound on forms made by different manufacturers show different amounts of change in inductance, with slug position, for a given diameter and winding length, because of the length of the core and type of material used in the slug. However, a factor of 1.3 is a reliable one to use with any ceramic form and slug material; that is, when the slug is all the way inside the winding the inductance will be *at least* 1.3 times the inductance with the slug all the way out.

As an example of how to use the graphs, refer to Fig. 5. The vertical column of figures at the left is the inductance, in microhenries. Across the bottom is the number of turns. Let's assume

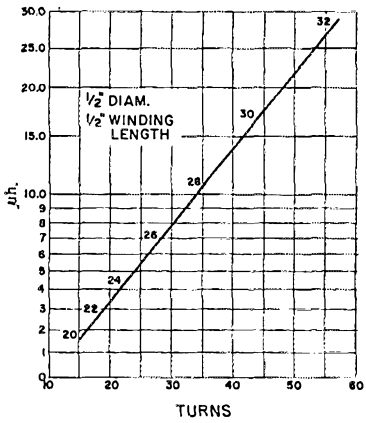


Fig. 5—This graph is for determining inductance values for ½-inch-diameter ceramic forms, ½-inch winding length. The inductance value is given along the left vertical column, and number of turns required along the bottom. The numbers along the coil line are wire sizes, enameled, Nylclad or Formvar

we want a coil with an inductance of 10 μh. The first thing to keep in mind is that the inductance figures in the graph are with the slug screwed all the way out of the coil, so the figure you check out will be the *minimum* inductance. With a factor of 1.3, the inductance range with slug position will be 10 μh. to 13 μh. To insure that we will actually get the desired 10 μh., the coil should be wound for slightly less than 10 μh. Then the slug will take us through the range. For example, if we use a factor of slightly less than 1.3, say 1.25, and divide this into 10 μh., we should get the desired inductance range. Dividing 1.25 into 10 gives 8, so we need to find the number of turns for an 8-μh. coil.

Referring to Fig. 5, find 8 μh. and then look across to where the vertical lines intersect the coil line. At the bottom of the graph we find that 30 turns are required in our ½-inch winding space

to give us 8 μh. No. 26 wire will just fill up the ¼-inch winding space with close-spaced turns. If we happen to have a smaller wire size available, the same inductance can be obtained by winding on the same number of turns but spacing them evenly across the winding area.

All of the data in the four graphs are for single-layer coils wound with enameled or Nylclad wire.

Although it may be apparent, there is a point worth mentioning here. Once you've found the coil size and inductance from the graphs, you can use your Lightning Calculator to determine not only the amount of capacitance required for a desired frequency, but also, with a fixed capacitor across the slug-tuned coil, you can easily determine a conservative figure for the frequency range of the circuit. This would be based on a maximum/minimum inductance ratio of 1:3, as suggested earlier.

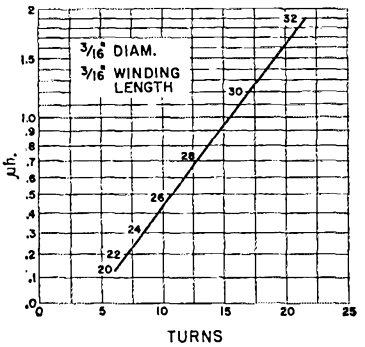


Fig. 8—Graph for 3/16-inch-diameter forms, 3/16-inch winding length.

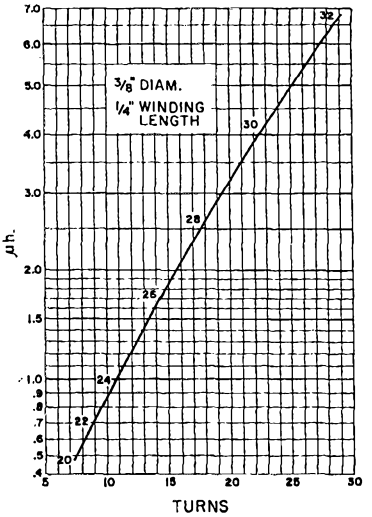
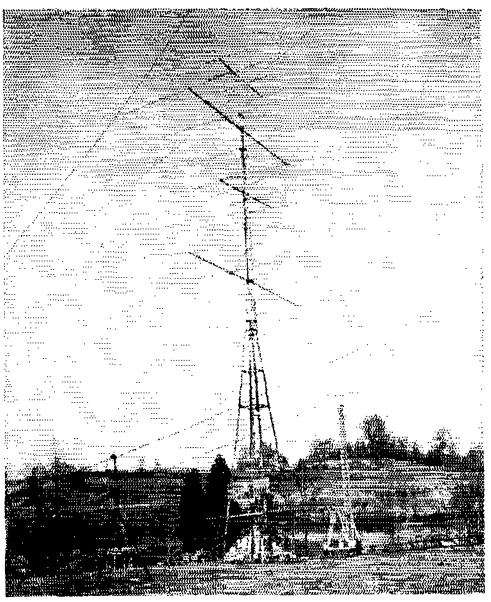
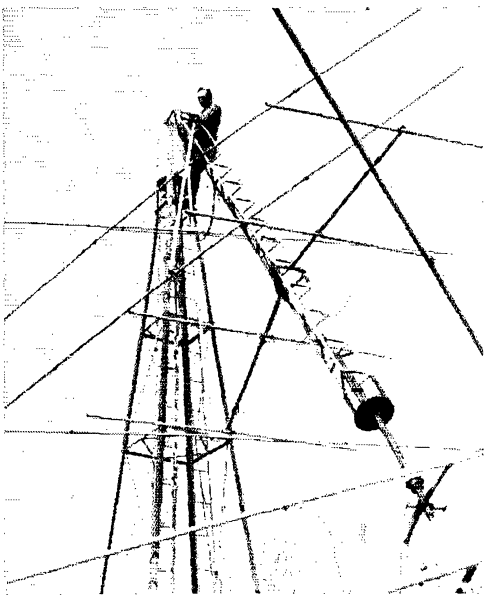


Fig. 7—Graph for 3/8-inch-diameter forms, 1/4-inch winding length.

As we said at the beginning, if you like to build your own gear, the Type A Calculator is one tool you really should have in the shack. QST

Strays





Before the storm W8HRV had a stacked array for 15 and 6 meters which looked like this photo at the left. But then along came the wind, leaving the mess shown at the right. (He has since rebuilt the beams and mast, and they are now more securely guyed.)

Happenings of the Month

Retaining Novice Calls
Canadian Alternate Addresses
Conditional Class Examination Circles

ITU SEEKS ENGINEERS

The International Telecommunications Union is seeking a large number of telecommunications experts to carry out various programs being financed by the United Nations. Positions will be available for communications systems engineers and other telecommunications personnel of equivalent skill levels in twenty countries, for periods ranging from six months to two years, or possibly longer. U.S. recruiting for these positions is being coordinated through Richard T. Black, Telecommunications Division, Department of State, Washington, D. C.

RETAINING NOVICE CALLS

Under present FCC procedures, Novice Class licenses must apply for a higher class license before expiration of the license if they desire automatic issuance of the equivalent call sign. If, for instance, WN2QRM qualifies as a Technician Class licensee before the Novice expires, he will automatically receive the call WB2QRM, paying only the standard $4 fee. If WN6QRS, however, waits until the week after his Novice runs out to take the General Class test, he'll be assigned WB6SOL or whatever call is next in line when his license is processed. He would be eligible for WB6QRS under the provisions of Section 97.51, but would have to pay the $20 special call sign fee in addition to the regular $4 fee. Thus, a Novice who is fond of his present call may want to hustle in order to qualify for a higher license by the end of his Novice year.

Technicians, Conditionals and higher class license holders may regain expired call signs within the one-year grace period after expiration, without paying the special call fee. Members with special problems concerning licenses are of course welcome to write League headquarters for advice and assistance.

CANADIAN ALTERNATE ADDRESSES

At the request of Canadian ARRL officials, the Department of Transport has modified its rules so that any amateur having a second location, such as a weekend cabin, no longer has to send an individual notification of portable operation for each period of operation. Instead, a VE or VO may secure an endorsement to his licenses permitting operation at a location in addition to the permanent location, upon making application therefore to the Regional Superintendent.

Quoting DOT's letter:

"An amateur experimental station may be operated at the location shown on the license, or at another location, e.g. place of business, summer cottage, etc., subject to the following conditions — 1. Any equipment left at one location must be securely locked. 2. Either station will not be used for communication with the station at the other location. The licensee of the station involved should forward his license with full particulars of the alternate location to the Regional Superintendent of Radio Regulations having jurisdiction in the area. Arrangements will then be made for the station license to be endorsed so as to preclude the operation of equipment at more than one location simultaneously."

With reference to requirement 1, above, the Department will be satisfied if the building in which the equipment is housed is locked in the licensee's absence. The second requirement need not be observed where there are two licenses available, e.g. if a husband and wife both are licensed.

A Canadian amateur may request this new privilege when the license is submitted for renewal prior to March 31.

FELLOWS, I.E.E.E.

John H. Gayer, HB9AEQ, a member of the International Frequency Registration Board and president of the International Amateur Radio Club at ITU headquarters in Geneva; John P. Costas, W2CRR, consulting engineer, GE Heavy Military Electronics Dept., Syracuse, N. Y., and "patron saint" of double sideband suppressed carrier transmission; and A. H. Sharbaugh, W2UKL, Manager, Dielectric Studies Unit, G.E. Co., Schenectady, N. Y. are among the January 1, 1965 class of Fellows, Institute of Electrical and Electronics Engineers. Hearty congratulations, OMs!

CONDITIONAL CLASS EXAMINATION CIRCLES

In November *QST* we reported on the Federal Communications Commission's Notice of Proposed Rulemaking, Docket 15640, which would change the mileage basis for Conditional Class eligibility from the present 75 miles to 175 miles, and count semi-annual as well as quarterly examination points for this purpose. It would leave unchanged the rules permitting Conditional Class examinations for shut-ins, servicemen and

citizens temporarily outside the U. S. The proposal would not affect any present holders of the Conditional Class license.

In keeping with policies previously expressed by the Board, and as a direct result of discussion at the November meeting of the Executive Committee, the League has filed comments in support of the FCC's proposed changes. The text appears below:

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of Amendment of Sections 97.9(d) (1) and 97.27(a) of the Commission's Rules governing eligibility for the Conditional Class license in the Amateur Radio Service	DOCKET NO. 15640

COMMENTS IN SUPPORT OF PROPOSED RULE MAKING

The American Radio Relay League, Incorporated, by its General Counsel, respectfully submits the following comments in support of the amendments of Sections 97.9(d) (1) and 97.27(a) of the Commission's Rules proposed by a Notice of Proposed Rule Making released October 1, 1964 (FCC 64-893).

In 1962 the League embarked upon a long-range program having as its objective the more efficient utilization of the amateur bands. To further implement that program, the Board, at its annual meeting in 1963, adopted a resolution directing the officers of the League, with the advice of its Executive Committee, to request the Commission to extend the existing incentive-licensing structure by modifications of the license requirements, examinations, procedures and privileges. Pursuant to that resolution, the League filed a Petition For Rule Amendments And Rule Making (RM-199) with the Commission on October 3, 1963. In that petition, the League noted that suggestions of possible modifications of the Conditional Class license were not submitted at that time because the Commission already had initiated a study of possible revisions and only recently, on September 13, 1963, had amended Section 12.44(c) (now 97.35(c)) of the Rules to strengthen the procedures for conducting Conditional Class examinations (FCC 63-813).

The instant proposal to amend Sections 97.9(d) (1) and 97.27(a) "to provide that only those individuals whose actual residence and proposed station location are more than one hundred and seventy-five airline miles distance from a Commission Field Office, Quarterly or semi-annual examination point shall be eligible for the Conditional Class license on a distance basis," is the second step taken by the Commission in little more than a year to strengthen the Conditional Class license. Inasmuch as the proposed amendments will strengthen the existing license structure, the League supports the proposal and respectfully urges its adoption.

Respectfully submitted,
THE AMERICAN RADIO RELAY LEAGUE, INC.
BY ROBERT M. BOOTH, JR.
Its General Counsel

December 14, 1964

FEEDBACK

There is an error in the bottom picture caption on page 59 of January 1965, *QST*. The caption should read W1VBG, of Westfield, Mass.

It should be noted that, due to a clerical error, the name of Robert K. Pratt, K9AAA, appeared in "Silent Keys" column of the January 1965 issue of *QST*. The listing should have read: Raoul Du Chatellier, K9AAB, Palos Heights, Ill.

Among the many scientists who have made a mark in their field after a start as radio hams is Dr. Brockway McMillan, ex-W9EAY, Undersecretary of the Air Force. Dr. McMillan, who has a Ph.D. from MIT, 1939, is a research mathematician. He was appointed Assistant Secretary of the Air Force for Research and Development in 1961 and took his present post in June, 1963. He received his ham ticket in 1931 while a high school student in Hinsdale, Illinois and first used an m.o.p.a. rig with a pair of 210s, modulated by a 250. The last entry in the W9EAY log was August 1938 when graduate studies precluded further hamming.

NO DUES RISE

On page 49 of December *QST*, we announced a change in the rate which libraries, schools, laboratories and the like will have to pay for *QST* annually, and also in the retail price at radio stores. Some individual members have misunderstood and have sent in more money than needed.

We remind members therefore that the fee for the regular combination membership in ARRL and subscription to *QST*, for Full and Associate Members in the U.S. continues to be $5.00; in Canada, it stays at $5.25 and elsewhere the fee remains $6.00. Members should pay their dues either through an affiliated radio club or direct; memberships are no longer accepted through agencies.

Banned Countries

The correct list of countries and prefixes that are "banned" for Canadian amateurs is: *Cambodia* (XU), *Viet-Nam* (3W8), *Indonesia* (PK, JZ0), *Laos* (XW8), *Jordan* (JY) and *Thailand* (HS).

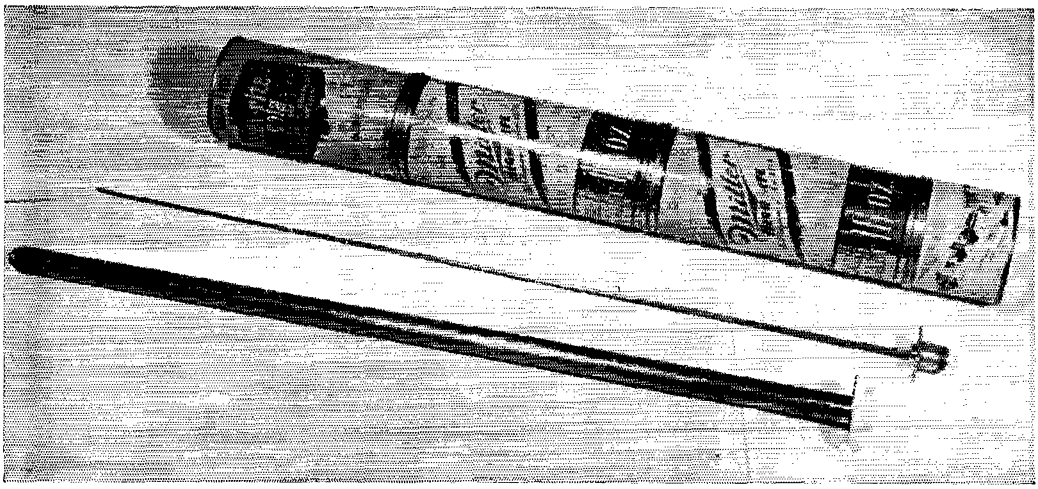


Fig. 1—Coaxial-sleeve balun for 144 Mc., showing the parts that make up the air-dielectric matching section.

Beer-Can Baluns for 144, 220 and 432 Mc.

Unbalanced-to-Balanced Feed, plus Impedance Matching

BY KEN HOLLADAY, K6HCP* and DON FARWELL, WA6GYD**

THE coaxial-sleeve balun transformer has several advantages over the flexible type commonly used in v.h.f. work. The novel aspect of the baluns described here is the use of standard beer cans for the detuning sleeves. This is easier, less expensive, and certainly more enjoyable than obtaining and processing copper or brass tubing.

This type of balun has been around for a long time, but it has not been widely used, probably because its properties have been doubted, and because it is somewhat harder to make than the type made by folding back a half wavelength of flexible coax. The latter appears to work well up to at least 50 Mc., but at 144 Mc. and higher its losses and matching qualities may be poor. Checks made at 144 Mc. indicate considerable r.f. on the outside of such a balun, as well as on the coaxial feed line, even when the s.w.r. is moderately low. In these circumstances, moving the balun from where it was taped to the boom to a position at right angles to the boom changed the s.w.r. noticeably.

At 220 Mc. these conditions become worse, and at 432 Mc. the conventional flexible balun may be all but useless. Length becomes so critical that it must be cut and connected with extreme care. Velocity of propagation varies so much from one piece of coax to another that an electrical half wavelength cannot be cut by formula, and balun radiation is nearly always excessive. An eighth of an inch of error or a small change in balun position may change its properties markedly. If you must use a flexible-coax balun, do not lay it along the mast or boom; mount it in a fixed position perpendicular to the driven element and boom. Cut it accurately. Ed Tilton described a good method.[1] Don't forget to take soldering lugs and leads into account.

Baluns described here are the so-called *bazooka* or Type I family; quarter-wave sections of air-dielectric coax, equipped with detuning sleeves. Theory regarding them is given in full detail in *Very High-Frequency Techniques*, Vol. I, McGraw-Hill Book Co.

Matching Various Impedances

The air-dielectric coax forms a quarter-wave "Q" section. It can be made to continue the line impedance, or transform it to any other impedance within fairly wide limits by proper choice of conductor diameters. The required impedance for a "Q" section is obtained from the formula

$$Z_o = \sqrt{Z_s Z_r} \qquad (1)$$

where Z_o is the impedance of the matching section, Z_s is the line impedance, and Z_r is the impedance of the load. This information and a more detailed explanation may be found in any ARRL *Handbook* or *Antenna Book*.

* 7733 Rainbow Drive, San Jose, Calif.
** 472 Martha Ave., Saratoga, Calif.

[1] "V.h.f. Antenna Facts and Fallacies," Part II, *QST*, Feb., 1964, p. 50.

After the desired impedance is determined the dimensions required can be calculated from the formula

$$Z_o = 139 \log \frac{b}{a} \qquad (2)$$

where Z_o is the impedance of the matching section, as before, b is the inside diameter of the outer conductor, and a is the outside diameter of the inner conductor. Or you can do it the easy way, from the chart, Fig. 2.

For example, let's say you want to match 50 to 300 ohms, a common situation that cannot be handled with a flexible-coax balun. From formula (1) we find we need a "Q" section with an impedance of 122 ohms. From Fig. 2 we see that a b/a ratio of 7.5 is needed. We can now check the plumbing supply houses and the *Handbook* wire table to find available materials that will come closest to this ratio. We used 9/16-inch i.d. copper water pipe for the outer conductor. ("Pipe" is sold in terms of i.d.; "tubing" in terms of o.d.). Dividing 0.5625 inches by 7.5, we get 0.075 inch, which is very close to the diameter of a No. 12 wire. Using the information of Table I, we can take care of common impedance matching problems with standard wire sizes and 9/16-inch i.d. pipe. Many other combinations can be worked out from the formulas and chart.[2]

[2] The required outer-conductor i.d. for various ratios with standard wires sizes for the inner conductor may be obtained from a chart appearing in the *Antenna Book*, Transmission Lines chapter.

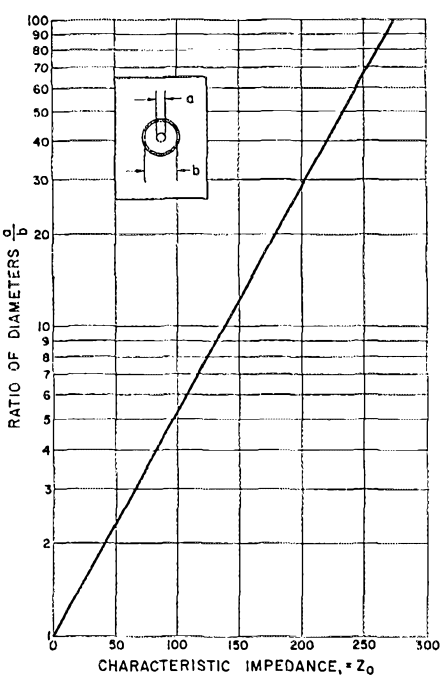


Fig. 2—Characteristic impedance of coaxial matching sections for various conductor diameter ratios. The outside diameter of the inner conductor and the inside diameter of the outer conductor are used.

Table I — Inner conductor wire sizes to be used with 9/16-inch i.d. copper pipe outer conductors, for various impedance matching jobs commonly encountered in v.h.f. work. The impedance of the main coaxial transmission line, Z_o, is given in the left column. Next is the balanced load, Z_r, to be matched.

Z_o, ohms	Z_r, ohms	Wire Size, A.W.G.
50	72	4
50	200	10
50	300	12
50	450	18
75	200	12
75	300	18
75	450	24

The Detuning Sleeve

With just the coaxial matching section we would still have an unbalanced condition. This would be all right where the load is unbalanced, but most antennas are balanced loads. This is where the beer-can decoupling sleeve comes in. Being a high-"Q" quarter wavelength of line, open at the top and shorted at the bottom, it presents an almost infinite impedance to r.f. currents (at the resonant frequency) that might be flowing on the outside of the coaxial feed line.

Calculations show that a sleeve for 432 Mc. should be 6.25 inches long. In our search for suitable materials we discovered that a half-quart beer can was exactly the right size. Two such cans are right for 220 Mc. For 144 Mc. three cans and part of another are required. For tips on soldering them together see October 1964 *QST*, page 13.

Construction Hints

Assembly of the baluns is the same for each band, except for the length. We've used two methods: one for a fully-soldered unit for use where impedance adjustments are not anticipated, and a bolted and soldered one that permits changing the center conductor to change the output impedance. To make the first type for 432 Mc. proceed as follows:

Select a half-quart beer can or other steel-end can 6¼ inches high. Do not use an aluminum pop-top can. With a kitchen can opener remove the top that was punched to remove the contents. Locate the center of the other end and punch a ¾-inch hole.

Prepare an N-type chassis connector by turning down the crimped flange on the back of the connector so that it will fit inside the 9/16-inch i.d. of the copper pipe to be used as the outer conductor of the line. If you do not have access to a lathe for this operation, filing or reaming out the end of the pipe slightly will serve the same purpose, which is to make the pipe end fit flat against the square flange of the connector.

Cut the wire for the inner conductor about one inch longer than the pipe length, dimension B in Fig. 3 and Table II. Solder the wire to the center pin of the N connector. Slip the copper

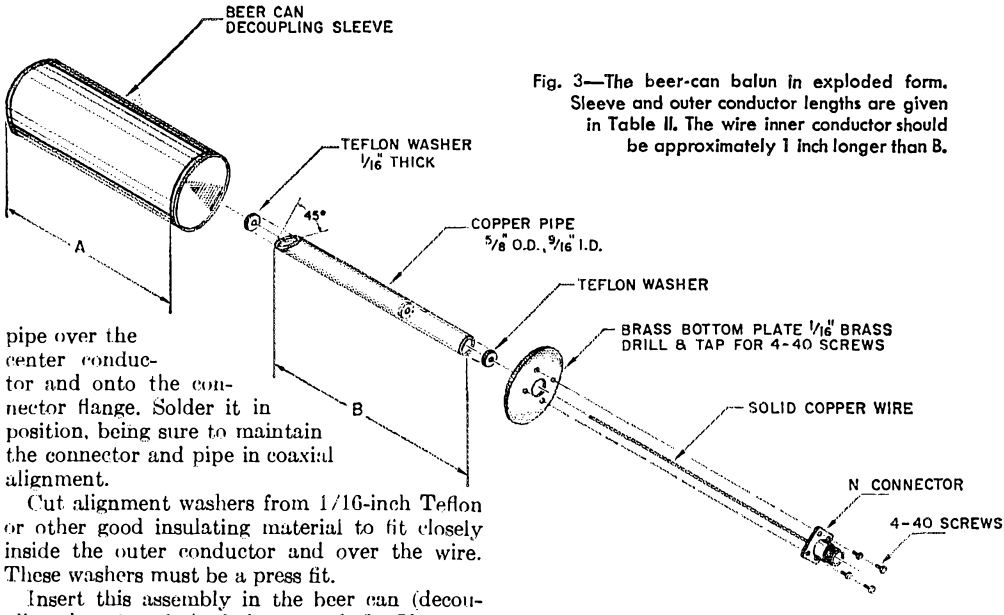


Fig. 3—The beer-can balun in exploded form. Sleeve and outer conductor lengths are given in Table II. The wire inner conductor should be approximately 1 inch longer than B.

pipe over the center conductor and onto the connector flange. Solder it in position, being sure to maintain the connector and pipe in coaxial alignment.

Cut alignment washers from 1/16-inch Teflon or other good insulating material to fit closely inside the outer conductor and over the wire. These washers must be a press fit.

Insert this assembly in the beer can (decoupling sleeve) and check for smooth fit. If necessary, trim away any excess solder at the point where the pipe joins the fitting, to make sure that the fitting sets evenly against the can bottom. Center carefully, mark the four holes for the connector mounting screws, drill, and bolt in place. The flange can be soldered to the can bottom, if you wish. Because of the weakness of the can bottom, you may want to strengthen the assembly by fitting the open end with a press-fit washer of polyfoam, or similar material.

The other version, shown in exploded form in Fig. 3, uses a brass bottom for strength. For this type, cut both ends from the can. Using steel wool or a file, remove the plastic coating from the crimped flange on the bottom.

Cut a disk about 1/32 inch larger than the can outside diameter from 1/16-inch sheet brass. Punch a 5/8-inch hole in the center. Trim the hole

Table II — Lengths for the decoupling sleeve, A, and copper pipe outer conductor, B, for 144, 220 and 432 Mc.

	A	B
144 Mc.	19¾"	20 1/16"
220 Mc.	12 1/2"	12 9/16"
432 Mc.	6¼"	6 31/32"

edge with a knife, so the connector base will lie flat. Cut the outer conductor from 5/8-inch pipe

(*Continued on page 146*)

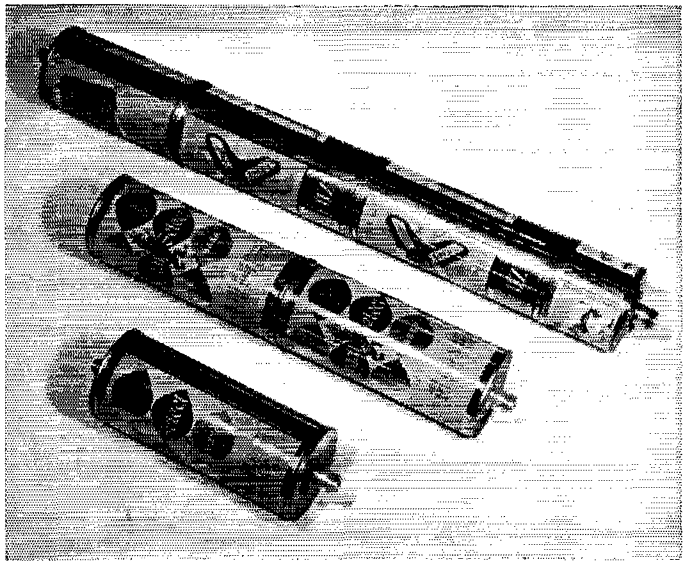


Fig. 4—Three completed baluns. A single half-quart beer can serves for the 432-Mc. balun, left. Two are right for a 220-Mc. model, center. The 144-Mc. assembly requires approximately 3⅓ cans. Except for length, the inner portions of the assemblies are all the same.

A Transistor Audio Oscillator

Simple Unit for Testing Purposes

BY FRANK C. BAXTER, JR.,* W3SKL

LIKE many of my projects, this one was conceived several years ago. I was searching for transistor oscillator circuits when I found the one that is the basis for this article. I never used the circuit in my work, but its simplicity, performance and apparent low cost seemed particularly attractive for a piece of amateur test equipment. Therefore, I put the circuit in my file and only recently completed the building of the oscillator.

Principles of Operation

Fig. 1 shows the oscillator circuit, which is basically the same as that described by Peter Sulzer in *Transistor Circuits and Applications*.[1] The circuit is classified as a "null-network" oscillator, the name being derived from the fact that the frequency of oscillation is controlled by a network that exhibits maximum attenuation (or "nulls") at a single frequency. The null network utilized in this oscillator, and drawn in Fig. 2, is appropriately called a "bridged-T." Furthermore, because only resistors and capacitors are used as circuit elements, the network is correctly termed an "*RC*" bridged-T. The null frequency can be determined from the circuit values by the following equation:

$$f = \frac{1}{2\pi RC\sqrt{bk}}$$

where the resistance and capacitance ratios represented by b and k, respectively, are chosen arbitrarily.

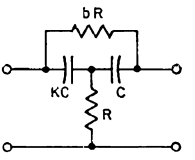


Fig. 2—Bridged-T network discussed in the text.

* HRB-Singer, Inc., Science Park, P.O. Box 60, State College, Penna.

[1] Carroll, *Transistor Circuits and Applications*, McGraw-Hill, 1957, p. 101.

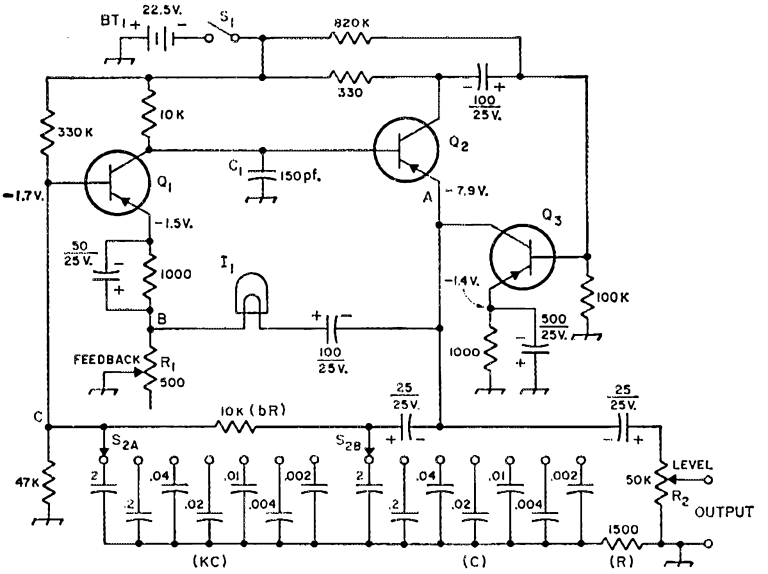
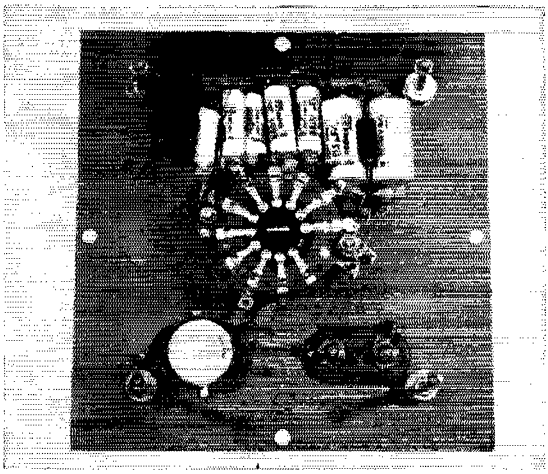


Fig. 1—Circuit of the transistor audio oscillator. Unless indicated otherwise, capacitances are in μf., and resistances are in ohms (K = 1000). Capacitors marked with polarity are electrolytic; others, if not listed below, are tubular paper. Fixed resistors are ½ watt. Capacitors and resistors corresponding to those of the basic bridged-T circuit of Fig. 2 are identified with similar designations in parentheses.

BT_1—22.5-volt miniature battery (Burgess 4156).
C_1—150-pf. mica or ceramic.
I_1—3-watt 115-volt lamp (GE FG616).
Q_1, Q_2, Q_3—Germanium p-n-p transistor (Lafayette 19 G 1502).
R_1, R_2—Linear control.
S_1—S.p.s.t. toggle switch.
S_2—Phenolic rotary switch, 2 sections, 2 poles, 7 or more positions.



Rear view of the front panel showing the mounting of the frequency-selector switch and frequency-determining capacitors. S_1 is at the upper right, and R_2 at the lower left. The spacers at the four corners support the perforated subpanel.

In addition to having a null frequency, the bridged-T has phase, attenuation, and bandpass characteristics. For fixed values of C and k, the attenuation and bandpass are determined by b; the greater the value of b the greater the attenuation and the more narrow the bandpass. At the null frequency the input is in phase with the output. For frequencies other than the null, both the phase and attenuation will vary between the input and output terminals.

In summary then, the bridged-T can be employed as a frequency-selective network by the proper combination of resistors and capacitors. There are, however, some practical considerations. The equation shows that there are four variables which affect the null frequency — R, b, C, and k. Because b determines the network attenuation, capacitor tuning is preferred. In this way amplitude changes are avoided. Furthermore, the use of dissimilar tuning elements can be avoided by setting $k = 1$.

Precise frequency control is difficult to achieve because of the tolerances and values of resistors and capacitors normally used by the amateur. The RC bridge is not a true null network because a complete null (infinite attenuation at a single frequency) cannot be attained. Finally, but not within the scope of this article, the use of the network in the over-all circuit must be considered.

Circuit

In Fig. 1, transistor Q_1 is an amplifier. Q_2 is a direct-coupled emitter follower which has Q_3 as the emitter load. In addition, Q_3 acts as an amplifier with capacitor C_1 coupling the signal from the collector of Q_2 to the base of Q_3. Essentially, Q_2 and Q_3 are acting as a push-pull amplifier, and this mode of operation appreciably decreases even-harmonic distortion.

By virtue of transistor action, a current at point A is in phase with the current at point B. Thus the lamp I_1 provides a path of positive feedback which, in turn, causes oscillation. Furthermore, because the lamp resistance increases with feedback current, the lamp tends to stabilize the amplitude of the oscillation.

Since the bridge is frequency selective, the circuit will oscillate at the null frequency. Also, the bridge is connected into the circuit in such a manner that a current at point C is 180 degrees out of phase with the current at point A. Therefore, the bridge provides a path of negative feedback and aids in reducing distortion. Oscillation will occur when the amount of positive feedback is slightly greater than the negative feedback.

At this point it should be noted that the condition for oscillation depends upon a phase shift occurring in the transistor circuitry. Accordingly, this circuit will cease to oscillate when the transistors cannot produce the required phase shift. Such a limitation generally occurs at high frequencies.

In Sulzer's original oscillator, CK-722s were specified, but I used close equivalents sold by Lafayette Radio at a cost of four for 89 cents. Although these bargain transistors oscillated with the original circuit values, considerable waveform distortion was evident. Therefore, the transistor operating points had to be adjusted to produce a good sine wave. Specifically, I selected new values for the emitter resistor of Q_1 and the base resistor of Q_3. I also added a few more switch positions and capacitors for a wider selection of frequencies. A third modification was required to squelch a parasitic oscillation at 2.5 Mc. The 150-pf. capacitor from the base of Q_2 to ground eliminated this problem.

Construction

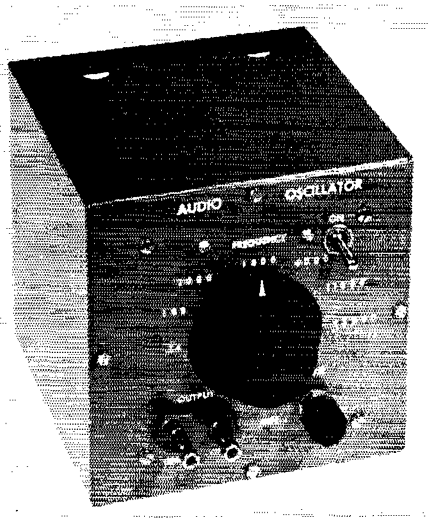
The oscillator is housed in a 6 × 6 × 6-inch utility box. Most of the constructional details are obvious from the photographs. The battery switch, level control, output terminals, and components of the bridged-T network are mounted on the front panel of the box. The remaining components are mounted on a prepunched terminal board (Vectorbord), and the board is attached to the front panel with spacers approximately 2¼

inches long. Transistor sockets were used to facilitate testing, but they are not required. Of course, the builder should exercise the usual precautions when soldering transistor leads.

No mounting hardware was used to secure the components to the Vectorbord. My technique is to mount all components on one side of the board and make all solder connections on the opposite side. The component leads are first bent to project through the perforations. On the other side of the board the leads are again bent to meet the proper connection and soldered together. Only five components used were of the miniature type so, with a better parts layout, the builder should be able to use all standard-size components.

Most of the components came from my limited parts bin; consequently, the photograph of the bridged-T shows more capacitors than indicated in the schematic diagram. This is a result of paralleling capacitors to obtain the proper values.

I determined that seven frequencies were sufficient for my needs. However, rotary switches



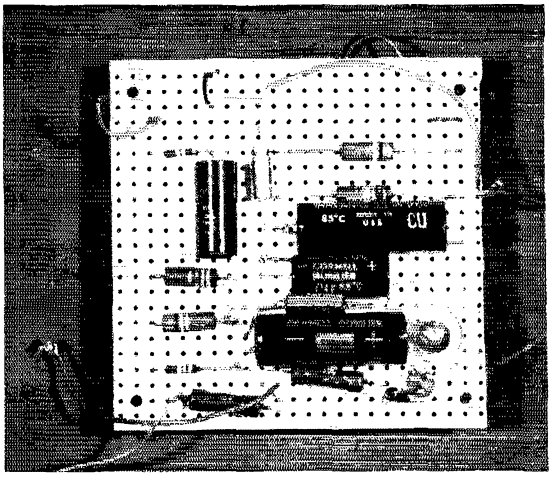
A transistor audio oscillator covering spot frequencies in the range of 14 cycles to 17,000 cycles.

are usually manufactured in 6 or 11 positions; thus there is a possibility of expanding the frequency coverage.

Adjustment

The oscillator is best adjusted with the aid of an oscilloscope. The scope should be connected to the output, the level control set at maximum, the frequency switch set to the highest frequency, and R_1 adjusted to produce a good waveshape at approximately 1.5 volts r.m.s. output. The waveshape should then be checked at all frequencies. Because of the circuit time constant and the thermal delay of the lamp, the oscillator will require a few seconds to stabilize in amplitude. The various d.c. voltage levels shown on the schematic were measured with a v.t.v.m. The total current drain should be about 4 ma.

The table will give the builder some idea of



Front view of the perforated subpanel, showing the mounting of the resistors and frequency-determining capacitors. I_1 and R_1 are in the lower right-hand corner. The transistors and the shaft of R_1 are on the reverse side of this board —the side that faces the rear of the cabinet in the final assembly.

what final frequencies to expect. The target value was my design goal. The calculated value was obtained from the equation by using standard-value capacitors. The actual value was measured with a laboratory instrument. The table also shows the maximum no-load output voltage for the different frequencies, and the total r.m.s. distortion plus noise measured at full output under no-load conditions. A test was also made to determine the lowest resistive load for the oscillator. As it turned out, under low loads the circuit had a tendency to generate parasitic oscillations. Nevertheless, good waveshape was maintained down to 2200 ohms with a maximum of 10 per cent drop in output voltage.

As previously mentioned, precise frequency control is difficult to achieve. My approach to this problem was first to measure each frequency with an 1800-ohm resistor in the bridged-T network. Then, because I felt that the mid frequencies were the important ones in amateur radio work, I made small changes in this resistor until I achieved a good compromise. My final value was 1500 ohms.

Type 2N1305s also appear to work well in this circuit, although no actual measurements were made. QST

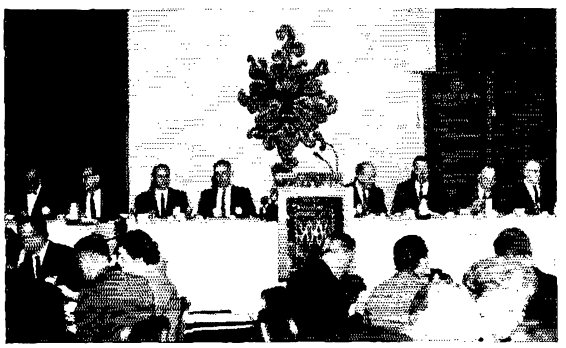
Target Freq. (c.p.s.)	Calculated Freq. (c.p.s.)	Actual Freq. (c.p.s.)	No-Load Output (v.r.m.s.)	Distortion Plus Noise (per cent)
20	20.6	13.7	1.9	not measured
200	206	174	1.7	0.12
1000	1030	970	1.8	0.13
2000	2060	1760	1.6	0.11
4000	4120	4100	1.8	0.14
10,000	10,300	10,600	1.6	0.09
20,000	20,600	17,000	1.3	0.06

Amateur Commemorative Stamp

Dedication Ceremonies Held in Anchorage and Washington

Our long-awaited U.S. postage stamp honoring radio amateurs, on which we reported briefly in January *QST*, was brought out with appropriate ceremony in Anchorage, Alaska on December 15, 1964. On the 16th, there were repeats in Washington and throughout the country where alert amateurs and clubs arranged local observances.

The program in Anchorage centered on a luncheon sponsored by ARRL and hosted by the Rotary Club, with Henry B. Montague, Chief United States Postal Inspector, as principal speaker. A. H. Romick, Commissioner of Commerce for the State of Alaska, represented Governor William A. Egan. Other guests included Jay B. Christensen, Assistant to Regional Director, Post Office Department; Mayor E. E. Rasmuson; Postmaster Tony Schwamm; Leo E. Olendorff, KL7CAH, president of the Anchorage Amateur Radio Club; LeRoy J. Davies, KL7CUK, president elect, AARC; Edward Schadek, president, Anchorage Philatelic Society; and John Carter, KL7DRW, of the Civil Defense Radio Service. Donald DaFoe, president of the Anchorage Rotary Club, was host and Merrill Mael was master of ceremonies. ARRL General Counsel Robert M. Booth, Jr., W3PS, represented League President Herbert Hoover, Jr.



Anchorage head table: from left, Messrs. Rasmuson, Romick, Mael, DaFoe, Montague, Booth, Olendorff, Davies.

To add to the occasion, Governor Egan proclaimed Amateur Radio Week in Alaska for December 14–20. The Anchorage Philatelic Society in cooperation with the Anchorage Amateur Radio Association issued a first-day cachet featuring a map of Alaska labelled "KL7" and a border in Morse Code which read "73 BT." The League, of course, had made available its official first-day covers, of which some 40,000 were sold. Other cachets were offered by philatelic specialists. One estimate was that 750,000 stamps were sold on the first day at Anchorage.

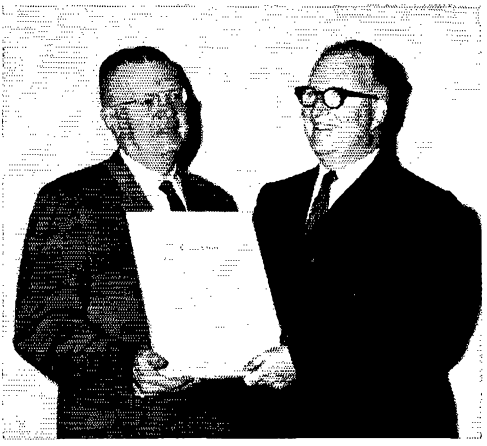
The amateur stamp was put on sale at all remaining post offices on December 16, setting off a round of locally-oriented ceremonies. In Washington, there was a luncheon sponsored by ARRL at the Hotel Willard, attended by government, military, civil and industrial telecommunications dignitaries. To quote one speaker, the "distinguished guests" outnumbered the "ladies and gentlemen." The head table featured Clarence Tuska, (ex-1WD, 1ZT, 1AY) co-founder of the ARRL and first editor of *QST*; ARRL General Manager John Huntoon, W1LVQ, present editor of *QST*; E. William Henry, chairman of the Federal Communications Commission; U. S. Representative Ralph J. Rivers, of Alaska; ARRL President Herbert Hoover, Jr., W6ZH; Frederick C. Belen, Deputy Postmaster General; Joseph Baudino, for Broadcast Pioneers; Dr. George W. Bailey, W2KH, secretary emeritus of the Institute of Electrical and Electronic Engineers and past president of ARRL; and Emil J. Willett, the commercial artist who designed the stamp.

Each year there are hundreds of requests for commemorative stamps filed with the Post Office Department by individuals and groups. Normally only fifteen are chosen, and thus the amateur stamp is a signal honor. Our five-cent stamp

Even a "Birthday" cake looked like a first-day cover. Made by Mrs. Norma Bullard, a temporary postal worker, it was cut by Messrs. Booth, Schadek, Schwamm and Montague.

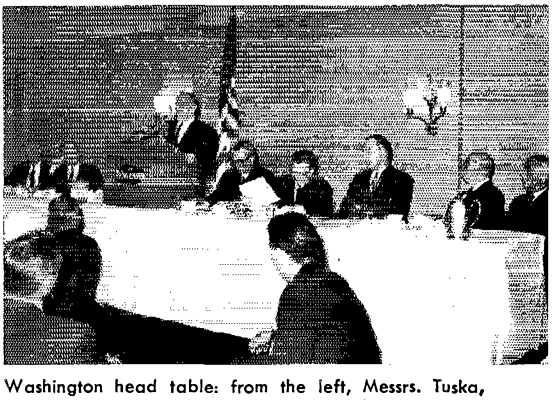
FCC Chairman Henry.

Postmaster Schwamm goes back to work while Messrs. Booth, Montague and Olendorff act like customers.



In the East—W3UMK, Chairman of the Delaware Valley Council of Amateur Radio Clubs, accepts Mayor James H. J. Tate's proclamation of Amateur Radio Week in Philadelphia from the city's Chief of Communications, Edgar P. Grim.

First-Day Covers called for lots of licking and sticking. Part of the nearly-fifty extra employees used at Anchorage show us how it's done.



Washington head table: from the left, Messrs. Tuska, Huntoon, Congressman Rivers at the mike, Hoover, Belen, Baudino, Bailey and Willett. FCC Chairman Henry was out of view behind the rostrum.

In the West—Los Angeles Postmaster Leslie N. Shaw sells a sheet of ham stamps to W6MLZ, director of the ARRL Southwestern Division for the years 1959 through 1964.

And in the middle—At Fort Dodge, Iowa, Postmaster WØLAR passes the first sheet to KØARA, prexy of the Fort Dodge Amateur Radio Club. *(Messenger photo).*

features a symbolic design of a wave form and part of a dial in purple with white lettering. The original sketch was in green and was horizontal rather than vertical; of several designs submitted to the Post Office, its selection was undoubtedly based on its simplicity and ease of fitting the Post Office's mechanical and budgetary requirements.

A great many additional communities reported some observance of the occasion with corresponding favorable newspaper, radio and TV publicity. Among these are the following cities and towns about which information reached us before copy deadline: Beverly, Massachusetts; Burbank, California; Casper, Wyoming; Cleveland, Ohio; Columbia, Tennessee; Columbus, Georgia; Corpus Christi, Texas; Danville, Kentucky; DeKalb, Illinois, Dover, Ohio; Fort Dodge, Iowa; Griffin, Georgia, Hiawatha, Kansas; Juneau, Alaska; Klamath Falls, Oregon; Lorain, Ohio; Los Angeles, California; Mankato, Minnesota; Mount Pleasant, Tennessee; McKeesport, Pennsylvania; New Brunswick, New Jersey; New Haven, Connecticut; New Orleans, Louisiana; New Philadelphia, Ohio; Newton, Iowa; Philadelphia, Pennsylvania; Princeton, Indiana; Russellville, Alabama; Ossining, New York; Sparta, New Jersey; Springfield, Massachusetts; State College, Pennsylvania; Sun City, Arizona; and Woodbury, New Jersey. Our hearty congratulations to the OMs and YLs who engineered this publicity. QST

First-Day Covers Still Available:

When the Amateur Radio First-Day Covers were processed in Anchorage on December 15, we gambled and had a few extra unaddressed covers prepared, because orders for the first-day covers were still coming in and we didn't want anyone to be disappointed. We still have some of these left. They are all singles, unaddressed but carrying the amateur radio stamp and the official first-day cancellation, and they will be mailed to you in an envelope. Prices are 35c each, three for a dollar. Send your orders to ARRL Hq., 225 Main Street, Newington, Conn., 06111.

Strays

The East Coast V.H.F. Society gets ready for Oscar III. Shown here with equipment and antennas for the Society station, WA2WEB, are, left to right, WA2INB/KL7ELA, WB2NCB, WN2OHH, K2LME and WB2DQS. The antenna has two 10-foot helical radiators with screen reflector. The transmitter uses a TMC SBE-2 exciter, home-built heterodyne unit, driving 4CX250Bs. For receiving a 416B converter works into a Squires Sanders SSI-R receiver.

Proposals for schedules and experiments are invited. Address the Society's Space Communications Group, P.O. Box 1263, Paterson, N. J. Additional Oscar plans will be discussed at the Society Dinner, February 27.

Building Fund Progress

THE GOAL of our Building Fund Drive is in sight, and as of this writing just over 90% of the hoped-for $250,000 has been contributed. Let our motto be "Complete the Drive in Sixty-Five." Will you do your part now?

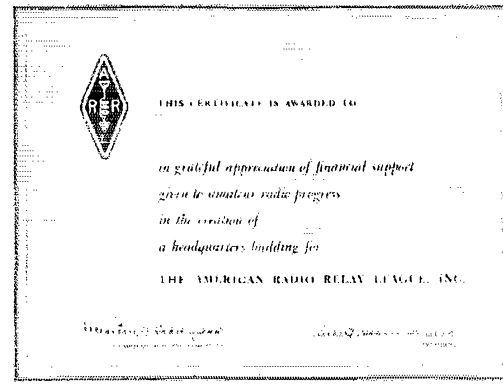
League divisions vary considerably in their individual accomplishments. On the Honor Roll, having exceeded their quotas, are:

Canadian Division **Hudson Division**
Atlantic Division **New England Division**
Dakota Division **Rocky Mt. Division**

Several others are within striking distance. The standings as of mid-December:

Northwestern	92.1%	Delta	79.4%
Roanoke	88.2	West Gulf	76.6
Southwestern	85.3	Atlantic	65.3
Central	84.3	Southeastern	56.9
Midwest	81.7	Great Lakes	55.5

The theme of much correspondence accompanying BF contributions in recent months has been "finally got around to it," or "been putting it off," or "sorry I'm so late." If you're in this class, start the League's second half-century on the right foot — *do it now!* Make checks payable to the ARRL Building Fund. Contributions are U.S. tax-deductible. A handsome certificate of grateful acknowledgement, shown above, is sent to each participant. Get one for your shack wall!


THIS CERTIFICATE IS AWARDED TO

in grateful appreciation of financial support given to amateur radio progress in the creation of a headquarters building for

THE AMERICAN RADIO RELAY LEAGUE, INC.

Members are Saying

Enclosed is $1 for each year I've been licensed. It repays in only a small way for the enjoyment I've had in reading the pages of *QST* through those many years. — *W1BOD*

Enclosed find contribution. I wish all amateurs realized how much we need the League and strong leadership. — *W6VON*

I'm sorry that the enclosed is all I can afford this time, but I'm married and in school which should speak for itself! — *WA4IPB*

Amateur radio is truly a hobby of many facets to those of us who benefit from, enjoy and perhaps on occasion enrich it. Lee de Forest in his autobiography *Father of Radio* most ably placed the ARRL in proper historical perspective as follows: "Foremost in the world awakening to the marvels of short-wave wireless will always be the American Radio Relay League . . . No institution or organization has had so widespread an influence in popularizing the art of radio throughout the world as the ARRL."

The ARRL as the embodiment of amateur radio launched me on my career 32 years ago. Enclosed is my delinquent contributuion to the building fund. — *WØCSZ*

I was introduced to amateur radio some 30 years ago via an issue of *QST*. The League and its publications will always be synonymous with this fine hobby. Thanks for your excellent work through the years. Enclosed is a fund contribution. — *W9YBQ*

Enclosed is a check for the building fund. I have been away from ham radio for a couple of years so I don't know what you are building, but anything ARRL wants to build is o.k. with me. — *W.14TOC*

I am giving not so much for the new Hq. building but to save some of the money ARRL has "in the bank" so it can be used for other worthwhile causes, such as incentive licensing. I hope ARRL can, as a powerful agent working in behalf of the amateur fraternity, lead the way to a new horizon in ham radio, in regard to higher standards for licensees and a new sense of pride in obtaining a ticket, to keep us above the level of citizens band far enough so as to allow no comparison between amateur operations and CB operations, as I am afraid to say the two are becoming surprisingly similar. Ever notice the similarity between 75 meters and 11 meters? — *K8UFT*

Now that I have finally become an amateur and a full member of the League, I find it only fitting to add my contribution to the building fund, with thanks for the many benefits gained. — *VE3DSB*

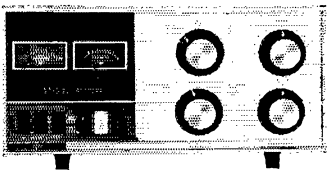
Please accept this small donation. ARRL has been responsible for me having a wonderful hobby since the year 1921 and many amateur friends I would otherwise have never known. — *W4ADG*

On behalf of the Kirkwood High School Radio Club, KØAZV, I wish to present our second contribution. We are all aware of what the ARRL has done for amateur radio and realize that the only way an organization like the League can continue to succeed is with the full support of its membership. — *W.10EVA, Secretary*

Enclosed is my second contribution. My first was made while I was a member of the Northwestern Division (K7LYN). It is evident that the Southeastern Division — where I got my start in ham radio — needs my support just as much. — *K4ZCM*

A 64-page cumulative index to *QST* is available for 25¢ postpaid, covering the years 1950-1964. Request your copy from ARRL Hq., 225 Main St., Newington, Conn.

The NCL-2000 Linear Amplifier



THE NCL-2000 is National Company's new linear amplifier, capable of power inputs of 2 kw. p.e.p. on s.s.b., and 1 kw. for c.w., a.m., or RTTY. The amplifier is completely self-contained, with power supply and r.f. circuits in a compact package measuring approximately 8 by 17 by 13 inches. Frequency coverage includes five bands, 80 through 10 meters. Two RCA type 8122 ceramic tetrodes, with a total plate dissipation of 800 watts, are connected in parallel and operated in Class AB_2. Any exciter with 20 to 200 watts peak output will drive the NCL-2000 to full input.

The input circuit of the amplifier is untuned, utilizing a resistor divider network for developing the required driving voltage for the amplifier tubes. An added feature of the amplifier is that the resistor network can also be used as a 50-ohm dummy load for tuning up the exciter, without plate voltage being applied to the amplifier tube.

An unusual feature of the amplifier is the grid-bias supply. The essentials of the grid-bias regulator circuit, on which a patent is pending, are shown in Fig. 1. In order to operate the amplifier in AB_2, with low values of grid current, the regulator circuit is designed to hold the grid-bias voltage constant at normal driving levels. However, when the grid current exceeds 15 ma. the grid bias automatically increases. Output from the bias supply, approximately –80 volts, is fed to the collector of Q_1, a series-regulator transistor. Operating bias for the amplifier tubes is obtained from the emitter of Q_1. The resistor network $R_{40}R_{41}R_{42}$ carries a bleed current of 15 ma., and a sample of the output voltage is taken from the bleed network and applied to the base of the control transistor, Q_2. The collector of the control transistor is fed from the –80-volt source through R_{38}. The emitter of Q_2 is returned to ground through CR_9, a Zener diode. The Zener diode is kept in its regulating range by the current through R_{39} from the negative supply. When the 8122 grids start to draw grid current, the bias voltage will tend to go more negative. This makes the base of Q_2 more negative and more current flows through the transistor, causing the base of Q_1 to go more positive, reducing the current through the regulator transistor. This tends to maintain the bleed current at 15 ma. and cancel any change in bias on the grids. When the grid current exceeds 15 ma. the regulator can no longer function and R_{40}, R_{41}, and R_{42} act as a simple grid leak. Thus, if the amplifier is driven past the point of regulation, the tubes will be protected because the increasing grid current increases the grid bias. (This is, of course, accompanied by nonlinearity on s.s.b., and is not an s.s.b. operating condition.)

In addition to the points already mentioned, the grid circuit also provides a.l.c. output. When excessive drive is applied to the final, modulation peaks resulting in more than 15 ma. of grid current will cause an audio voltage to appear on the bias circuit. This voltage is rectified by a voltage doubler and is then available to control the exciter gain automatically.

A pi-network tank is used in the output side of the 8122s. In order to maintain the proper LC ratios for working into a design-figure load of 40 to 60 ohms, additional capacitance is switched into the pi on both the input and output sides of the inductor on 40 and 80 meters. The inductor is a tapped coil, the proper taps being selected by the band switch.

Plate voltage for the amplifier tubes is obtained through a voltage-doubler circuit using silicon rectifiers. In fact, all the supplies in the NCL-2000 use solid-state rectifiers. The screen voltage is developed from a full-wave bridge circuit.

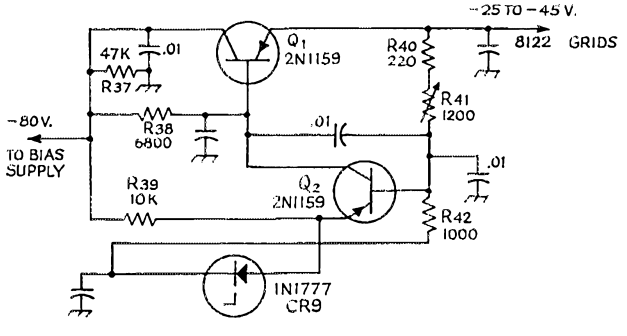
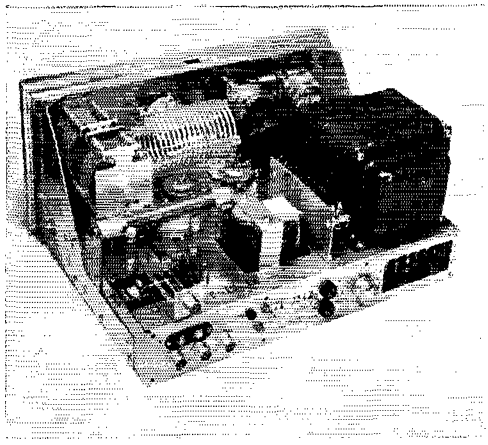


Fig. 1—The grid-bias regulator circuit.



The pi-network input capacitor and inductor are in the upper left in this view. Just below the inductor are the amplifier tubes. The antenna relay is visible through the opening in the chassis top at the left rear. Near the rear center is the blower motor and to its right is the plate transformer.

Metering of the amplifier is taken care of by two meters, one of which is switched. The plate-current meter (not switched) has a full-scale reading of 1 amp. The other meter can be switched to read plate voltage (full scale 5000 volts), screen current up to 50 ma., grid current 50 ma. full scale, and exciter tune, in which position the meter again reads grid current but with the antenna relay switched to the transmit position. This permits exciter adjustment with the amplifier plate and screen voltage off.

The amplifier is set up so that either 115-volt, 2-wire, or 230-volt, 3-wire input can be used. When the a.c. panel switch is turned on, power is applied to the bias supply and the 8122 heaters, and also to a squirrel-cage blower which cools the 8122s. A green dial lamp comes on with the a.c. switch and after approximately one minute warm-up time, another dial light marked "ready" comes on. This indicates that a time-delay relay has closed. This relay prevents the plate voltage from being turned on before the amplifier tubes have a chance to warm up. When the plate switch is closed, another dial lamp comes on. The plate switch is connected to a relay which controls the primary of the transformer for the plate and screen supplies.

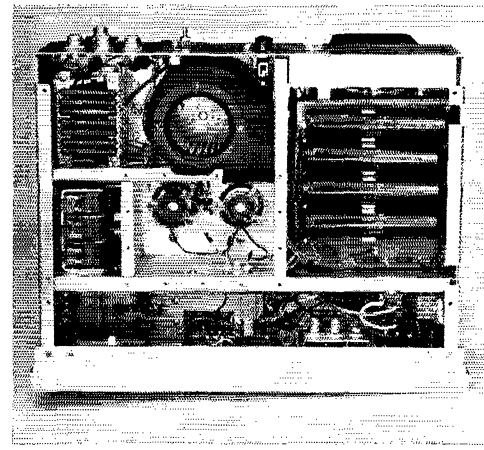
The remaining panel switch is used for changing from c.w. to s.s.b. operation. In the c.w. position the plate and screen voltages on the amplifier are 1800 and 290 volts, respectively. This is determined by a tap on the plate and screen transformer primary. In the s.s.b. position the tap is changed and the plate and screen voltages are 2500 and 400 volts.

The amplifier is designed for a *peak* input of 2 kw., which means running the tubes at 2500 volts and 800 ma. With an efficiency on the order of 60 per cent, the output is approximately 1400 watts peak. When going to c.w., 1-kw. input is 1500 volts at 550 ma. The NCL-2000 is designed so that when the amplifier is tuned up with a 50-ohm load to a c.w. input of 1 kw., all you need do is switch to the s.s.b. position and you are properly tuned up for s.s.b.

Control circuits in the amplifier include a built-in antenna relay, which is opened or closed by the plate switch when two external terminals are shorted. These two terminals can be controlled by the exciter send-receive switch or VOX. If the exciter is a transceiver, all you need do to operate "barefoot" is to turn off the amplifier plate supply and make sure that the multimeter switch is not in the exciter-tune position.

An additional contact on the antenna relay is used to open the ground return of the screen supply since the idling current of the 8122s is 250 ma., which would cause considerable noise generation. Opening the screen supply eliminates this problem.

The instruction manual is complete with detailed tune-up instructions and trouble-shooting



The resistor network for grid-input circuit is in the upper left corner. Just below the bank of resistors is the pi-network output capacitor. A bottom plate which seals off the tube compartment has been removed for the photograph; the tube sockets are visible in this compartment. At the right are the electrolytics used in the plate power supply.

information. Top- and bottom-view photographs are included with all components clearly identified, a feature we heartily approve of. A chart of voltage and resistance checks is also included. — *W1ICP.* QST

National NCL-2000 Linear Amplifier

Height: 7⅞ inches.
Width: 16¾ inches.
Depth: 12¾ inches.
Power Requirements: 110/120 volts 50/60 cycles, 220/230 volts 50/60 cycles.
Price class: $585.00.
Manufacturer: National Company, 37 Washington St., Melrose, Mass.

Results Fourth Annual RTTY World-Wide Sweepstakes

Propogation favors October 17–19 Event

THE fourth annual World-wide SS contest for the RTTY'ers featured the best propagation conditions that have existed since the advent of this event. As a result, the participation by the overseas group was by far the greatest in any RTTY contest since this mode of communication started. The top three leaders all had higher scores than the top scorer of last year. Once again Bruno Riffesser, I1RIF, took the honors with another of his outstanding performances.

I1RIF would still be top scorer without the special multipliers. Bravo Bruno!

I1RIF topped his closest competitor by nearly 8000 points and topped the best score by a North American participant by over 20,000 points! It is interesting to note that Bruno's score was so tremendous that without the additional multiplier which the rules allow for stations outside of the North and South American Continents, he would still have been the grand winner by a narrow margin. In other words if I1RIF had been allowed *only* the same multipliers as a W station he would still have won! This is indeed an exceptional feat of operating.

Conditions from the South Pacific areas to the Stateside gang were very poor which is another unusual circumstance. For the first time in the short four-year history of this contest, Asia was not represented so no contestant was able to manage all six Continents although many worked the five Continental areas that were active. 5A5TR did a fine job of giving the gang their African multiplier. Many new stations showed up in Europe for the first time in this annual jamboree. Another encouraging feature was the large increase in VE activity this year. The Canadian gang showed up in strength and gave a good account of themselves. DX contacts on both 40 and 80 increased to a large degree and for the first time several of the gang made some fine DX scores using 10 meters. A weak spot in the SS was noted again this year by the committee when a survey of the logs showed that less than one third of the stations participating bothered to file logs before the deadline.

— *W6CG*

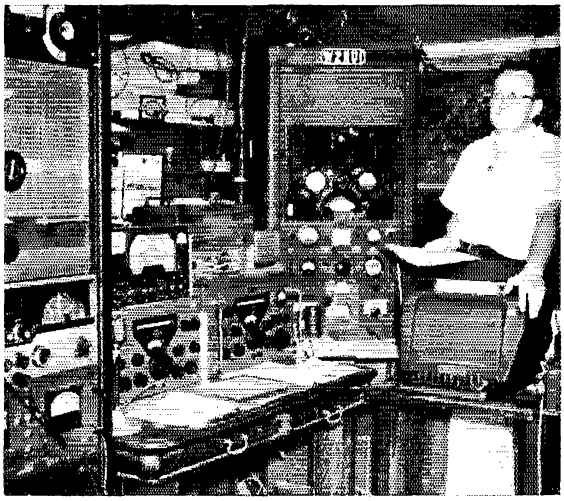
TOP TEN

I1RIF	58,840	W4EGY	29,876
DL1VR	50,950	K8MYF	28,734
I1AHN	40,690	W7VKO	28,656
K8DKC	38,444	KP4AXM	24,954
W2RUI	34,140	K8KDW	24,916

SCORES

W1AOH	16,664	K8DKC	38,444
W1GKJ	13,600	K8MYF	28,734
K1PLP	6,510	W8KDW	24,916
W1BGW	2,100	W8FWG	13,066
W1ILV	1,406	W8DBW	11,952
W1BZT	896	W8HYX	3,104
W2RUI	34,140	K8QLO	896
W2MZV	17,600	W8OMY	704
W9ECV/2	11,712	W8CAT	420
W2FAN	7,400	W9QAH	3,638
WB2AHB	2,528	WA6JEF/9	2,720
K2AMI	944	K9QNV	1,619
W2UJH	290	W9DQB	4,096
W3DJZ	17,070	DL1VR	50,950
W3KDF	15,796	DL1VN	19,800
K3YAH	14,060	DJ4BF	13,750
W3NMP	10,722	F2FO	9,000
W3ZVJ	6,036	F8KI	4,700
W3ISE	5,680	F3PI	10
W4EGY	29,876	G2HIO	4,280
W4AIS	24,520	G2FUD	820
W4BOC	21,100	GM3ENJ	5,900
WA4GTA	13,860	I1RIF	58,840
W4CQI	10,704	I1AHN	40,690
W4GJY	9,910	I1LCF	4,920
W4TMS	1,650	KH6ANR	3,016
K5QBU	6,564	KH6AX	2,508
W5FCP	5,624	KP4AXM	24,954
WA5BNH	2,732	LA6VC	20,450
W5JUM	688	LA6J	7,080
W6LDF	10,698	OZ8US	2,640
W6EV	6,672	PA0FB	3,360
W6BB	4,112	SM6CSC	9,000
W6LVQ	3,850	VE3BIJ	9,240
WA6VVR	3,310	VE4BJ	7,100
WB6GOU	1,744	VE3CM	3,382
K6SLR	576	VE3IR	1,726
W7VKO	28,656	VE3WR	1,680
W7UKC	21,680	VE7XY	520
W7PHG	12,960	VE7AMJ	360
W7BAJ	6,400	VK3KF	1,840
W7TDK	4,328	VK2EG	360
W7JFU	18	XE1YJ	4,500
W7ESN	12	YV5AVW	15,552
		ZL1WB	13,440

(*Continued on page 152*)



W2RUI, 2nd-high W-station, tops in the second call area.

PERHAPS you have read some of the recent articles in electronic literature which describe the new voice-controlled computers. According to these articles, computers will accept verbal commands, thereby simplifying the programming. In a way, it's like commanding your dog to sit, speak, play dead, and so on.

The thought occurred that such a system must be able to recognize certain syllables and that this recognition might be applied to filter theory to reject the repetitious phrases, the clichés and the "in" jargon of the amateur. The savings on the ear and on the patience would make a selective "word filter" a really worthwhile project.

The "By Golly!" Filter

A New Kind of Selectivity

BY P. E. ECKBERG,* WA6VSC

So, several weeks and a couple of junk boxes later, it emerged --- the "by golly" filter. Of course, the first model was a breadboard version and quite unsophisticated but it attenuated every "by golly" by at least 30 decibels. A considerable amount of experimentation brought this figure down to 50 decibels or, for all practical purposes, to total silence.

Installation of this filter between the first and second audio stages of the receiver brought amazing results! Here is an excerpt from an early 40-meter phone contact:

"Well, -- -----, you sure have a very Q5 signal here, -- -----. Real armchair copy, -- -----."

As you can see, not *one* "by golly" got through!

With such promising results, work was started on a "gee whiz" version but unfortunately it developed a tendency to drop out all Welsh station identifications (GWs) and had to be abandoned. It didn't really matter as there are not many "gee whiz" addicts on any more.

Just about this time a real breakthrough occurred. An obscure article published many years ago with the title "Electronic/Semantic Analogies" was found in a local technical library. This article contained the mathematical approach which allows the reduction of complex verbal statements into electrical analogies, thus rendering them suitable for filter-design calculations.

The possibilities now became exciting! First came the "very Q5" filter (how Q5 can you get?), then the "old cotton picker" filter. These were followed by the "see you down the old log", the "real fine business, by George", the "thank you for the shout", and the "old buddy" versions.

With all of these filters installed in the receiver, a real operating problem appeared. While it was pleasant not to have to hear all the "by gollies" and "very Q5s", one recent 20-meter sideband contact turned out something like this:

"WA6VSC, this is WA6KUF. Well, --- -----, you --- -------- ------, ----- --- --- --- -----. You have a ---- -- signal here in the San Francisco area, -- -----."

As you can see, it was difficult to tell if I was arm-chair copy, as the filters were chopping out all of this guy's favorite expressions.

The next development, therefore, was a "ham-expression translator" that would convert ham jargon into common English expressions. "Hearing aid" emerged as receiver, "sky hook" was converted to antenna, and "hi" came out as a jolly chuckle.

The problem with the translator, however, was the need for logic circuitry that would distinguish between similar or identical words, such as "hi" and "high", for example. Otherwise a chuckle could appear where it wasn't expected! "High fidelity" might emerge as "ha-ha-ha fidelity" which wasn't too desirable. The answer was a logic-analyzer circuit which analyzed the sentence context and translated only "ham expressions," allowing legitimate words to pass through unaltered.

For those who are interested, production models will be available shortly and will be furnished with installation instructions, diagrams, and two sets of original factory cartons (the second set for resale purposes). Each filter-translator is guaranteed to attenuate any 10 unwanted phrases by at least 50 decibels and will translate an equal number of ham expressions. Please specify your choice of "hi" filter — giggles, chuckles, and belly laughs are available.

So anyway, you old cottonpicker, any time you hear me on, give me a shout and we'll have a fine business QSO, by golly. See you later down the old log. Hi! QST

* 16 LaSalle Drive, Moraga, California.

For Public Service

Simulated Emergency Test—1964

The Story of an Important Annual Activity in Which You Should Have Been Involved

BY GEORGE HART,* W1NJM and PETER CHAMALIAN,** W1BGD

WHEN a particular activity which is beneficial to the amateur service shows an increase from one year to the next, this is because of the hard work of those who participated the year before, and those who formed the leadership, in getting new personnel lined up and in promulgating an interesting program. When it shows a decline, this is usually attributed to inconsistencies in the statistics which seem to show a result that is probably untrue.

The annual Simulated Emergency Test which was conducted in October of 1964 was of the latter nature. Most of the statistics were down, but prior to the analysis we would have taken bets that they would be up even from the all-time high of 1963. We just don't believe that interest in public service is down from last year, even though the SET statistics show a decrease in participation in this particular activity. Here are some of the reasons why the drop may have occurred:

(1) An actual emergency existed in a wide area of the south central states, which may have superseded participation by many ECs in that area.
(2) The general level of activity is so high that fewer ECs felt that they needed an SET.
(3) SCMs and SECs may in some cases have been over-zealous in weeding out ECs who have not complied with reporting requirements but who are nevertheless active.
(4) Generally poor operating conditions.
(5) Football games.
(6) Defection.

The last-mentioned is put in this position because it belongs there. We refuse to believe that there is any significant segment of amateurs who are so illogical that they would desert the one ARRL program in which everyone is in favor because of some phase of the over-all program for the upgrading of amateur radio of which they disapprove.

But, excuses excuses! The 1964 SET had many good points, and we hope herewith to detail some of them and give due credit to those who did the most in putting it over.

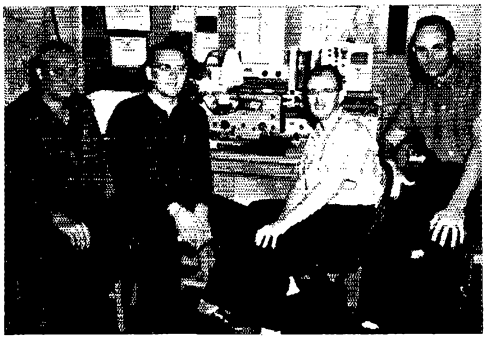
What is the SET?

For the benefit of those who are curious about all this, let us point out that the Simulated Emergency Test, usually abbreviated and pronounced SET, is an annual activity intended both to put our Amateur Radio Public Service Corps (ARPSC) organization through its paces, for self-criticism purposes, and to demonstrate to the general public and the agencies we serve or are capable of serving that we are adequately prepared. It is usually set for a particular weekend in the fall, at which time we set up a special schedule of National Traffic System networks to handle the expected load of traffic. Each local unit of the Amateur Radio Emergency Corps, one of two divisions of ARPSC, is asked to conduct a local drill simulating an emergency of the type that is likely to occur in that area. If they are unable or find it inconvenient to do so during the designated weekend, any such drill held within a month before or after those dates can be counted as the SET. Each AREC member is asked to originate at least one message. The emergency coordinator solicits messages to his

Operators at W6CXO, Red Cross amateur station in San Francisco, including (l. to r.) WA6YCY, W6JWF, W6GGC and K6CQC.

Lauderdale and Colber Cos., Alabama EC, WA4HFE during the SET.

* National Emergency Coordinator, ARRL.
** Communications Assistant, ARRL.



Here's the gang that operated at various times from K3OTS. Left to right are W3GGZ, K3UIY, K3WNG (EC Beaver Co., Pa.) and K3OTS, SEC WPa. (Photo courtesy *News-Tribune*, Beaver Falls, Pa.)

national or regional headquarters from the Red Cross and civil defense, and sends one himself to the national emergency coordinator reporting briefly the results of the test.

Most of the statistics come from the mail reports sent in by ECs on behalf of their AREC groups.

The National Traffic System (NTS, the other division of ARPSC) has the principal responsibility for handling all the traffic over distances outside the local AREC area of jurisdiction; in fact even many of the AREC nets are part of NTS. The 1964 and 1963 SET were the first ones in which the NTS undertook to do this, and this last year the system did a really bang-up job, as we shall see later on.

Served Agencies

The ARPSC serves any or all agencies that need and want its services and are willing to cooperate. This includes all agencies, both government and private, which in some way serve the general public. One of the principal to-be-served agencies is the American Red Cross, with which the League has recently revised and renewed a long-standing agreement. Another, most important of recent years, is the Office of Civil Defense of the Department of Defense. Still others include telephone and power companies, law enforcement agencies, other government departments or agencies, news agencies and newspapers, radio and TV stations, and you-name-it we-serve-it.

Only with the Red Cross, however, does ARPSC have an over-all working agreement. Civil defense, of course, is served through RACES, itself a part of the amateur service and one of the primary functions of ARPSC. Other agencies are served at local levels, depending primarily on the relationship established between them and the local AREC group.

Thus, the emergency coordinator's function is of the utmost importance and carries with it a high degree of responsibility. The SET is primarily a local operation, although the long-haul aspect has received more emphasis with entry of NTS into the picture.

Local Aspects

Whether or not an EC chooses to conduct a simulated emergency test is entirely up to him — or, more correctly, up to him and his AREC group, for one can do nothing without the other. This year's data show that 282 out of approximately 1400 emergency coordinators found it possible to conduct such a test. Those who did so deserve the greatest credit, and we shall endeavor to give it to them in the statistical analysis to follow. Where were the rest of you guys?

Long Haul Aspects

The biggest complaint from NTS participants, from local right up through TCC level, was that there wasn't enough traffic to keep them busy. If all 1400 ECs had taken part and each originated at least one message, in addition to getting messages from their Red Cross people and c.d. officials, most likely there would have been enough traffic to keep everyone busy, and some would surely have been swamped. But with less than one fourth of ECs reporting, and some of those not bothering to originate messages, many of our NTS nets, most of which set up extensive extra sessions to take care of the expected load and simulate emergency conditions, were left high and dry and dependent on routine, non-NTS traffic to keep them from falling asleep.

The NTS operating schedule was based on the premise that in an emergency the system would operate in bi-hourly cycles or, in effect, continuously. Local, section, region and area nets simulated such emergency conditions during specified periods during the SET, embracing times from 2300 October 3 to 0800 October 4, and from 1800 Oct. 4 to 0700 Oct. 5, all GMT, for a total of eight bi-hourly cycles instead of the routine two in each area. The Transcontinental Corps (TCC) set up schedules to connect all sessions of all area nets. The procedure was for local net

Who sez YLs don't participate? Here's KØTGU taking traffic from the two-meter net during the Jackson, Clay and Platte Cos., Mo., operation.

Prince Albert, Sask., EC, VE5BY, during the SET operation. Appointed on Sept. 1, he set up the entire SET operation and signed up more AREC members than any other EC in the area.

representatives to report their traffic into NTS section nets, whence it would proceed through the system toward destination. Traffic from ECs and SECs to headquarters was designated "test priority," as was official Red Cross and c.d. traffic and that from any other served agency.

It is realized that operating according to a schedule which eliminates late hours is unrealistic as to a real emergency. In such a contingency, of course, those NTS nets required for emergency operation would operate continuously throughout the night, regardless of convenience. For test purposes, this is not only unnecessary, but impractical — because we know all concerned would turn out for the real thing, while for practice or test purposes a relatively small percentage would respond.

Is this an indication of indifference on the part of NTS operators? Not at all. On NTS, who needs practice? The system operates every day, 365 days a year (366 on leap years). In the SET, NTS merely showed that it can do all the time, or as often as necessary, what it does once every day in the year.

The biggest need is closer liaison between local and section level nets, so that more of the traffic would follow established routes and less of it be handled on a haphazard basis.

Of NTS's 100-odd nets, we received reports on the form provided from 35 of them — a percentage a great deal higher than that of ECs who reported. Seven other nets reported on the standard form. Analysis indicated that NTS nets put in a total slightly short of 322 net hours during the weekend and a total of 4,454 message handlings. Of these, 20 were classified "emergency" 702 "priority" and 3667 "routine." Now someone is going to add up this breakdown and tell us it doesn't equal the total. Never mind, we know it already. A few of the reports did not break down the traffic into precedences, just gave us the total.

This is, of course, just the reported total. We know that many more nets were active who did not report, or whose SET traffic was included in their regular monthly total, and there is no way to separate it. From horseback, we would guestimate that the NTS total was about three times the figures above, making a traffic total of over 13,000 — not bad for a weekend's work, bearing in mind that nearly all nets were operating far below capacity even during the time they were on.

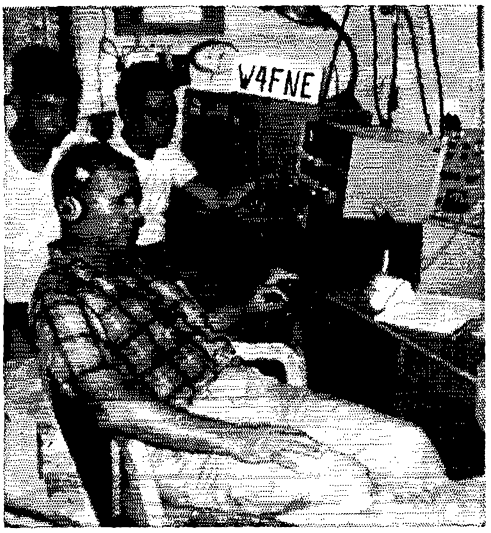
Here is a breakdown of reports received:

National Traffic System.

Net	*Hours*	*Tfc.*	*Emerg.*	*Priority*	*Routine*
EAN	8	647	3	75	569
CAN	16	405	1	58	346
PAN	16	267	2	25	235
2RN	5	123	0	52	71
3RN	16	190	1	11	178
4RN	17	338	2	33	303
RN5	32	506	1	71	434
RN6	16	130	1	15	114
8RN	10	186	0	80	106
9RN	16	91	0	8	83
ECN	16	31	1	0	30
TWN	5	60	—	—	—
BREN (Va.)	5	90	0	16	74
NCN (N.C.)	8	100	0	13	87
AENB (Ala.)	5	45	0	32	13
AENR (Ala.)	4	84	0	9	75
AENM (Ala.)	3	204	0	20	184
AENO (Ala.)	2	25	0	1	24
AENP (Ala.)	3	69	0	11	58
Newport Co. (R.I.)	2	8	0	0	8
CN (Conn.)	17	234	7	80	147
WPPN (Fla.)	18	7	0	5	2
SCN (Calif.)	22	57	0	8	49
2M RACES (Fla.)	4	119	0	2	117
GSN (Ga.)	16	173	0	11	162
Me. 2M	4	20	0	20	0
GCEN (Okla.)	3	27	0	27	0
MDD (Md.-Del.)	16	140	0	11	129
OQN (Ont.-Que.)	14	65	1	0	64
OSN (Ohio)	2	3	0	3	0
SCEN (S.C.)	3	5	0	0	5
Twin Lakes (Ark.)	1	5	0	5	0
WSN (Wash.)	18	31	0	0	31
MISS	1	4	0	0	4
AENT (Ala.)	1	10	0	0	10
NLS (N.Y.)	7	55	0	25	30
EPA (Pa.)	16	193	—	—	—
AREC (Ala.)	3	239	0	5	234
SEC-75 (N.Y.)	2	18	0	0	18
SEC-6 (N.Y.)	2	14	0	0	14
SEC-2 (N.Y.)	2	29	0	0	29
VN (Va.)	16	148	—	—	—
BC ARPSC (B.C.)	2	2	0	2	0
Tamaqua (Pa.)	4	12	1	11	0
Non-NTS Nets.					
Randolph (Ind.)	1	4	0	0	4
Everglades (Fla.)	5	64	27	14	23
Milton-Northumberland (Pa.)	8	8	0	0	8
Blue Valley (Nebr.)	2	11	11	0	0
Spiderweb (Minn.)	1	4	3	0	1
Henry Co. (Ind.)	1	0	0	0	0
Chautauqua Co. (N.Y.)	2	0	0	0	0

Red Cross Participation

The American National Red Cross has always been a principal participant in our SET, and in 1964 the participation has been even heavier because of the recently revised understanding between ANRC and ARRL (see page 20, Apr. '64 *QST*). We present the following summary of Red Cross SET operations as received from area



Front to back, WA4NXV, W4FNE and WA4AGN operated during both Hurricane Cleo and Dora, and then in the Orange Co., Fla. SET.

offices and national headquarters in Washington.

Prior to the SET, national headquarters sent out a bulletin to all four area offices instructing them how to contact amateurs and specifically what to do in connection with the forthcoming test, including a suggested letter of instruction to chapter officials. This letter resulted in many chapters receiving information on amateur radio availability because it included the calls and addresses of local ECs and other ARPSC officials to be contacted.

Red Cross area offices are located at Atlanta (Southeastern), Alexandria, Va. (Eastern), St. Louis (Midwestern) and San Francisco (Western). In each area an amateur station was set up to handle traffic from Red Cross chapters to area offices and vice versa during the SET.

The Southeastern Area office in Atlanta reports 85 messages sent and 92 received. The station used was W4DOC, club station of the Atlanta Radio Club, with the following amateurs assisting either as operators of W4DOC or from their home stations: K4MDC, *W4s* WKP YE FOE PIM JWO, WA4HHK.

The Western Area office in San Francisco operated W6CXO, club station of the Naval Shipyard Amateur Radio Club in another all-out effort to make contact by amateur radio with Red Cross chapters in the area. On Oct. 1 and 2 some 364 messages were originated by W6CXO and cooperating stations K6TWJ, W6BIP and W6QIE. Then on Oct. 3–4 W6XCO was manned by W6JWF (in charge), W6GGC, W6GHI, WA6YCY, W6IMF, W6OPL, W6FAX, K6CQC, WB6FBS, WN6MOK and WB6FDM. K6GRX tied in with the Calif. RTTY Net. By the end of the month, 146 replies or acknowledgements had been received from chapters addressed, considered by W6JWF to be an excellent showing. The NCEFs, the Mission Trail Net (3854 kc.) and MARS channels were used during the operation.

The Eastern Area office reports 64 messages sent and 118 received. This area utilized the services of W4PAY, club station of the Northern Virginia Amateur Radio Club, and 25 of its members, including the following principals: *K4s* MXF MLB, *W4s* HFH (Alexandria Radio Club) MXU ZMC OP and RIIA.

The Midwestern Area office in St. Louis operated the St. Louis Amateur Radio Club station KØLIR and the operating services of *KØs* KJX TOV, *WØs* BGO DSW. KØAEM operated his home station. A total of 115 messages were sent from this office and 75 received.

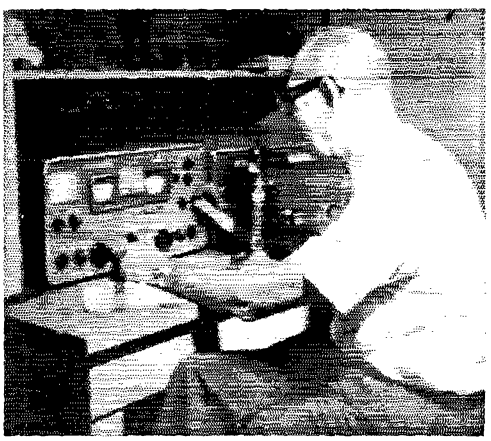
National headquarters in Washington did not originate any messages, but 52 were delivered by local amateurs. The opinion expressed at the national level was that analysis of received traffic indicates a marked improvement over previous years in accuracy and delivery time attributable to placing traffic in organized networks. The '64 SET was characterized by an increase in chapter participation and greater area support, believed principally a result of the revised understanding between ARRL and ANRC.

The following quote comes from the Eastern Area Office: "We feel the operation was a very successful one and as a result shows that lack of normal communications facilities in a disaster situation in almost any section of the Eastern Area should not be a major handicap to getting the job done."

The national office wishes to express its deepest appreciation for outstanding support rendered by area office collection stations and to all those amateurs who supported local chapters. We regret lack of space does not permit us to list all the calls.

Headquarters Traffic

Headquarters received 308 messages reporting SET operations. W1BGD and W1NJM divided



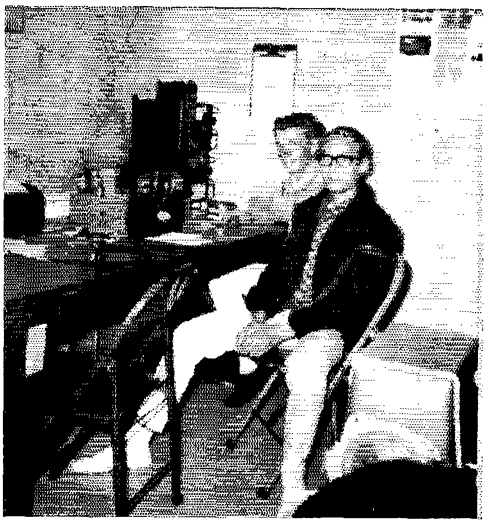
W8MCW, Asst. EC, operated the Dayton, Ohio Red Cross station during the Montgomery, Greene and Preble Cos. drill.

up the time and concentrated on receiving this traffic on the Conn. Net and the NCEFs. With W1AW in temporary operating quarters in the basement of the building and with most of the traffic coming through NTS, the headquarters station, which usually collects the most, this year failed to collect a smidgin. The following delivered SET traffic to headquarters in the amount indicated: W1NJM (124); W1BGD (113); W1BDI (19); K1PQE (17); K1LFW (10); W1EFW, K1RQO and W1YBH (5); W1DZM and W1PTS (2); WA1BUL, W1ECH and K1ZYF (1). (Some delivery stations were unidentified.) Of the 308 messages, 170 were reports from ECs, 138 were from other AREC members, net managers, SECs or other officials.

Statistical Analysis

We present below the customary analysis of statistics derived from the mail report forms submitted by ECs or persons acting for ECs. The non-competitive scoring system remains the same from year to year because AREC groups try to better their previous scores, but in any event contribute as many points as possible to the national total. The "standing" by sections is based on four factors involving reports and total points. Inevitably, the more populous sections would tend to place higher. However, we note in passing that the perenniel high scoring sections are not the greatest in amateur population, while those with high population often place comparatively low. This just goes to show that effort and interest play the biggest part. How did *your* section place, compared with last year (in parentheses after your section's point total)? What did *you* have to do with it?

Figures in parentheses are 1963 scores for comparison:
Total Reports Received: 282 (325)
By Mail: 217 (276)
By Radio: 160 (136)
By Hearsay: 17 (14)
Total Reported AREC Membership: 7320 (9014)
Total Known Participation: 3697 (4459)
Mobiles & Portables: 1150 (1483)



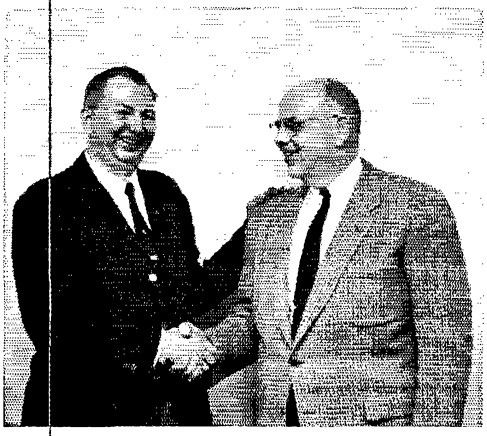
WA8KYN and WA8KKQ in the AREC communication center, in the Red Cross office, Monroe, Mich. before the SET. Things were too hectic to take pictures during the operation.

Fixed Stations on Emergency Power: 235 (260)
AREC Messages Sent to SEC: 2225 (2698)
EC Radio Reports to ARRL: 156 (177)
Per Cent Received by Radio: 75.0 (59.4)
Total Points Compiled: 30,522 (36,449)
AREC Groups also heard from in 1963: 143 (135)
AREC Groups bettering 1963 score: 62 (71)

Area of Jurisdiction	*Reported by*	*Points*	
1. IOWA (25 reports)		1328	(1)
Buchanan Co.[1, 2, 3]	KØVQL	21	
Buena Vista Co.[1]	KØEVC	49	
Cedar Co.[1, 30]	KØHCL	24	
Cherokee Co.[1]	KØTBO	63	
Clinton Co.[1, 2, 3, 15]	KØSCW	158	
Floyd Co.[3]	KØYVU	....	
Gardner Co.[3]	WAØSSW	....	
Handcock Co.[1]	WAØFSW	32	
Hardin Co.[2]	WAØFEX	....	
Humbolt Co.[1, 2, 3]	WØFDM	39	
Ida Co.[1, 3]	WAØAMX	24	
Jefferson-Van Buren Cos.[1, 2]	KØIQV	41	
Jones Co.[1, 3, 32]	WØCQC	50	
Kossuth Co.[1, 3, 33]	WAØDQD	31	
Linn Co.[1, 2]	KØQKR	158	
Mills-Pottawattamie Co.[1, 25]	KØPOI	116	
Muscatine Co.[3]	....	....	
Pocahontas Co.[1, 3]	KØZKA	21	
Palo Alto Co.[3]	WAØCKZ	....	
Plymouth Co.[1]	KØYWC	89	
Sac Co.[1]	WØYOZ	73	
Scott Co.[1, 15]	KØMST	83	
Story Co.[1]	KØYLO	99	
Wapello-Davis Cos.[1, 2, 3]	KØYPP	86	
Webster Co.[1, 6]	KØARA	71	
2. ALABAMA (13 reports)		1799	(5)
Alabama Gulf Coast [1, 2, 3]	K4THT	559	
Blount Co.[1, 2, 3]	W4TSY	31	
Etowah Co.[1, 3]	W4PAC	38	
Franklin Co.[1, 6]	W4RLS	101	
Huntsville [3]	K4ADK	....	
Lauderdale, Colber Cos.[1, 2]	WA4HFE	130	
Limestone Co.[1, 2, 3]	K4YKA	95	
Macon Co.[1, 2, 3]	K4HJX	100	

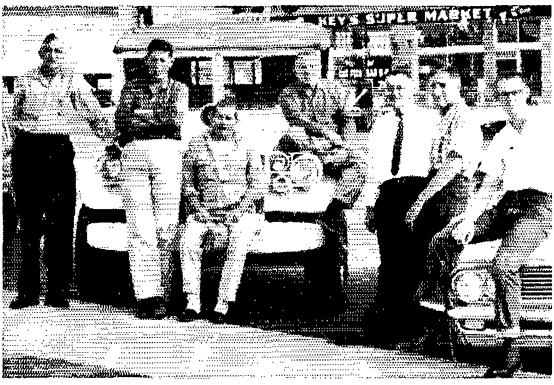
Active in the Gloucester Co., N.J., test, WA2WWF operated mobile, while WA2TOW is shown here with the clip board.

Madison Co.[1, 2, 3]	W4YFN	338	
Marshall Co.[1, 3]	K4WHS	93	
Morgan Co.[1, 2, 3, 16]	K4WHW	168	
St. Clair Co.[1, 2]	K4NUW	76	
Tuscaloosa, Pickens Cos.[1, 3]	K4GXS	70	
3. EASTERN FLORIDA (14 reports)		2574	(2)
Alachua Co.[1, 2, 17]	W4KZL	291	
Broward Co.[1]	K4OAP	165	
Clay Co.[1, 2, 3, 19]	W4WHK	46	
Desoto Co.[4]	.....	....	
Duval Co.[1, 3]	W4GUJ	218	
Manatee Co.[1, 2, 3]	K4ILB	123	
Monroe [3]	WA4OXH	....	
North Dade Co.[4]	K4GPJ	548	
Orange Co.[1]	K4ZXS	558	
Osceola Co.[1]	W4DDW	71	
Polk Co.[1, 2, 3]	W4FP	201	
Sarasota Co.[1, 2, 18]	W4DSH	92	
South Dade Co.[1, 2, 3]	W4RQP	177	
St. Lucie Co.[1]	W4RGJ	84	
3. OHIO (15 reports)		1811	(10)
Ashtabula Co.[1]	K8LXA	66	
Buller Co.[1, 3]	W8MGA	87	
Clearmont Co.[3]	W8OWP	....	
Dayton [3]	W8IEQ	....	
Franklin Co.[1,3]	W8ETU	210	
Hamilton Co.[3]	W8SQK	....	
Harrison Co.[1]	K8LGB	11	
Jefferson Co.[1]	.....	160	
Lucas Co.[1, 2]	K8TVW	502	
Montgomery, Greene, Preble Cos.[1]	W8ILC	214	
Portsmouth [3]	K8BNL	....	
Richland Co.[3]	WA8MBR	....	
Ross Co.[1, 2,2]	K8SUB	133	
Stark Co.[1]	K8UBK	204	
Van Wert Co.[1, 3]	K8PFD	194	



K3NYD (right), deputy emergency coordinator for Delaware County, gets personal congratulations from SCM W3ZRQ for a fine job.

5. NEW YORK CITY — LONG ISLAND (10 reports)		2748	(4)
Bronx & Yonkers [1, 3]	WA2QAO	213	
Kings Co.[1, 2, 3]	WB2DUD	837	
Kings Co. 2-Meter Net [3]	WA2GEB	....	
Manhattan [3]	WA2VKK	....	
Nassau Co.[1, 3, 12, 13]	W2FI	1428	
Nassau Co. Area [1, 10]	W2UAL	105	
Nassau Co. Area G [1, 3, 11, 13]	W2ELK	....	
Queens Co. 10-Meter Net [1]	W2IAG	135	
6. INDIANA (12 reports)		1016	(6)
Cass Co.[1, 2, 3]	K9WET	137	
Dearborn Co.[1]	K9ZIW	33	
Delaware Co.[1,3]	W9FYC	170	
Henry Co.[1]	W9SVL	44	
Jay Co.[1, 2, 3, 7]	K9VXH	131	



After completion of their SET, members of the Terry Co., Texas, AREC assembled for this shot. Left to right are: W5NFO, Asst. SCM, K5LFJ, W5AMA, K5s GEC JST LFI KWZ.

Johnson Co.[1]	K9QJT	107	
Madison Co.[1, 3, 31]	W9FWH	101	
Morgan Co.[1, 3]	W9ZSK	90	
Randolph Co.[1]	WA9GKF	47	
Ripley Co.[1]	K9PYM	27	
Seymour[5]	W9RTH	....	
Wayne Co.[1]	K9QAN	129	
7. TENNESSEE (11 reports)		1044	(3)
Bristol[1, 2]	W4YAU	137	
Davidson Co.[1]	.....	48	
Gibson Co.[1, 3]	W4IGW	27	
Greene Co.[1, 3]	WA4PFD	34	
Madison Co.[3]	W4KAT	....	
Oakridge, Anderson Cos.[1, 3]	K4VOP	105	
Orange Co.[3]	K4ZXS	....	
Roane Co.[1, 12]	W4VNU	61	
Rutherford Co.[1, 3, 10]	W4SZE	73	
Shelby Co.[1, 3]	K4FZJ	428	
Sullivan Co.[1, 2, 3, 15]	W4TYV	131	
8. NORTHERN NEW JERSEY (12 reports)		753	(7)
Belleville[1, 3]	WA2BNF	79	
Brielle[3]	WA2MXR	....	
Elizabeth[3]	W2IIN	....	
Englewood[1]	WA2CCF	93	
Fanwood[1, 2,3]	W2HXP	56	
Jersey City[3]	W2ZAL	....	
Madison Twnship[1, 3]	WB2ALF	97	
Morris Co.[1, 3]	K2ZFI	174	
Oakridge, Dover, Boonton[3]	.....	....	
Red Bank[1, 3]	WB2BCS	184	
South Amboy[1, 2, 3]	K2BEV	70	
Sussex Co.[3]	WA2SED	....	
9. EASTERN PENNSYLVANIA (7 reports)		1545	(18)
Adams Co.[1, 3]	K3EYL	57	
Lackawanna Co.[1, 2, 3]	W3QDW	139	
Montgomery Co.[1, 3]	W3AHZ	621	
Northumberland Co.[1, 3]	W3LXN	177	
Philadelphia Co.[1, 2, 3]	W3ELI	409	
Schuykill Co.[1]	W3ZRQ	47	
Susquehanna Co.[1]	K3PBU	95	
10. MICHIGAN (8 reports)		976	(8)
Hillside Co.[1, 3]	K8GKX	60	
Ingham Co.[1, 2, 29]	W8CKK	280	
Kalamazoo Co.[1, 2, 30]	K8JZP	283	
Lapeer Co.[1, 2, 3]	W8EST	72	
Manistee Co.[1, 26]	W8DCT	49	
Menominee Co.[1, 3]	W8QGQ	31	
Monroe Co.[1, 2, 3]	W8NDM	176	
Montmorency Co.[1]	W8ZHB	25	
11. EASTERN MASSACHUSETTS (7 reports)		777	(12)
Cloveland[1, 2, 3]	W1MRQ	109	
Needham[1, 2, 8]	W1STX	79	
Newton[1, 3]	W1RM	129	
Sharon[1, 2,3]	K1ICJ	121	
Somerville[1]	K1DZG	98	
Waltham[1, 3, 9]	W1JSM	85	
Winthrop[1, 10]	W1BB	156	

(*Continued on page 138*)

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* W1NJM

DELUGES OF TRAFFIC

THE other day, on a TCC schedule, K6DYX presented us with 135 messages, 130 of which were Christmas and holiday greetings originated at a home show or something of the sort on the coast. With good signals, it took us 2½ hours to clear the hook. That evening we started peddling them on the various section and region nets and the area net here on the East Coast, but conditions being what they were we managed to clear only about half. A few more the next night and the rest the third night and we were clean again.

There are some traffic men who wouldn't consider 135 messages such a big load for one sked, but for the average (including the writer) this is ten times or so the usual number. Other stations and nets have been similarly busy, making it even more difficult to clear the traffic because of everybody being "loaded." Result: slowdown, delays, garbles, and ultimately bad public relations when messages are delivered late or not at all, or are butchered from their original form.

In normal times, amateur traffic handlers are geared to perform a daily traffic-handling service featuring a moderate flow of messages. Everything hums along satisfactorily, nets meet and observe their schedules, operators keep in trim without knocking themselves out, and everybody is happy. Then what happens? Someone or some group decides he or it will make a big public relations pitch for the amateur by setting up a booth somewhere and not only offering but urging all comers to file messages to anyone, anywhere, anyhow, saying whatever comes to mind or, if they can't think of anything to say, things are suggested that they might say. Such traffic is usually generated by someone not intimately acquainted with message form or message-handling procedure, and is dumped into the traffic nets more or less unceremoniously, not to mention magnanimously, with the attitude that this is not only giving amateur radio a big PR lift, but it is helping the traffic nets by keeping them busy, giving them something to do.

It is true that the traffic nets have to be kept busy and that traffic men want traffic to handle, but *this* is ridiculous. We regularly go from traffic drouth to traffic flood every December, and at other times we frequently coast along more or less somnolently until someone crashes one of our nets with an electrifying "QTC 135." The question we should ask ourselves is, "How do we prefer our traffic load — too light or too heavy?" Because it seems it is always one or the other.

We traffic men are at a disadvantage in this matter, because for the most part we don't originate the traffic, we just handle it, and we are sort of pledged to handle as well as we can anything that comes along. On the other hand, we are doing this because we like it, and most of us *don't* like it when our facilities are suddenly flooded with "junk" traffic and its concomitant implication that we should spend a lot of extra time and effort handling it. As an analogy, one might say that if one likes beer, one would enjoy drowning in it. Anyway, it's the same kind of logic.

Ed Hart, W2ZVW and W3NF, is well known to most traffic handlers and CD Party enthusiasts. Ed is an ORS, A-1 Op., holds CP-45 (CWA) operates in NTS from the section to TCC level, and is past manager of 2RN. Incidently, he is W1NJM's older brother, but don't hold that against him.

In an emergency situation, of course, there is a difference. What we enjoy doing is simply set aside at such times, and we roll up our sleeves and get the job done, whether it is dirty or not, and revel in the fact that we are prepared and skilled enough to do it well so that somebody will benefit from it, and so that lives can be saved. But in normal times, nothing can drive an amateur away from traffic handling quicker than throwing him bodily into a situation in which he is subjected to large gobs of "junk" traffic.

So, what to do? Trouble is, most who read this are the ones who handle the traffic, not the ones who originate it, and the latter are the ones we have to reach. So here's the solution, and it requires some action from *you*. Whenever you hear of someone or some group making plans to set up a "traffic mill" at some public event, let us know so we can send a set of our pre-prepared suggestions for doing this. We don't want to veto the idea, we just want to advise the perpetrators how to do it right, so the amount of traffic generated will not impose an undue burden on anybody and so it will be good traffic. Sometimes a club, perhaps one of which you are a member, will ask your advice, knowing you are a traffic man. *Please* write for our recommen-

*National Emergency Coodinator.

dations, or ask a club officer to do so. We traffic men like to handle traffic, naturally, but there can be too much of a good thing. — *W1NJM*.

—•••—

Some time back, we mentioned that occasionally our readers asked who was committing these outrages in *QST*, and we advised all and sundry that W1NJM was solely responsible for the AREC and Traffic Topix columns. Since those two columns have been combined into this ARPSC section of *QST*, no one will ask this question because the name and call of the conductor of the column is printed plainly above.

For the record, however, and to give credit (also affix blame) where it is due, let it now be known that although W1NJM retains supervisory responsibility for the whole works, a portion of the actual work is regularly done by W1BGD, who each month laboriously prepares the NTS statistics, the AREC "diary" including the SEC report summary, RACES News (if any) and any special emergency write-ups.

National Traffic System

Editorially speaking, we're pretty critical, but once in a while something comes along that strikes us as worthy of being quoted word for word. Tucked away in our source material for this sub-heading, a marked item in a back issue of the *8RN Newsletter* has come to light. Despite the fact that it talks about 8RN, we're sure it applies to any NTS net at region level and probably to many at other levels as well. It is entitled "A Small Pep Talk."

"The net is not 'my' net, nor is it ARRL's net, nor NTS's net. Its functioning depends on the functioning of each individual member in performance of his duty as he volunteered to do it, and in trying to build the net by recruiting new members. We need more representation from the sections, more help on EAN and NTS work, and generally a better net operation. This need not be a faster net, but we should and must get our job done — that is, we must be able to clear traffic to and from the area and among the sections. It is a responsibility of the section nets to provide liaison to and from 8RN, and it is my responsibility to line up NCS and EAN liaison stations. However, the RMs cannot do their jobs in the face of apathy, and too often the NCS and EAN jobs are built almost entirely from members of the same section net.

"Perhaps we should stop and think for a moment what we are doing when we join in a system of networks such as NTS. This is a completely voluntary organization of several thousand amateurs, dedicated to keeping themselves trained in written communications, self-improvement, both available for and capable of handling life and death emergency communication should the need arise. It covers the entire 50 states, possessions, and all Canadian provinces. In an emergency it is capable of handling quite sizable amounts of emergency traffic on a local, regional or national basis. Belonging to NTS is something to be proud of. Doing one's utmost to build the system, while building individual proficiency, is no small task. The more operators and stations we can get into the system the better we can fulfill the goals of NTS. We cannot for a moment stand still, because we then find ourselves slipping backward." — *W8CHT*.

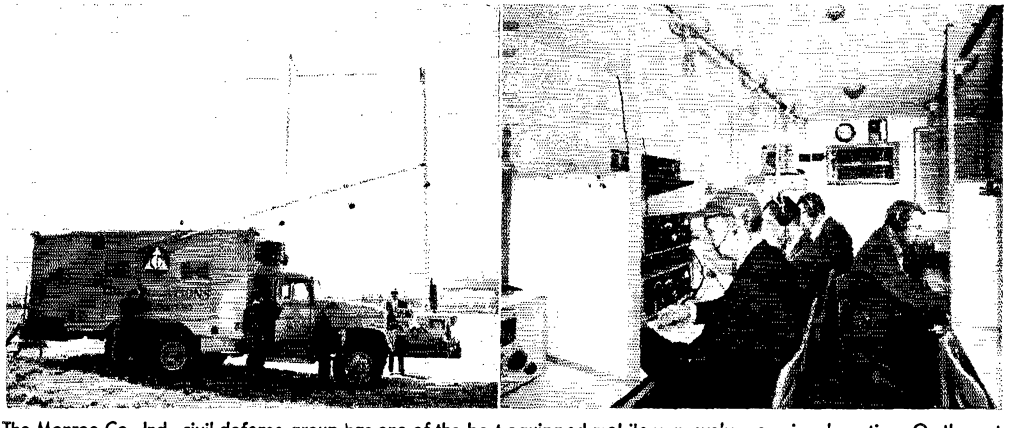
November reports:

Net	*Sessions*	*Traffic*	*Average*	*Rate*	*Representation (%)*
EAN	30	1546	51.5	.977	97.7
CAN	29	943	32.5	.727	100
PAN	30	1216	40.5	1.000	98.3
1RN	53	479	9.0	.311	84.1
2RN	60	664	11.6	.579	99.0
3RN	60	542	9.0	.315	93.9
4RN	60	716	11.9	.416	93.8
RN5	60	847	14.1	.361	90.5
RN6	60	825	13.8	.508	97.8
RN7	29	554	19.1	.530	85.5[1]
8RN	60	336	5.6	.253	76.7
9RN	30	331	11.0	.393	95.0[1]
TEN	60	433	7.2	.350	78.9
ECN	30	93	3.1	.145	90.0[1]
TWN	27	289	10.7	.388	88.9[1]
Sections[2]	1227	6686			
TCC Eastern	111[3]	543			
TCC Pacific	112[3]	944			
Totals	1905	17,987	8.7	PAN	CAN
Records	2100	21,014	12.6	.934	100

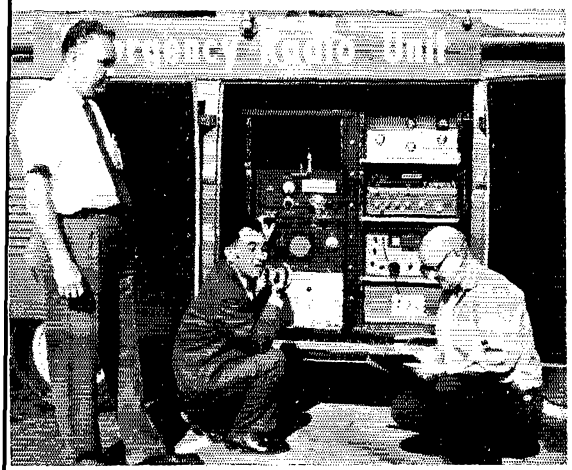
[1] Representation based on one or less sessions per day.

[2] Section nets reporting (40): QFN, WFPN (Fla.); AENB, AENM, AENO, AENP (morn.), AENP (eve.), AENR, AENT (Ala.); OZK, QAN (Ark.); CN (Conn.); NCN (late), NCCW (N.C.); GNB (Ont.); BUN (Utah); SCEN, SCCW (S.C.); OSSBN, BN (Ohio); OSN (Ore.); MTN (Man.); MDDS (Md.-D.C.-Del.); WSBN (Wis.); PTTN, PFN, EPA (Pa.); OQN (Ont.-Que.); VTNH (Vt.-N.H.); SCN (Calif.); QMN (Mich.); RISPN (R.I.); MJN, MSPN (noon), MSPN (eve.) (Minn.); NTTN (N. Tex.); VN, VSN, VSBN (Va.).

[3] TCC functions not counted as net sessions.



The Monroe Co., Ind., civil defense group has one of the best equipped mobile vans we've seen in a long time. On the outside we have 6- and 2-meter antennas, provisions for h.f. antennas, a 6-kw. generator and a public address system. The equipment can be powered from either the generator or 117 volt lines. Standing left to right are K9TZJ, K9QKZ, K9CWA, W9MTU. Inside we have a complete h.f. station including RTTY, complete stations on 6 and 2 meters, and such luxuries as an air conditioner and heating unit, exhaust fans, spring-wound clock, storage for tubes, tube tester, spare parts, a hot plate and coffee making equipment. Pretty neat setup, eh?



Speaking of vans, the one above is operated by the West Covina, Calif., AREC. It is equipped with a full kw. on 80 through 10 meters and lower power on 160, 6 and 2. The entire station is powered by a 3½-kw. generator which in turn is powered by 2 of the cylinders in the engine. The other four cylinders drive the wheels. Standing on one side of the van are: W1KUX/6, Asst. SEC, W6YBB and K6OFS. A very impressive set-up!

We broke the rate record this month. Most of the net managers are complaining about poor condx and the fact that their nets aren't coming through with the same totals they did the same time last year. While it's true that we are below the record figures, the extra work involved in getting as much traffic through as we did deserves a pat on the back and a "well done" to each and every one of you!

K1WJD is hard at work on an EAN bulletin for issuance early in January. W9DYG is back on the air from his new QTH and says conditions have really been hard on CAN operation. WB6JUH is pleased with PAN's operation during Nov. even though there is still room for improvement. W1BVR notes 1RN's difficulty coping with conditions, the second session being almost completely wiped out. WA2GQZ sez 2RN is just about holding its own. Skip troubles bother 3RN, but they just keep rolling along according to Manager K3MVO. On RN6, WB6BBO thinks conditions are slowly getting better with skip not so erratic on the early session. K7JHA is pleased that RN7's average and rate figures are holding up despite condx and lack of traffic. W9QLW optimistically looks for things to go up in December because they can't go down. *WØLGG reports* ole man skip making things rough on TEN and it's sometimes necessary to have a station from the east coast QNB.

Transcontinental Corps. W3EML has finally gotten a few stations to handle the Station D skeds. Any more night owls interested? W4ZJY has resigned as director of Central TCC. W7DZX sez things are looking up a little with a few new stations making themselves available for TCC skeds.

November reports:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	111	82.9	1614	543
Pacific	120	85.8	1888	944
Summary	231	84.8	3502	1487

Net Reports:

Net	*Sessions*	*Check-ins*	*Traffic*
Eastern Area Slow	26	47	36
7290	40	1305	730
Interstate SSB	29	1109	553
Northeast Area Barnyard	25	680	17
North American SSB	25	306	328
Hit & Bounce	30	465	705
20 Meter SSB	21	803	2196
CNEN	27	704	3

Diary of the AREC

During a routine patrol on Oct. 31, K1FTY was stationed in a shopping center parking lot when a car suddenly burst into flames. He immediately notified WA1BXA, operated by WA1AOQ, the West Hartford, Conn. AREC base station. Fire officials were notified by means of the direct phone line to the fire department and a truck was dispatched. — *K1SJG, EC West Hartford, Conn.*

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On Nov. 14, several amateurs from Memphis, Tenn., assisted the Illinois Central Railroad when one of their long freight trains broke in two between Holly Springs, Miss. and Grand Junction, Tenn. Although there was no danger to life or property, it was necessary that the train dispatcher know how much time would be consumed in chaining up the car with the broken draw bar, so that special instructions could be given to train crews if necessary.

Before leaving his office, WA4HBY, the railroad agent at Holly Springs, alerted K5FMV, who in turn alerted WA4FSR, WA4LSV and W4OQG, all in Memphis. WA4HBY finally located the runaway cars and relayed information to the chief train dispatcher in Memphis. — *W4WBK, V. Dir., Delta Division.*

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Emergency communication was provided by the Marin Amateur Radio Club on Nov. 29 in a search for a missing University of California professor on Mt. Tamalpais in Marin Co., California. When communication between the search headquarters at Stinson Beach and the sheriff's office in San Rafael was not possible, mobile units from the Marin Club reported to the search scene and provided communications through a relay point on the east ridge of Tamalpais. The missing professor was found dead on Nov. 30, having succumbed to exposure after apparently having fallen while hiking. Those amateurs known to have participated were: *W6s* FVK HST, *K6s* APA BAQ RKG JGX, *WB6s* GLD IMO. — *WA6AUD, SCM, San Francisco Section.*

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On Dec. 8, WA2THL was racing up route 130 in N.J. in answer to a fire call. The municipal building in Willingboro was on fire, and he wanted to warn fire fighters that several full gasoline cans were stored in the civil defense office. *W3s* ELI GPO YPK and K3VGN were monitoring 6-meters when they heard WA2THL's emergency call. They immediately called the Willingboro police department and relayed the warning. — *W3ELI, SEC, E. Pa.*

—•••—

On Sept. 22, the Falls City, Nebr., AREC went on alert should their assistance be needed in fighting a brush fire. Mobile units were set up at the scene of the fire and in the city, but the fire was quickly brought under control and emergency communication was not required. — *KØDIN, EC Falls City, Nebr.*

—•••—

Members of the Kanawha Co., W. Va., AREC activated two nets and went on alert Nov. 7. Several forest fires were raging throughout the county and their help might be needed. Luckily, winds were next to nil and the fire didn't spread to such proportions that it couldn't be controlled. Over 30 amateurs were ready and standing by just in case. — *W8IRN, EC Kanawha Co., W. Va.*

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The Milwaukee AREC provided its services on May 10 by supplying the cars and communication for a collection of receipts from teenagers who had conducted a door-to-door canvas, collecting for the luekemia drive. Some ten mobile units were available and they were instructed as to where to make the pick-ups by K9ZPP, net control. — *K9KJT, EC Milwaukee, Wis.*

—•••—

Thirty SECs reported for October representing 14,413 AREC members. This is a drop of 9 SECs and some 3,600 AREC members over last year. C'mon, fellers, let's get those reports in! Sections heard from are: E. Mass., Sask., Alta., Del., S. Tex., Ind., Utah, Mich., W. Fla., Nev., Ala., E. Fla., Wyo., Wash., B.C., Maine, Ark., Ariz., N.C., Va., Colo., N. Mex., Nebr., S. Dak., Okla., N.N.J., Iowa, Minn., R.I., N.Y.C.-L.I., Kans. QST

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Sciences and the industries have always deluged us with downpours of specialized vocabulary. Much terminology listed as "new words" by lexicographers a few years ago now is conversational commonplace; a larger number didn't hang around. We're at flood stage right now and sinking deeper.

There is also a startling acceleration in the age-old pastime of whomping up new exalted handles for old familiar objects. Thus you may hear the newer generation discussing remote-tuned voltage-fed dipoles (Zepps) as they monitor their anode current read-outs (plate meters).

Most of us don't strenuously object to a steady diet of new syntax, tube types, country callsign prefixes, etc. We accept the fresh lingo as a communicative aid in a world of change. But we're likely to bristle when some wise guy tries to sell us a miniature collapsible portable identification records and legal tender file when we know it's only a wallet. This news clipping forwarded by K7VMK deals with the problem:

AN EVEN SWAP ???
Fronkelsnortz for Sorlit-Sfitzer

Edmonton, Alta., Canada (UPI) — Anyone who manufactures fronkelsnortzes can find 31 possible buyers in Canada, particularly if they come equipped with transverse gridges and other special accessories.

G. H. Wheatley, advertising manager of the Edmonton *Journal*, ran an ad for a fronkelsnortz in his own paper the other day and got a pleasing commentary on advertising readership.

The model he advertised came with a transverse gridge, special power dippoleck and left-handed zoenstiff.

Thirty-one persons wrote back. Only five asked what the machine was, if it was a machine. The others carried on the fun.

One firm said it would buy the fronkelsnortz at 10 per cent below the original price if it was a Mark IX model.

One man offered 450 herns or a straight trade for two 1948 sorlit-sfitzers (one on skids).

Many trades were offered. These included a variable-preble lapse tuner (with a complete set of stainless steel gropers thrown in gratis), a 1957 veeble feetzer with an output of 17 blink-kovac and a 1958 splitzenkister with a self-lubricating glokspleen and hoofer shaft.

Mr. Wheatley apparently got his fill of superfluous technical gobbledygook and struck back. You can do the same. Next time somebody offers you an electromagnetic interceptor (receiver) with an altospectral heterodyner (h.f. oscillator), variable-scan intraspectrum (tuned i.f.), Q-magnifying audio extractor (regenerative detector) and extraspectral multicircuit segment selector (band switch), just offer a dozen selected herns or a transverse-gridged fronkelsnortz in trade.

*7862-B West Lawrence Ave., Cnicago, Ill. 60656

What:

Wonder where we can pick up one of those variable-preble lapse tuners. Could come in mighty handy in the 1965 ARRL DX Contest getting under way this month. That premium set of stainless-steel gropers may be just the thing for a confusing 20-meter pile-up. Our 14-Mc. band will bear the brunt of Test pressure, as usual, but the guys with the BIG scores will have milked the other bands for multipliers. This month we give 20 an editorial breather while the "How's" Bandwagon tools along other scenic DX byways. A listing like "BY1PK (3) 12" in the 40-meter rubric means that BY1PK was reported using 7003 kc. at 1200 GMT. *Gid-dap*! . . .

15 Novice is a good place to start our DX tour, for the newcomers are commendably making the most out of rather bitter days on 21 Mc. **WNs** 1BXP 2LLK 2OLN 3BFB 3BFR 4UXU 6IWX 6KKM and 6LIV await the colorful wallpaper of **CEs** 1GJ 2CT. **CO2s** CO FE 17, **CR6IG** 15-16, **DJ1XW** 9, **F9TE** (132) 7-8, **Gs** 2HHV 2ZR (150) 9, 3IDG 3RFE 14, **HA7PJ**, **HC1JQ** (130) 22, **JA1LPZ**, **KA2CJ**, **KP4s** AOO (150) 22, AQL 17, **KZ5MC**, **ON4NQ** (150) 10, **PA0WOR** (132) 11, **PYs** 1GU (108 17, 2GFK 2SO 5ASN (132) 17, **SMs** 4AMM 5BGK (150) 9, **SP3AUZ** 10, **TG9s** BM (108) 19, SC, **WG6APH**, WN9KLO/**KG6**, **WP4s** ARZ BRF (130) 6, BRH CKZ (132) 19, CLB (130) 18, CLX (132) 15, **WV4EJ** (150) 19 and **YV5ATX/6** (148) 17. Courage, lads; there are better 15-meter times ahead.

15 phone developments find **Ws** 1RF 3HNK 6BCT 8YGR 8ZOQ, **Ks** 1MOD 6OVF 7VMO 8IQB 0GSV, **WAs** 2WIJ 4JJY 4RIJ 5HJK 6TGH, **WB2s** AYU CAN DUI FVD JFQ and VE2ANK conversant with CE9CO 15, **COs** 2VN 6JO 8RA 13-22, **CRs** 4AS 20, **6AL** 6DA* 6DU 19-20, 6GM 19, 6GQ (325) 20, 6JL (200) 17, **CT1FL**, **CXs** 2CN 21, 5JE (300) 22-23, 9CO, **DUs** 6TY 7SV, **EA8DU** (250) 13, **EP2AZ*** (385) 13, **FG7XW** (225) 19, **FH8CD***, **FR7ZD**, **GB2SM** of England, **GD3NMG***, **GI4RY** 14-15, **HCs** 1AH 19, 1HG 18, 1QM* (410) 19, 2EH 8FN* (423) 21, **HIs** 4ARM 8AAD 20, 8WSR* (430) 18, **HKs** 3AZ 20, **0AI** (220) 16, **HRs** 6CGA (230) 18, 9EB 22, IT1GAI, **JAs** 1DXE 1GKB 1GTF 1KFK 1JXU 1KVT 1LIO 1MHV 1MTV 1MXE 1MYR 1NSJ 1PCS 1QMF 2BFK 2BPH 2CWX 2DQI 2DSU 2DNA 2ESB 2YCF 3APL* 3BUT 3CEJ 3GAK 3GKO 3GQY 4AFT 4BXU 4CPC 4CQS 4IWF 6BI 7BQY 7MA 7UJ 7YT 8ANG 8AST* 8AWC 8AZY 8BAX 8BOV 9AOU 0AOC 0AWH 0YAM, **KB6CS**, **KC4USK*** (340) 23, **KG4s** BU CB, **KH6BGS***, **KL7s** BGZ BNL ERD, **KM6BI***, **KJ6BZ***, **KP4s** AXM* BCL* BFF* BOF BPW* SV*, **KR6AF**, **KV4CX**, **KX6DM**, **KZ5s** JK 22, SN 15, SS, **KW6EF**, **LA3C***, **LUs** 4DN 22,

4EAW 5AC* 8AAL, LX1s DB (335) 12, DC (213) 14, OAs 4KY* 6W 20, 8B 21, OEs 1SQ 21, 2MRL 19, PJ2MI 15, PYs 1ASE 1NEZ 2BZB 5EG, PZ1BA 19, SVØWF* (410) 15, TG9s JT KJ*, TI2s AB BJH* HK 20, TN8AA 9, TR8AD (185) 20, TU2AE 22, UA9VB 10, VE8CD, VKs 2ADE 2AKF 2APK 2NN* 3ATN 3AZY 3QK 3UL 3WL 4LT* 4RH* 5ZK* 6QL, VPs 2AS 2AX 15, 2KR 2LA 20, 4LH 7CX* (410) 16, VQ8s AM* 13, AZ* BS 16, W8BZB/7G1* (443) 12 on shipboard, XE2s AAS CJ PET 21, SZ 18, ZN, YN1s DT RK, YO4HO 19, YS1HUKE*, YVs 1AB 17, 3BG 22, 5AST 15, 9AA* (419) 15, ZC4AK (273) 14, ZD8WR* (407) 20–22, ZEs 1BK* 1JE 22, 1JR 7JR 7JV* (416) 18–19, 7JZ, ZLs 1AIX* 1CA 1RI 1VH 2UD 3FV* 3JO* 3QK 3RD 3TD, ZP5DC, ZSs 1AB* (417) 17, 1ACD 3JW 17, 4PU* 6IW* (383) 15–16, 6JK* 6VX*, 5A2TD, 5H3TH* (395) 15, 5R8BC, 5H5IU 20, 5Z3AA*, 5N2JEB (255) 21, 6O1KH*, 6Y5s LK* (403) 21, RA UC, 7Q7s GN 0, PBD 20, PM (275) 18, 7X2s MD (245) 16, SQ (245) 14–15, 9G1s EC GR 18, 9J2s GR 17, VB 0, WR 10, 9LIWN (260) 17, 9M4s LP 16, LX* (395), 9Q5s AB* AK* DO 20, DV EB (165) 17, KC* PA 10, PN 17, RG* TH 17, 9U5s MV and KU 10. The asterisks represent s.s.b. entries, a rarish commodity on 21 Mc.

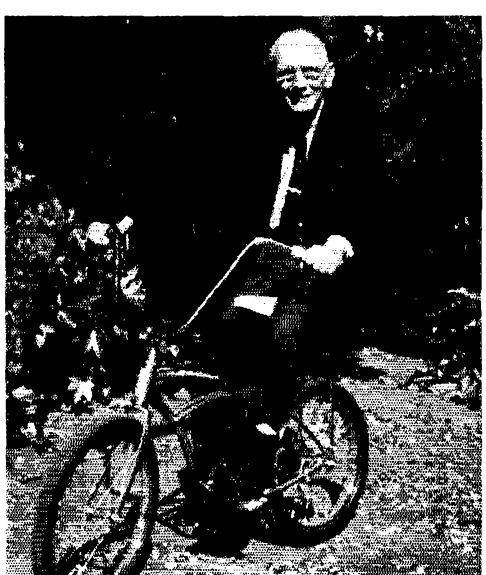
15 c.w. treats Ws 1ECH 5OLG 6BCT 8TRN 8YGR 8ZCQ, Ks 1ZQC 3UXY 4MYO 7QXG ØARS ØGSV ØJPL, WAs 2KSD 2WIJ 4JJY 4KXC 4RIJ 5EQA 5HJK 6TGH 6VAT 9AUM 9FMQ ØJCA, WBs 2AYU 2CAN 2DUI 2FIT 2LDX 6CUU 6ITM, DL4IO, H1ER and KA2TP to a large helping of CEs 5EF 9AB, CM2AV, CN2AQ, CO2BB (102) 19, CPs 3CN ØCY/5 (10) 21, CRs 4BB 6AI (30) 15, 6EI 6GS (38) 17, 6HG 6JL (110) 18–19, 7IIC 7IZ (60) 19, 7LU, CTs 1SX (25) 14, 2AL (100) 16, DM3YME (50) 15, EA7JZ, EL2AD (10) 15–16, ET3USA (20) 16, FB8s WW (30), XX, FR7s ZD (86) 17–18, ZI, HA8s CI WT, HC2SB (38) 17, HI8s DAB (155) 22, WSR, HKs 4ALE 7UL ØAI, HP1AC, JAs 1FAK 1FGW (57) 23, 1KSO (50) 22, 1LPZ (13) 22–23, 3GAK 3GHI (33) 22, 4CN8 (25) 22, 5FQ 6TQ 8BQJ (42) 22, ØACO, JT1AI, KL7s BJV CAT, KP4s AOO BJR, KV4CI, KZ5BA, LUs 1ZC 9ACZ, LZ1LRP, OAs 4CG (35) 21, 4PF 4PY 6W 20, OD5LX, OR4VN, PJ3CB, PYs 3AZ 7NJ, PZ1s BH CM (10) 22, SVØWAA (20) 16, UAs 1NZ 3ST (28) 8, UQ2KAX, VKs 2GW 3AHO 3AZY 4TY 5DF 5ZP 6RS 6RU 6SM 7SM 12, 9RB, VPs 2KJ (40) 22, 8HJ (5) 21, 9BO 9FU, VQ8s BS (90) 17, BY (60) 18, VRs 2DK 6TC (60) 15, VSs 6FC (27) 8, 9AMD (80) 16, WP4s CLB (105) 19, CMM CMT, XEs 1PJ 2PET (55) 16, YN3KM (60) 22, YU1GB YVs 1AB 1DP 5CAH 17, 9AA, ZB1s AO RM, ZC4s GB KW (28) 8, ZD8BB (35) 20, ZEs 2KL 3JJ (98) 18, 4JS 6JM (71) 18, 6JS, ZL2AWJ, ZPs 5LS 9AY, ZSs 1OU 1RM 2MI 10–14, 2NG 2RM (40) 15, 5AL (18) 20, 6EQ 6IW, 4S7NE, 4W1s F G (75) 14, 4X4LW, 5As 3TX 5TR (24) 14, 5H3s J1 JJ (103) 17–18, 5N2JKO, 5R8s AL AN CB (55) 17, 6O6BW, 6W8s BF DD, 6Y5MJ (50) 21, 7Q7s EX (105) 17, GB (90) 18, RM 12, 9J2s BA BC (85) 15–16, JG (60) 19, LH (42) 15–16, W (50) 16, 9L1s HX TL (76) 17, 9M4LP, 9Q5s AB HD (47) 19, JA (45) 19, QR (33) 17, PA (80) 19 and TJ (5) 14.

40 c.w. embellishes its sterling nighttime DX reputation with occasional impressive daylight openings on the coasts. Ws 1ECH 1YNE 2OLU 3HNK 6BCT 6KG 6YKS 7DJJ 8ZCQ, Ks 3UXY 4MYO 4TWJ 5JVF 8PFY ØGSV ØJPL, WAs 2FUL 2KSD 2WIJ 4KXC 4OYX 4RIJ 4TLB 5ABG 5IIS 6TGH 6VAT 6WSN 9AUM ØJCA, WBs 2FIT 6CUU 6ITM 6MOS and DL4IO pass the word on 7-Mc. grabbables AP5HQ, BY1PK (3) 12 who remains somewhat aloof in Peking, CE2DI, CMs 1AR 5ES, CN8FW, COs 2FC 2IC 2RC 2TR 6AH 6GF (20) 23, CP5EZ, CRs 4BB 6AI 7CI 7FC, CT1s CB DJ, DU1PAR, EAs 2CR (24), 6AM, EI9AR 16, ELs 2AD (11) 3, 2AP 8X, ET3USA, FB8XX (6) 3, FO8JL, FY7YF, GCs 2FMV 3JAG/p, HA1KSA (16), HCs 5CN 8JU, HIs 3AGS 3PC 8NPI (10) 12, 8WS, HKs 3APT 3RQ ØAI, HR2FG (20) 23, IT1s AGA (16) 22, PS TAI ZGY, JAs 1AEA 1BEJ 1BM 1BOR 1BZR 1CG 1CSX 1DDR 1DSU 1EGM 1ES 1EUV 1FGW 1HZN 1IBX 1ISL 1IWM 1JIO 1JWM 1JXC 1KFN 1KUU 1KVG 1LWI 1LYZ 1MZL 1OHV 1PTI 1YL 3BAC 3CKB 3DDG 3EJG 3F1P 3GRN 5IP 6AK 6CMM 6YG 7ACQ 7AGL 7AKQ 7ARW 7YAI 8QO ØAIF mostly at breakfast-time on our side, KA2RJ, KG4CQ, KL7s CAJ BJV MF PI (12) 5, KP4s ARS BJU BKY BRG, KR6OJ, KS6BN (15) 9–10, KV4CI, KW6EI, KZ5s AF EH EV, LZ1s KID KND, MP4BEQ, OA4FW (15) 6, OR4VN (3) 6, OX3AY, OY2H, PYs 2SO (8) 5, 4AP (15) 0, 4OD 7PO, SPs 7HX ØAJL, UAs 1KAE/2 of the antarctic, 1KED (15) 14 of F.J.L., 1KGD 6MT 9KOG ØEF ØEH ØKCG ØKCU ØKFG ØKKB ØKSB ØLH, UB5s KDS (16), LU (10) 21, VD (30) 18, UH8CH, UI8LC, UL7KKB, UM8AP, UP2KCR (20) 18, UY5AH, VKs 2APK 2EO 2QL 2QP 3ADB 3AXK 3AZY 3CB 3SR 3XB 5FO 5NO (10) 9, 5ZP 6RU 6KO 7DK 7GK 9NM, VPs 1TA (18) 5, 2AV (8) 11, 2SC 2SM 4GH 5SG 6BW (23), 6PJ 6YD 7BG 9BO 9FT 9FU (11) 3, VR2EG (15) 12, XEs 1S 2JS 2OK, YN3KM, YOs 5KAI (3) 23, 8OU (27) 22, 8KAE 2, 9JY, YU1s DP GB, YVs 1AB 2AH 4AU 4ID 4JJ 5ANT 5ASP 5BAA 5BQA 5BTX 5BX 9AA, ZB1s J WT, ZD8RH, ZLs 2AAG 2AWJ 2BD 3OR 4BO 4GA, ZP9AY, ZSs 1O 2RM 5RU 6AP/KC4 6OW, 4X4s FA NP (26), 5A1TW (17), 5R8AB, 6W8BF 22, 6Y5s FH LK (8) 4, RO XG, 9J2DT, 9M4s LP LX (15) 18, RS and gadabout 9Q5AB .-.-.- WN6KKM made the grade with WL7FCX in the crammed and jammed 7-Mc. Novice range.

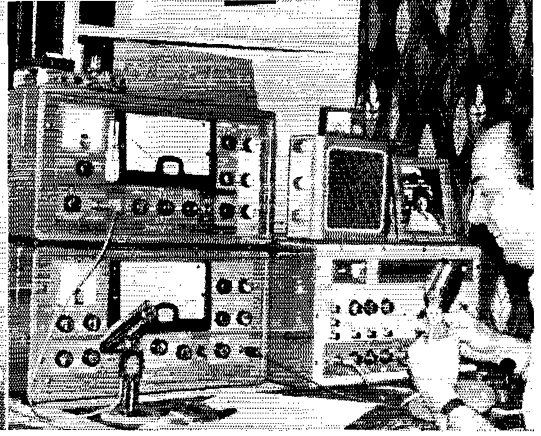
40 phone grudgingly gives ground to Ks 4TWJ ØJPL, WAs 4OYX 6TGH and DL4IO, namely CO8RA 12, CX3BH (83) 7, DJs 1FV* 2SM* 8CB (81) 7, G5IIZ (90) 8, F9CJ*, K5VCE/mm off Bermuda, KH6GF, KR6OJ, KZ5s AF 7, EC, MP4BBW (45) 21, OE4EM*, OHs 5SM (84) 7, ØNI*, OK1ADP (78) 6, OX3JV 7, OZ1HS*, PY4ND (94) 8, SV1s AB (45) 21, BL (50) 22, TGs 8IA* (90) 8, 9GH* 9MP 9PM, TIØRC not on Cocos, UR2AO (77) 6, VKs 2ACN (90) 11, 2AVA (83) 7, 2NN 3ACS 9, 3BN, VO1AE 2, VPs 1FB 7CX 7NX 12, 9BY 8, XEs 1AB 1OE 8, 2KT* (85) 9, YV5AKQ 1, ZLs 1BY (80) 10–11, 2BD (82) 7, 2WS (90) 10, 3ID (210) 10, ZS1XX (93) 5, 4U1ITU (45) 21, 5A1TZ (50) 21, 6O6BW 23 and 9M4LP 16, the stars blinking for non-s.s.b. performers. Say, when are those SWBC juggernauts going to try some single-sideband?

80 c.w., afflicted by a deluge of commercial QRM on foreign shores, nevertheless enables Ws 1ECH 6YKS 7DJU, K5JVF, WAs 2WIJ 6VAT 8KEX 9IXF and DL4IO to exchange pleasantries with EAs 3KT 5CS, GD3TNS, GI3OQR, HI8s WSR (18) 6, XAL (8), I1BAY (20) 23, JAs 1DMX 1DSW 1JOH 1KAU 1LYZ 1MCU 1PGG 1YKO 2DMO 2WB 4AIH 6ABA 6AK 6EBY 8ANG ØRC ØSZ, KP4BJ, KR6s BQ FG, KV4CI (1) 9, LUs 1ACF (2) 7, 5DVS (15) 8, M1ZG, PAØVB, TF3OM, UAØs KFG KKB, UB5KKA, UG6AD, UL7CG, VK2QL, VPs 2AV 7BG 9BO 9EB, XEs 1AX (8) 4, 1OK (7) 6, 2N, YVs 2AH 9AA (12) 4, ZLs 2AWJ 4GC, 4X4DH, 6Y5s FH (25) 0–1 and XG (8) 4.

75 phone is kept solvent here by listener W. P. Kilroy and club reports dealing with DJs 6QT 7, 8EG 5, DLs 1UX 7, 9CZ 9OK 7, F8RU 7, Gs 2PU 6, 3IWV 6, 3KPV 6–7, 3PFZ 7, 8PO 6, GIs 3CDF 7, 6TK 7, GM3HMB 7, GW5SA 6, HB9s FU 6, QR 7, UC 7, HI8WSR 4, KZ5AF 6, LA5YE 7, LX1BW* (3670) 18, OZs 4FA 7, 5BW 7, PJ3CD 5, SM4CMG 7, TI9RC 6, UW9AF, VE8RG 6, VOIs DN FX* 5, VP9s AK 6, FJ 5, YVs 5AMR 6, 5ANS 6, 5BPJ 6, 9AA 6, ZLs 1AIX 6, 3GN 8, 4U1ITU* (3680) 21 and 5N2CKH (3790) 22, the lonely asterisks indicating non-s.s.b. endeavors.



Drag, anyone? W4BPD, visiting W6ISQ last year, seems ready and eager for another pile-up in this shot. The DX world anticipates a long and lively Gus-hunt in 1965 as W4BPD heads for his latest DXpeditionary swing through central Asia. (Photo via ex-W2ISQ)



9X5GG, miking at left, entertains visiting neighbors Dr. and Mrs Whiting at his Nyanza mission station. The trio, with WA2RAU and others, figured in a dramatic emergency medicine relay to Burundi last summer. 9X5GG also signs 9U5ID. At right, 9AQ5QR (ON4QR) searches for W/K/VE contacts from the Congo daily around 1900 GMT on 14- or 21-Mc. c.w. and single-sideband. (Photo via W1WPO)

10 phone is still with us, b'gosh, thanks to **DL4IO** and Mr. Kilroy who espy such items as *HK*1OI 19, **KP4**ARS 20, KZ5SS 20, YN4CWH 21, **ZE**1ES 12, **5H3**JI, **6Y5**XG and **9J2**DT, all straight-a.m. customers . . . . . **Ten c.w.**, of all things, allows **K3**ZXG, **WA6**VAT, **DL4**IO and **I1**ER to capture Gs 2XW 3AXO 5IP, **LU7**AU, **OA4**PF and YN1AA (60) 21. Openings? Maybe they're not so indispensable after all.

160 c.w., as we hinted last month, is really living it up DX-wise. **W1**BB, hauling in new countries one after the other, is only a dozen or so shy of the 1.8-Mc. 100-mark. K5JVF, though saddled with a midcontinental QTH, added XE1OK and VP2AV. **W6**GTI apparently scored the first U.S.A.-Japan 160-meter QSO with **JA6**AK on November 12th, there has been frequent U.S. east coast s.s.b. work with Australia, and **VS1**LP miked all the way to VK3ATN. Balloon-supported verticals, crazy box kite lofted long-wires — man, the band is *wild*. Some of the stuff reported workable would do 14 Mc. proud: **DLs** 1FF 4IO, **EI9**J, **FP8**CA, dozens of Gs, **GC3s** EML RFS, **GI3**PDN, **GMs** 2FCZ 3NYY 3OUV/p 3TMK, **HB9s** CM J, **HR3**HH, **JAs** 1CNE 1CO 1CR 2JM 2JW 2WB 2YT 3AA 6AK, **KR6**BQ, **OE3**JL, **OH2**NB, **OX3**DL, **OY7**FP, **PA0**PN, **PY1**NFC, **UB5**WF, **VKs** 3EM 5KO, **VP2**VL, **ZBs** 1BX 2AF, **ZL3**RB, **ZSs** 2FM 6BCT 9G, **6Y5**CZ, **9A1**VU, **9J2**AS, **9L1**HX and **9M4**LP. **OY7**ML, XE1AX, **9G1**DV and others are said to be madly wrapping coils for the sport . . . . . W1BB's 160-meter newsletter tells of **ZE1**AZD, a continuous 10-watt 1801.5-kc. beacon station installed by ZE2JV, radiating with a half-wave vertical on a high Rhodesian mountain. Heard it? . . . . . Remember that the concluding scheduled dates for this season's 160-Meter Transatlantic and World-Wide DX Tests are the 7th and 21st of this month. **Be** there! (See page 100, December '64 *QST*, for details.) W1BB and this corner will welcome your battle summaries for the event. Newcomers to 160 are also urged to inspect page 60, July 1963 *QST*, for frequency allocations and power limitations in their specific locations. Good huntin'!

* * *

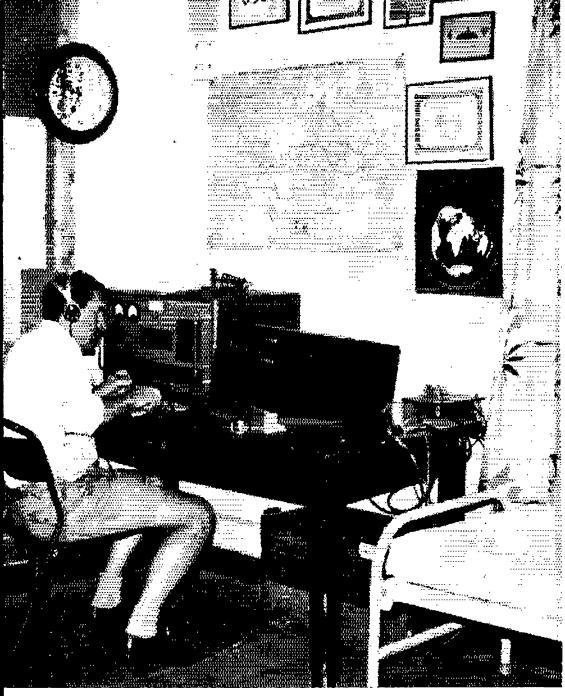
No room for a 14-Mc. rundown this month but we'll try it next issue with the help of (c.w.) **Ws** 1ECH 1TS 1YNE 3HNK 6YKS 7DJU 7VRO 8EQA 8YGR 8ZCQ ØIEM, **Ks** 3UXY 3ZOL 4MYO 4TWJ 8PFY ØARS ØGSV ØJPL, **WAs** 2KSD 2WIJ 4IUM 4KXC 5ABG 5EQA 5IIJK 5JEY 6TGH 6VAT 6WSN 8KEX 9FMQ ØJCA, **WBs** 2AYU 2CAN 2JFQ 2WIJ 6CUU 6ITM 6MEQ; (phone) **Ws** 5AI 5VA 8EQA 8ZCQ, **Ks** 3ZOL 4MYO 4TWJ, **WA6**TGH, **WB2s** CAN FVD and JFQ. We acknowledge the assistance of contributing s.w.l. phone diggers K. Deschere, W. P. Kilroy, C. Maher and L. Stewart in accumulating the preceding.

Where:

HEREABOUTS — Your "QSLers of the Month" this month are CN8GB, CO2ER, CRs 7IZ 9AH, CX1OP, DJ9GB, DL1RK, EI9J, ET3USA (K1QHP), F2GD, FO8BI, FR7ZI, G3AAM, GD3FXN, GI3RXV, HL9KA, JAs IVX 7AD, KC4USN, KP4BJU, KR6JZ, KS6BN, LU6FA, LX3AX, OHs 2FA 5VA, OK3UL, PA0CE, PJ2CY, PYs 1MCC 2SO 7ABY, **SV0**WAA, TF2WIV, TR8AD, VKs 2GW 9BW, VPs 2KA 2SC 2VI 5RH 7NQ 9BY, VQ9HB, VRs 2DK 6TC, VS9s ART MB MG, WA9LLG, YV5s CAH BPG, ZD3A, ZL1AH, 5T5AD, 5Z4DW, 6O6BW and 7X2WW, plus QSL managers Ws 2CTN 2GHK & Co., 4TAJ and WA4STL (ex-W2HMJ). Their pronto pasteboards are aptly applauded in dispatches from "How's" correspondents **Ws** 1ECH 1TS 6AR 6YKS 8YGR, **Ks** 3TIQ 3SWW 3ZOL 5JVF 9RNQ, **WAs** 4IUM 5ABG ØJCA, **WBs** 2AYU 2FVD 6MEQ and G. Pharr whose call escaped us. Any fast fellows you feel we overlooked? . . . . . *Help!* The following italicized colleagues apply for assistance in running down QSLs from the respective holdouts listed: *W3HNK*, HB9AET/4W1, KG1FH; *W6AR*, CE3ZK; *W9DWQ*, ET3s AP GB/m '63; *W9EXE*, FM7WB, KW6BC, VP2CO, VRs 1D 3H '62; *K3TIQ*, FM7WB, OY7TA; *K4MYO*, KG1BX; *K7IUZ*, EI9AD '61, FP8AG '63, GD3UB '63, HB1VW/f1 '62, HL9TF '63, VK9SB '63, VS6FC '63, ZB1HC '61, 9M2UF '63; *WB2AYU*, Fr. Ralph of HV1CN '63; and *WB6CNO*, CR5SP, the latter to round out a hard-earned WAC . . . . . WØIEM and WAØDXZ add their availability to the list of lads willing to undertake QSL chores for DX stations in bona-fide need . . . . . W1ECH and W6AR more or less humorously suggest the possibility of our listing "Non-QSLers of the Month." We'd rather accentuate the positive, of course, for many a QSL is delayed because of DXtentuating circumstances . . . . . "Returns are very poor from W/K stations, only a 20-per-cent return," testifies VE3AHQ after shipping 1237 QSLs Statesward in 1964. Aw, let's *go* . . . . . K1DFT assures Rhode Island hunters that he QSLs all the way, usually in bundles via bureaus. "I sometimes receive as many as five QSLs from the same station in a single shipment from my local ARRL bureau." Anyone need Illinois? . . . . . W1ECH quotes HI8XAL, "W/Ks who send cards to my W9SZR address need not include s.a.s.e. and will receive airmail reply." Fred recently operated HI8WSR . . . . . We sometimes overhear complaints that our P.O. is more efficient on long-distance deliveries than short-haul stuff, but K9RNQ plucked WA9LLG's QSL from his box Monday morning after a 275-mile Sunday afternoon QSO . . . . . XE3MF (K4ZXT-TI2PT) writes, "All QSLs are answered as received through the Radio Club de Merida whose QSL manager sends out my own cards every week or ten days."

ASIA — Mr. M. T. Young of Taiwan, listed in older *Call Books* as QSL manager for BY stations, reiterates that he does *not* provide this service . . . . . If and when W8BKO, now in the Lebanon, is authorized an OD5 or other Middle East call, W8ZCQ will do QSL honors . . . . . Via WGDXC's well circulated *D X Bulletin* W9VZP points out that he no longer handles HL9KH QSLs. Try W6KTE . . . . . "No more ET3RR," announces WA1IWV, one and the same. "QSLs will be answered from my Massachusetts address." . . . . . "Who says KR6s don't QSL? Try KR6JZ," recommends WA4IUM . . . . . WGDXC learns that W4ANE will handle cards Stateswise for the Andaman emanations of VU2s NR and RM on receipt of weekly airmail log transcripts. Self-addressed stamped envelopes and Greenwich Time reference are musts.

AFRICA — VQ1GDW leaves Zansibar hamless this month. WB2AYU has it that W2CTN can confirm Willy's past QSOs. S.a.s.e., of course, but the usual prepared VQ1GDW QSLs are no longer requisite . . . . . WB2AYU also understands that F2SQ can assist in the procurement of 6W8DF cards . . . . . W3HBK, QSL aide for ZE4JS and 5A3TX, has complete logs for the fall contest activity of those stations . . . . . 9Q5HD confirms previous word that his QSLs are received only via VE4OX . . . . . Ex-ZD3A writes W1WPO, "There is at present no other ham station in the Gambia. Should anyone have doubts about any ZD3 he may obtain information from the Telecommunications Manager, Government of Gambia,



ZC4TX, using its old call again after a spell as 5B4TX, is the headquarters station of the 259th Signal Squadron Amateur Radio Club at Episkopi. Ex-5B4CL is shown at the controls of a 150-watt Minimitter and AR-88, the nucleus of DX-chasing gear for 10 through 80 meters.

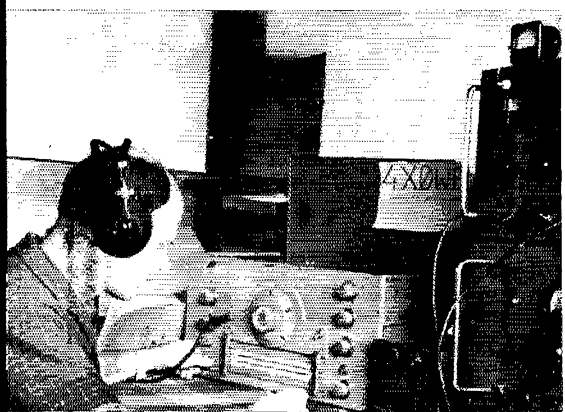
GPO, Bathurst, Gambia." Reg already has acknowledged all QSLs with the exception of some contest contacts.

EUROPE — "G3OIZ sends me log information at the end of each month," reports QSL rep WA4KXC, specifying the customary s.a.s.e. from W/K applicants . . . . . W1ECH's QSLs to SVs 1BK and 5LP bounced as "unlicensed". While on this sappy subject, Jeeves observes that the frequency of fake Albanians is running lower, exceeded even by ungood FP8 nonsense. Most of today's mental misfits apparently are sane enough not to pirate totally unrealistic prefixes. Perhaps they're buffaloed by the fact that assigned S.M.o.M. and Outer Baldonia prefixes remain well-guarded secrets . . . . . Yes, Virginia, there are F1s. In fact the only French prefix numerals unheard these days are F4 and F6.

OCEANIA — "I was the last operator at KM6CE," writes WA6FMB/KM6 who left Midway in September. "Please discontinue the listing of KM6CE as QSL bureau out there." Dave suggests the KM6BI route but this is not as yet confirmed by W1ECH of ARRL . . . . . KR6BQ (KØPIV, ex-CN8IF) knocks off at APO 331 with these comments: "All requests for QSLs confirming contacts with KR6BQ since May 31, 1964, should be sent to W2CTN. Prior to that date I QSLd 100 per cent via bureaus. Check your bureau first, and if still no QSL I'll be glad to do it over again on receipt of s.a.s.e. and QSO data in GMT. Incidentally, some operators mix GMT with their local calendar date which is very confusing." And, we might add, hardly conducive to a significant QSL returns percentage . . . . . "I still accept requests for QSLs for my VR5AR operations on Tonga," informs W9EXE. "Some second-request cards have arrived indicating lost mail and possibly incorrect addresses. I have logs for all QSOs for July through November, '62, and can also confirm VR5AA and VR5HP contacts made by operator Oak. VR5AA's senior operator now is ZL2OY, so inquiries on other VR5AA QSOs can be directed to him. For VR5AR correspondence s.a.s.e. is a must." . . . . . "QSL returns are very poor," laments K3SWW/KG6, "one received for every five sent out. I'm learning the hard way that International Reply Coupons and s.a.s.e. do not guarantee results, and I find that people who claim to QSL 100 per cent rarely do so. QSL expenses may force me to QSL only on receipt, a policy I do not like. At present I'm getting low on cards, so until I can afford to have another 1000 printed I'll only answer QSLs as received. I no longer answer s.w.l. reports; the expense is too much." K3SWW/KG6 is surprised to find that every listeners' report but one refers to c.w. reception. Must be lots of budding hams coming up through the s.w.l. ranks . . . . . "I get weekly logs from KG6SB," declares QSL aide W7PHO . . . . . K1SHN, editor of NEDXA's *DX Bulletin*, says that self-addressed airmail-stamped envelopes rarely fail to get QSLs from amateurs in U.S. territories and possessions . . . . . VS4RS, due back next month as a 9M8 perhaps, has his Sarawak logs with him while on holiday at G3IHP, according to VERON's *DX press*.

SOUTH AMERICA — QSLs for LU6ZM's 1964 South Orkneys action will come forth this year according to PY2SO via W1TS. It's summer down that way now, so facilitated transportation will begin turning up other eagerly awaited antarctic and subantarctic QSLs in quantity . . . . . "PY2SO affirms that IRCs are okay in Brazil," continues Don. "She recommends their use if a direct airmail return QSL is desired, especially since air postage rates there went up 120 per cent last September." . . . . . Time to check our monthly input of specific postal recommendations donated by generous "How's" helpers, remembering that each item is necessarily neither "official" nor precise. Like

CR4AJ, Box 5, Praia, Cape Verde Islands
CX7AP, D. Cahill, P.O. Box 122, Montevideo, Uruguay
CX8CD (via RCU)
DJ7XC/M1 (to DJ7XC)
DM4YPL/DM7L, S. Schlettig, P.O. Box 13, Glashuette/Sa., E. Germany
EL3C, C. Schenning (SM5ACC), Lamco Buchanan, Monrovia, Liberia
ex-ET3RR, R. Syriac, WA1IWV, P.O. Box 703, Belchertown, Mass.
FG7XQ, L. Emilien, 21 rue Gambetta, Pointe-a-Pitre, Guadeloupe
FU8AG, J. Gavarone, Box 104, Santo, New Hebrides
G2RO/VP (to G2RO)
G3OIZ (via WA4KXC)
GD3GMH (via GW3NWV)
ex-HI8DGC (via VE6AOT)
HI8XAL, A. Luan III, Box 1087, Santo Domingo, D.R. (or to W9SZR)
HL9KH (via W6KTE)
HR1RP, c/o U.S. Embassy, Tegucigalpa, Honduras
HZ3TYQ/8Z4, Box 1721, ArAmCo, Dharan, Saudi Arabia (W/Ks via W1RAN)
JA1KGW, K. Aoyama, c/o 1st Sect. Eng. Dept., Best. Equip. Ind. Dvn., Radio Joint Dvn., Nippon Electric Co., Ltd., 1000 Honshuku, Fuchu-city, Tokyo, Japan
ex-JA2OP (to JA1KGW)
K2JGG/JY, Box 7388, GPO, New York, N. Y.
K3SWW/KG6, C. Bluhm, 126 L.E. Sunset Blvd., Navy 943, FPO, San Francisco, Calif.
KA2DF (via W2CTN)
KG6SB (via W7PHO)
KV4CQ (to WA2DEW)
KZ5BA, P.O. Box 841, Curundu, C.Z.
LU7FAG (via WA9BXR)
LX3MZ-DLØMZ/LX c/o Horst Wiese, 6500 Mainz, Sommeringplatz 1, W. Germany
MP4TBJ (to G3IZU)
OA4PY (via RCP)
PX4TU (via DJ4SQ)
TJ1AC (via DARC)
UA2AO, Anly Moskalenko, P.O. Box 77, Kaliningrad obl., U.S.S.R.
VK4TE (via VK2AGH)
VK9CJ, P.O. Box 204, Port Moresby, Papua Territory
ex-VKØIT (to VE8WT)
ex-VKØPK, P. King, 18 Daly St., Gawler, S.A., Australia (or via WIA)
VP2KA (to W2YTH)
VP2KJ, K. Jarvis, Box 199, Charlestown, Nevis, W.I.
VP2VI (to W2YTH)
VR2DK (via W2CTN)
VR5s AA AR HP (see preceding text)



4XØWF, manned by 4X4s UJ and WF (shown here) was installed in November on Massada mountain, archeological excavation site of biblical King Herod's palace. A ham-brewed 200-watter and HRO-7 collected c.w. QSOs on several bands. The operators are former SPs 5ALG and 6WF, respectively. (Photo via 4X4SK, IARC)

VU2GW (formerly VU2GWZ)
W5IWR/VP9 (via RSB)
WB6IWB/mm, California Maritime Academy Radio Club, P.O. Box 1392, Vallejo, Calif.
XE3MF, J. Walker (KIZXT), P.O. Box 329, Merida, Yuc., Mexico
XT2HV, G. Demangeat, Box 793, Ouagadougou, Upper Volta
YA1AW (via K5YYP)
YV4IH, Simon, P.O. Box 18, Maracay, Venezuela
ZB2AK, c/o Cable & Wireless, Gibraltar
ZC4TX, 259th Sig. Sqdn. ARC (ComCan), Episkopi, BFPO 53, c/o GPO, London England

VU2LE, formerly VU2LEZ, welcomes 20-meter c.w. contacts with North America almost daily from 1230 to 1530 GMT. Bala QSLs 100 per cent despite the fact that some 250 W Ks still owe him confirmations.
(Photo via Ws 1YYM and 8IV)

ZC5AL (via SM6AAL or direct; see "Whence")
ex-ZD3A, R. Scarrow, 6 Guildford Close, Worthing, Sussex, England
ZD8JC (to W5EBJ)
ZD8RH (via W2CTN)
ZS2MI (via ZS1CZ)
ZS3EW (via W2CTN)
4X6WF (via W2VLS)
ex-5H3HZ-ZC4HB-VQ3HZ (to G3APX)
5R8CB, Box 173, Diego Suarez, Madagascar
7G1H (via K9BPO)
9Q5AB (via WA4STL)
9Q5TJ (via DJ4OP)

Thanks for the preceding possibilities goes to **Ws** 1ECH 1RAN 1TS 1WPO 1YYM 2IWM 3HNK 6YKS 7UVR 7VRO 8EQA 8HBI 8YGR, **Ks** 1DFT 3MNT 3ZOL 5JVF 6GSV 6JPL, **WAs** 5ABG 6VAT 6WSN 6JCA, **WB2**AYU, **DJ6**SB, **PY2**SO, 4X4SK, J. Hart, G. Pharr, DARC'S *DX-MB* (DLs 3RK 9PF), DX Club of Puerto Rico *DXer* (KP4RK), Florida DX Club *DX Report* (W4HKJ), International Short Wave League *Monitor* (12 Gladwell Rd., London N.8, England), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (W2FGD), Milwaukee Amateur Radio Club *Hamateur Chatter* (W9ONY), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N. Y.), North Eastern DX Association *DX Bulletin* (K1SHN, W1BPW), Puerto Rico Amateur Radio Club *Ground Wave* (KP4DV), VERON'S *DXpress* (*PA0s* FX LOU VDV WWP) and West Gulf DX Club *DX Bulletin* (W5IGJ). Good show, team!

VP2AX of Antigua likes 21-Mc. DX work on c.w. or phone, his favorite a.m. hangout being 21,300 kc. This picture comes via W8EQA, Phillip's QSL representative.

February 1965

HEREABOUTS — In our November and December dissertation on operating prowess W4CDA says we left out his favorite definition of a really good c.w. man: One who can come in at four in the morning after an all-night party, sit down and take 40 w.p.m. in Old English with a six-inch paint brush. . . . W5AI-W5VA thinks young squirts who finally learn to pull signals through heavy QRM one at a time are doing okay, but they still have a long way to go if they can't conveniently copy two or more stations simultaneously. (Personally, we have trouble merely mumbling "Yes, dear, right away, dear," as we call another CQ.) . . . W5VE figures we went 'way over the heads of 90 per cent of today's "hams". . . . W9VES missed specific mention of *timing*. Good point; a QRP man who times his calls skillfully is more than a match for an ill-timed kilowatter . . . . . DX is likely to pop up almost anywhere. WA2TGL bumped elbows with PJ3AT while boarding the Staten Island ferry . . . . . Good to see G2RO on the DX prowl again. W2IWM says Bob's December itinerary included Trinidad, Grenada, St. Vincent, St. Lucia, Dominica and St. Kitts with fifty watts of c.w. on 15, 20 and 40 meters . . . . . K6MQC, WA6s GNA MJL and PRX sign WB6IWB/mm aboard training ship *Golden Bear* on 20 and 15 with a KWM-1 while voyaging to DU KH6 VS6 and JA regions. They'll be back next month . . . . . K1DFT offers Rhode Island to the DX crowd each week end around 14,075 kc. Bob gets out well on 40, too, with a 33-ft. vertical made of stacked and soldered fruit juice cans . . . . . KV4CQ (WA2DEW) recommends a closer look at 10 meters. "Even if you hear no one, a healthy CQ may pleasantly surprise you." . . . . . WA2KSD occasionally enjoys a DX hunt from W2SZ, well-appointed club station of Rensselaer Polytechnic Institute at Troy . . . . . Best logging pen K3CUI has yet encountered is the "Pentel" from JA-land. "They come in blue, black and red and are available in most stationery stores — all the convenience of a ball-point without the skip, smear and mess. No, I'm not a stockholder." . . . . . Thirty more countries will net K3UXY his third DXCC. Henry made it previously as OE1KR and WA2KMY . . . . . "I plan to go all out in the ARRL DX Contest," warns XE3MF (K4ZXT-TI2PT), sensing a general yen for XE3 contacts. "My first 196 QSOs from Yucatan produced 31 countries and 34 states." Jack has a quad for 15 and 20, an inverted Vee for 40 and 75, and he keeps his TR-3 on s.s.b. "My power comes from a 500-watt Onan gas job. I'm a missionary pilot living in a small Mayan village of 500, seventy-five miles east of Merida." . . . . . W1ECH finds HI8WSR's Fred now signing HI8XAL on the low edge of 80 . . . . . W3HNK feels better after a 7-Mc. chat with W1FH. Even Charlie finds over-all conditions deplorable . . . . . WA2RAU would appreciate contact with hams associated with medicine manufacturing firms. Doc gets an occasional rush request for rare drugs from Africa contacts . . . . . G. Pharr says we're gonna miss old reliable KG4BU on 15. He's swapping Guantanamo for Uncle Sugar . . . . . Local notes via the clubs route: W9WNV is reported enjoying DX scenery from W6AM's rhombic patch. . . . FG7XT and PJ2AA talked up an RTTY-style DXpedition to FS7 at year's end. . . . VP2DAA's HT-40 keeps Dominica dominant on 21,225-kc. a.m.

EUROPE — The French Contest phone week end comes along on the 27th-28th of this month, you know. Participation details appeared here last month — good F-fishin'! . . . . . G. Pharr finds OZ3UD concluding a Danish vacation for return to OX3UD next month . . . . . K1BVI-WB2CCO will spend a few years in EA4 following an earlier three-year sojourn in EA7 areas. YF WA2UJI will be with Bernie and the pair expect eventual DXpeditionary doings in Africa, San Marino, etc. When and if EA calls are issued to U.S. nationals they'll be near the head of the line . . . . . W8NRB/UA3 of the U.S. Exhibition in Moscow scheduled sign-off last month after a long and prolific DX stint on 20 sideband . . . . . You can practice your French with 3A2FK who likes 14,110 kc. at 1230 GMT, according to LIDXC's *D X Bulletin*. QST

The World Above 50 Mc.

CONDUCTED BY SAM HARRIS,* W1FZJ

1964 — In Rerun

THE beginning of a new year is usually accompanied by resolutions to do better. Now in order to do better we have to review what was accomplished last year. The station operators on the following list are all recipients of a special v.h.f. achievement award for their efforts in furthering the interests of amateur radio in the v.h.f. field.

W6DNG, Bill Conkel — for his untiring efforts in the 144-Mc. moonbounce field. His final success on April 12, 1964 established a long list of firsts (see June 1964 *QST*.)

OH1NL, Lenna Souminen — the European end of the first 144-Mc. moonbounce QSO. Lenna's contributions didn't cease with his first success. He is still maintaining schedules with W6DNG and turning out all his own equipment in his own workshop.

KP4BPZ, Gordon Pettengill — provided the first mass moonbounce operation on both 420 Mc. and 144 Mc. Using the 1000-foot Arecibo, Puerto Rico *reflector*, Gordons signals were heard in seven countries and two-way contacts were established with five countries and ten states. (See *QST*, August 1964.)

K4IXC, John Perchalski — put Florida on the 144 Mc. map providing dozens of other states with their first Florida contact and proved that it's how hard you work that counts.

VP7CX, Harold Lund — provided hundreds of stations with a new country and a new contest multiplier on 50 Mc. Hal is enroute to a new QTH and more "derring do's" this year.

KH6UK, Tommy Thomas — proves that there is always something new to do. His July 31, 1964 contact with W1BU on 432 Mc. made him the co-record holder for 220 Mc., 432 Mc. and 1296 Mc. And he still has the longest tropo record on 144 Mc. with W6NLZ.

W9ECV/2, Mark Mandelker — established the first 50-Mc. RTTY scatter contacts over an 800-mile path. Mark spent the better part of a year assembling his equipment and finding someone to hold down the other end. Nightly contacts with K8ICB, Dan Eisenman, near Columbus, Ohio, demonstrated the usefulness of this mode.

VE2LI, George Elliott — put Canada on the 432 map after two years of schedule keeping and equipment building. Presently keeping 432-Mc. schedules with 96 elements and a full fifth, George is a cosmopolitan who can be found anywhere that c.w. is used (160 to 1296 Mc.)

HB9RG, Hans Lauber — After three years of preparation put his Swiss and German crew in the forefront of the moonbounce move. Contacts with KP4PBZ on 432 Mc. and W1BU on 1296 Mc. make him the only two-band moonbouncer in Europe. (*QST* November 1964.)

K7ICW, Al Olcott — who through his tireless work on propagation and scatter has made a number of firsts on 144 Mc., and has put Nevada on the two meter map.

W8PT, Jack Woodruff — Hasn't let his "top of the 8's" 144-Mc. activities stop him from keeping the fire lit on 220 Mc. and 432 Mc.

W5RCI, Audie Turner — proved that it pays to work all bands. His ceaseless schedules have him at the head of his class on 144 Mc., 220 Mc. and 432 Mc.

*P.O. Box 334, Medfield, Mass.

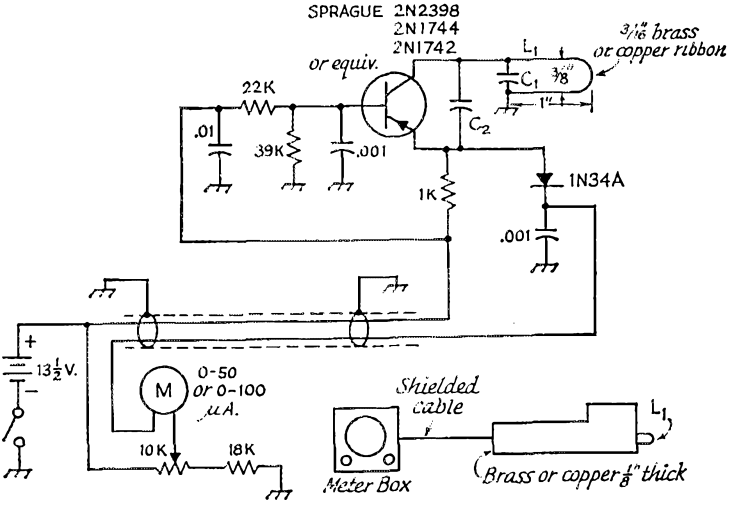


Fig. 1—K6JC's 432-Mc. "dip" oscillator. C_2 is made by twisting together two short pieces of plastic insulated No. 22 wire. It is important that all the r.f. leads be kept as short as possible. Decimal values of capacitances are in microfarads (uf.); resistances are in ohms C_1 is a miniature 5- or 7-plate variable capacitor with an approximate range of 3 to 15 pf.

VE8BY, Peter Radcliff — continued to prove that 50-Mc. propagation is possible from an impossible location. Pete is ready for Oscar on 144 Mc. and maintains a continuous monitor on both 144 and 50 Mc. The Yukon is in the v.h.f. scene because of one man who decided that "it could be done" and did it.

XE1OE, David Brill — wouldn't take no for an answer and so we have a new multiplier in the v.h.f. contests.

WØPFP, K9HMB, K8MMM, K1PBE proved that a 1000-mile radius is a sure thing on 50 Mc. s.s.b. Their year-round schedules proved that conditions can come and go but the signals are always there.

W6NLZ, W6WSQ, W7HKD and W7LHL have sparkplugged a scatter circuit on both 50 Mc. and 144 Mc. which makes most of the eastern circuits look easy. Their miles-per-contact have provided a tremendous boost to v.h.f. DXers.

Now all these aforementioned operators have resolved to do better this year. Can we do any less?

432-Mc. Dipper

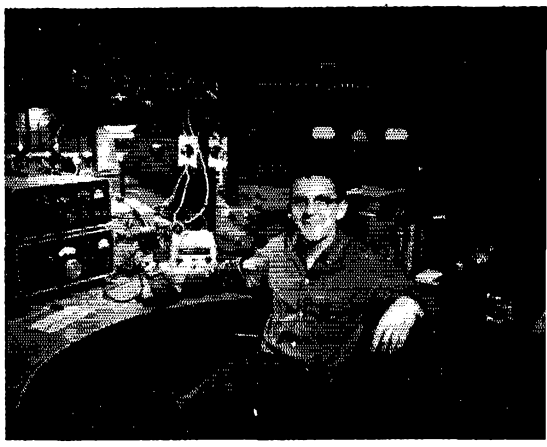
The circuit shown in Fig. 1 was sent in by Jim Brannin, K6JC with the following comments: "This 432 'Dipper' does not exhibit any false dips and circuits can be checked with very loose coupling. Occasionally what appears to be a false dip will be noted but further checking reveals that a lead in wiring or some other part of the unit will be found resonating. One of my 432 unit chassis resonates at 450 Mc.!! Have mine reasonably well calibrated from 360 to 460 Mc.; however, the range of the unit can be extended or reduced by changing size of C_1.

"Would have been lost without this little job when I built all my 432 gear. Loaned it to a fellow and now have to run him down and get it back." Thanks, Jim, and good luck on the "running him down" job.

144 Mc. and Up

After several months of conversion work on APX-6's, K4UGC and W4IIS in Miami Shores, Florida, are now working 100% two-way contacts on 1220 Mc. K4UGC is using a vertical antenna 20 ft. up and W4IIS is using a reflector 25 ft. up. The boys say that signals are S9 both ways with some QSB noticed during midday hours and damp rainy weather. Both stations are working on various experimental antennas and a power amplifier; and both of the boys are looking for skeds. WA9FUH is also working on an APX-6. Ray says he's working on the receiver portion but expects to have the receiver working well and the transmitter oscillating in a very short time. He is also interested in microwave work and would like to hear from others in his area interested in the same work. If anyone knows of a good, safe way to move a 2K25/F23AB reflex klystron up to the 10-Gc. band without ruining them, please get in touch with WA9FUH.

"There are a number of stations in this area (Greensboro, N.C.), including myself, who are started on a project of putting TV on 432 Mc within the next year. This includes stations in Burlington and Greensboro." So sez K4GPL. Ron also tells us that there is much activity in Greensboro in the antenna improving field, and among the improvers are WA4POA, W4WDH, WA4DXT, WA4SAD and K4GPL. Ron now has a new 88 ft. tower with 4 eight-element beams in a quad arrangement. Top



W1EHF — co-holder of 2300 Mc. record.

beam is 100 feet off the ground. He can run c.w., a.m. or s.s.b. and is looking for skeds with states yet needed. In Marshall, Michigan WA8DXW has decided to start with video gear on 220 Mc. First project is a converter down to channel 5. At the present time John is in the process of locating parts and identifying those from T.V.'s. Good luck, John! "Video modulation tried on a grounded grid (2C39) amplifier for 432 Mc. Some loss in detail. Otherwise the transmitted pictures were good." So sez Karl, WB2OSA at Syracuse, New York. He has also completed a new tripler/amplifier for 432 Mc. using 2C39s, and his old unit is being modified for repeater service. Jack Woodruff, W8PT, wonders where all the guys are said they were getting on 432 Mc. No activity within a hundred miles of Jack's QTH in Watervliet, Michigan. Stations worked on 432 during November were W8JLQ, W8RQI, WA9HUV and W9BTI. He also says that signals are dropping as winter conditions arrive but there are still many nights with above normal signals. Jack would like to sked anyone interested. W8WNX at Detroit tells us that November 1, 2 and 14 were very good for extended ground wave on 432 Mc. with S9 signals up to 200 miles. Larry also tells us that W8JLQ, W8RQI, W8RLT and K8AIY, all regular 432 operators are building gear for 1296 Mc. And — W8DX is revamping video gear for 432 for regular TV operation. Out in Indiana K9UIF is putting up a new 50-ft. tower for his 432 Mc. antenna exclusively, and has ordered a special 80-element array for 144 Mc. moonbounce work. WB2HZY tells us that he and WA2MQP are now in the "blueprint stage of a square halo for two meters." Charlie sez he can always bend the metal back into a round shape if the idea doesn't work out. K3ZGI and K3CFA both make mention of good conditions on two meters during November. K3ZGI, Howie, noted the 2nd of the month when VE3QP was heard with a 5/9 signal. Joel, K3CFA sez the 4th, 7th, 8th, 15th and 22nd were good ones at his QTH in Lemont, Pennsylvania. Among those worked during these periods were: W8AXR, K2IEJ, W3NOY, W8SKP, W8PHJ, W3RUE, W3PGV, W2FDI. Report of an opening across the Gulf of Mexico on November 25 was sent us by W4AWS in Orlando, Florida. Art sez the stations he heard in Louisiana were W5UKQ, W5GIX, W5VUY and WA5HAO. Florida stations were W4MNT, W4NEE and W4AWS. Signals were sometimes as strong as S9 plus 30 db.

Larry, K1IED/4 seems to be doing his share in

the southern climate to keep the two meter band warmed up. He tells us that he has worked stations in Wisconsin, Michigan and Illinois, and has heard stations in Kentucky and Indiana. Nightly skeds are being kept with W1HAD in Connecticut (145.027) at 2230, and the boys hope that some of the two-meter gang will start looking for them and join in the schedule. A final comment from K1IED: "When the band is in good shape we hear quite a bit. For instance on the night of September 7 we worked 84 different stations, all over 100 miles, and most in New York, Connecticut, Mass., etc. The following night we worked 45 stations, all 1's and 2's." Nice going, Larry. Keep that rig warmed up! During the Leonids meteor shower W8PT gleaned only a few pings from K7NII in Arizona during their sked. Only other station heard by Jack was W4SJF. Sez he hears more bursts on K2IEJ during nonshower times. At Ypsilanti K8PBA noted three good nights on 144 Mc. during November. The 1st was fair toward the southeast; the 16th was fair toward the south and southeast; the 22nd was fair toward the north. "Band conditions were exceptional during November on 144 Mc." sez WA8DZP." "Heard a lot of choice stations but didn't have the power to work them. K2MNB came in almost every night and other regulars were K2LOK and W3GLC." Sounds like it was good in Detroit! At Kalamazoo W8CVQ observed strong inversion conditions to the north and east on November 8. Exceptional signals were heard within a range of several hundred miles. From Stevensville, Michigan W3RTV/W8EYO writes us that he is working on 146.94 Mc. f.m. regularly across Lake Michigan into Chigago. Jule sez that there is very little activity in southwest Michigan on this frequency. He also tells of a recent opening on this frequency which resulted in contacts with Saginaw, Owossa, Detroit and Allan Park, all in eastern Michigan about 180 miles. Jule would like to hear from stations in Michigan, Indiana and Illinois who are active on 432 Mc. f.m. He is extremely interested in a v.h.f. link between Chicago and Pittsburgh.

A call of distress: "We have a station prepared for Oscar III but lack schedules with other stations. Could you help us find other stations who want schedules? We realize this is an eleventh-hour call, but would appreciate any help you could give us. The station, W8EDU, (Case Institute of Technology Radio Club) is located in Cleveland, Ohio and stations up to 1000 miles away would be perfect." Any of you "Oscarites" interested, write to Emil Pocock, K3OKC/8, Box 160 Yost, 10902 Euclid Ave., Cleveland, Ohio 44106.

A successful sked with contact made on 154 Mc. was brought to fruition On November 12 between W4AWS and W4WNH. Shelby, W4WNH, sez "the tropo QSO was the most exciting part of this series of m.s. skeds started in September, but other things of interest have also shown up. We began this series in September and have been running them Monday through Friday, 0800-1830 EST, both of us on .099 and W4AWS transmitting the first 15 second period. So far we have worked six times-five times via m.s., once via tropo. Bursts longer than 30 seconds have not been unusual, and we have had two or three that lasted up to two minutes. Of the five QSO's, three of them have been during periods when there supposedly was no shower activity (two were during a minor shower). However, checking burst rates against W4LTU's table, I'm not sure but what all of these may not have been minor shower QSO's. The past few weeks W4AWS and I have been hearing about the same amount from each other. But before that time, what I heard had no necessary connection to the amount that he heard. One morning I would get 50 pings while he got only 10. The next morning the situation would be reversed. Rigs always checked out normally, etc. We have no explanation yet on the differences noted here, but it has been quite obvious. The past two weeks we have received quite a bit each day. I have a sked for the Geminids lined up with K7NII, 1600 miles. Sure, it's too far! But can't get anyone to sked in the states that I need that are within range. (Boy I've heard that before too!) This is still one of the best v.h.f. QTH's I've ever seen. And since we don't know how much longer we'll be here, I try to get on for a few minutes every night. Call CQ to SSE at 2145 EST and to NE at 2220 EST for five minutes every night I'm home. Understand that the New Jersey stations regularly hear my 2220 CQ by both m.s. and tropo. None of us down here ever hear them though. W4AWS calls CQ to NNW at 2150 EST nightly on .105. If any of the fellows up that way need Kentucky, I'll be glad to hive them a sked, so long as I have time left." Very interesting Shelby, thanks for some of the "interesting things" that have shown up. Speaking of schedules, W4HHK writes that he is listening for W9GAB's 432 signal via the moon, and that he has resumed work on 432 kw. Paul sez he's obtained a TD-2 for pumping a 432 Mc. paramp and is also working on horn feed for his dish.

Regarding 432 Mc. and moonbounce W9GAB writes that he has rebuilt most of his moonbounce rig and is now getting four times more power from the transmitter, not including better power transfer due to coax change. Frequency of the transmitter is 432.011 ± 1 kc. He tries to be on each time the moon is visible during the evening hours between 1800–2100 CST and also weekends through out the day. "I can just hear my own echoes at times and still have more things to check out, so may improve my own signals more in the near future. I have been on sked with W4HHK at 1930 CST 7088 kc. Monday and Thursday evenings with regard to keeping the moonbounce skeds. Can also get on s.s.b. on 40 and 20 if anyone is interested." Thanks Bob. Know the other v.h.f.ers are as interested as we.

50 Mc.

Between WB2IPX and WB2MLK/2 in New York we get a glimpse of six-meter conditions during November. Les, WB2IPX, worked VE3CJA on November 1, VE3CTE on the 10th and K3LCO on the 15th. Skip, WB2MLK/2 sez he heard VE3DML and K3NNZ on November 7 and on the 28th it was WA5CDG, WA5FDU and W4SFH. In North Carolina WA4JCS caught the opening of the 28th when he heard stations in Topeka, Kansas with 5/9 signals. We swiped the following from "The VHF-UHF Spectrum" and know it will be of as much interest to the rest of you as it was to us. "A six-meter band opening on October 30 was reported by K5RYD. Another one occurred on November 5 from about 1930 to 2045. And still another one occurred on November 19 from 1500 to 2000, according to WA5CZX. Again the band opening was to the east with good signals being heard from stations in Alabama, Louisiana, Mississippi and eastern Texas. It is interesting to note that band openings have occurred on October 17, 18, 19, 20 and on November 5 and 19. S.s.b. signals are still being heard on 50.1 Mc. just about every Sunday morning around 0700 to 0900 hours at W5YXG. Copy is good on signals for just a few seconds up to about 20 to 30 seconds with some signals staying in on bursts

(Continued on page 162)

CONDUCTED BY JEAN PEACOR,* K1IJV

Honest to Goodness — YLs

TEEN agers take note! YLs in their teens have responded in fine style to the letter printed in the December 1964 column asking where they all are.

To quote Judy Birkeland, WB6ADR: "He missed hearing me at age 16, I just had a birthday two months ago, but I was on. In fact, I was on at 15 and at 14. He just wasn't listening — hi!"

Judy Birkeland, WB6ADR, of Santa Barbara.

Judy, a senior in high school, is the only licensed ham in her family and an avid radio operator from all reports. The familiar signal of her DX-60 is known to many on 80, 40, 20, 10, and particularly on 15 meters, her favorite band, on both c.w. and phone. Those hams who frequent the haunts of a rather dead 15 meters at night may have talked with Judy where she's become a good friend of all who have talked with her.

Shining through all these contacts, one OM has gained Judy's favor over all others and she's now going steady via the air waves — something she thought couldn't be done. Romance budded and bloomed for her on 15 meters. Is it any wonder that she urges XYLs with daughters to encourage them to get their tickets?

Meanwhile, in the sunny south, two sisters have added a great deal of southern charm to the ham bands as members of NCN (North Carolina Net) and 4RN will assure you. The McDade YLs from Skyland, N. C. are members of quite a ham family, their father being W4DYW and a brother Evan, WA4AAK.

Elissa (Liz), WA4BVF, is 16 years old and a junior at St. Genevieve-of-the-Pines Academy for girls in Asheville, N. C. At school she is president of her class and a member of the student council. In between classes her activities in the amateur radio field have earned for her such certificates as A1 Op, ORS, 4RN and one for high score for the 4th district in the 1964 YL-OM contest.

Eighteen-year-old Emily, WA4BSJ, is a freshman at Rollins College in Winter Park, Florida where she is Secretary of the Rollins Radio Club. She also enjoys sailing and is taking flying lessons. All these activities have not curtailed her radio enthusiasm since she too holds certificates for NCN, 4RN, ORS and is another A1 Op.

Three and a half years ago Liz and Emily became licensed in "self defense" as their father and Evan were always talking ham radio. Needless to say, they both now contribute greatly to such conversations. Since they share the same transmitter and keyer and operate mostly c.w., don't count on being able to tell them apart on the air but you will find pleasure in talking to either one.

Those who sometimes express fears regarding the future of the world when placed in the hands of today's youth could well take a look at the outstanding youth represented in the amateur radio ranks. While receiving untold benefits to themselves in becoming hams, it's such persons that also give the world of amateur radio another fine reason for its sense of pride.

Elissa, WA4BVF, (seated) and Emily, WA4BSJ, (standing). Photo courtesy of WA4AAK.

* YL Editor, *QST*. Please send all news notes to K1IJV'S home address: 139 Cooley St., Springfield, Mass.

25th YL Anniversary Party Results

COMBINED SCORES

K1NST	2197	K7RAM	6811. *
K2JYZ	4562.50*	K7ADI	2052.50*
K3HZY	2013.75*	K7OFX	1743.75*
WA4FJF	3575. *	W8WUT	3108
W4ZDK	3617.	W8HWX	3605. *
W4UF	1603.75*	K8ITF	3180. *
K4LMB	662. *	K8LHF	3077. *
K5YIB	8545. *	WA8IAQ	645. *
WB6CGA	5253.50*	VE3BII	4441.25*
WA6AOE	2216.25*	VE7ADR	4275. *
W6DXI	1160. *	VK3KS	2.50*

CORCORAN AWARD

Ellen Ackerman, WA4FJF 8575.00*

NORTH DX YL AWARD

Jeanine Burgess, VE3BII 4441.25*

WORLD DX YL AWARD

Mavis Stafford, VK3KS 2.50*

PHONE SCORES

K1EKO	3990	WA6KLP	2175. *
K1OYM	3948	K6UHI	1682
K1IIF	3780	WA6AOE	1210. *
K1GSF	2247. 5*	W6DXI	1025. *
K1NST	1537	K6JCL	275. *
W1ZEN	87. 5*	K6VFE	90
K2JYZ	3850. *	K7RAM	6325. *
WA2GPT	3034	K7KSF	4347. 5*
W2OWL	1430. *	K7NZO	2210
K3HZY	1993.75*	K7ADI	1500. *
WA4FJF	7200. *	K7JPI	1155. *
K4RNS	6727. 5*	W7GGV	907. 5*
W4BWR	3828	K7OFX	573.75*
W4ZDK	2904	W7HHH	294
WA4FEY	2280	K7UER/7	276
W4UF	531.25*	W8HWX	4987. 5*
K4LMB	162. *	K8TVX	4370. *
WA4BMC	3	K8LHF	3193.75*
K5YIB	7500. *	W8RZN	2987. 5*
K5OPT	5676	K8ITF	2720. *
W5NQQ	3948.75*	W8WUT	2244
WA5ALX	2635. *	K8VCB	1856
W5TSE	1680. *	WA8ARJ	1496.25*
K5JFJ	78.75*	WA8IAQ	630
K6KCI	7860. *	K9TRP	4663.75*
K6DLL	5092. 5*	K9AXS	4180. *
WB6CGA	4646	K9LUI	2720
W6YZV	3483	WA9EYL	720. *
WA6LWE	3062. 5*	W0JUV	2379
K0JFO	1522. 5*	KZ5TT	3075
W0IIJL	1485. *	VE3BII	2816.25*
K0VPJ	1363	VE7ADR	3330. *
K0EPE/M	1292. 5*	VE7NW	3280
WA0AAM	262. 5*	VE7ABP	1840. *
PY2SO	60. *	VK3KS	1.25*

Confirmation logs: W3MDJ, WA4VKG, K5OPS, W6QYL, W6VDP, W6BDE.

CW SCORES

K1NST	660	K7ADI	552. 5*
K1UZG	546.25*	K7RAM	486
K1WZY	462. 5*	W8HWX	617. 5*
K1WXF	176	W8WUT	864
K2JYZ	712. 5*	K8LHF	522. *
K3HZY	20	K8ITF	460. *
WA4FJF	1375. *	WA8FSX	18
W4UF	1072. 5*	WA8IAQ	15. *
W4ZDK	713	W9MLE	1050. *
K4LMB	500	WA9CCP	761.25*
WA4PAE	42	WA9EZP	55. *
K5YIB	1045. *	VE3BII	1595. *
WA6OET	1540. *	VE3ABV	1363. *
WA6AOE	1006.25*	VE7ADR	945. *
WB6CGA	607. 5*	G2YL	162. 5*
W6DXI	135. *	OH5RZ	36
K7OFX	1170. *	VK3KS	1.25*

Confirmation logs: W3CDQ, W6NAZ, K8ONV.
* Low-power multiplier.

Results of September Howdy Days

High Score YLRL Member — Roberta Lemon, WA8ARJ, 82 points High Score non-YLRL — Carolyn Thompson, K1BJZ, 18 points. Runners-up were: (YLRL members) K1EKO, VE3BII, K8TVX, K5JFJ, K8VCB, WA8IAQ, K1GSF, K1IIF, K1WXF, K1USQ; (non-members) K7ADI.

After checking logs for this contest, Martha Edwards, W6QYL, found the results were more encouraging this year. She reports that HC2AH, Evelyn, from Guayaquil, Ecuador was logged twice, OZ5QM, Lydia, from Copenhagen was logged once and the third highest score from Jan, VE3BII. It might be possible next year to work WAC/YL during Howdy Days!

Rules 16th Annual YL-OM Contest

TIME:

Phone — Sat., Feb. 20, 1965, 1300 EST to Sun., Feb. 21, 1965, 2400 EST. (1800 GMT Sat. to 0500 GMT Mon.)

C.W. — Sat., March 6, 1965, 1300 EST to Sun., March 7, 1965, 2400 EST. (1800 GMT Sat. to 0500 GMT Mon.)

Eligibility: All licensed OM, YL, and XYL operators throughout the world are invited to participate.

Operation: All bands may be used. Cross-band operation is not permitted.

Procedure: OMs call "CQ YL". YLs call "CQ OM".

Exchange: QSO number, RS or RST report, ARRL section or country. Entries in log should also show band worked at time of contact, time, date, transmitter and power. (ARRL section list available for s.a.s.e. to YLRL V.P.)

Scoring: (a) Phone and c.w. contacts will be scored as separate contests. Submit separate logs.

(b) One point is earned for each station worked, YL to OM or OM to YL. A station may be contacted no more than once in each contest for credit.

(c) Multiply the number of QSOs by the number of different ARRL sections and countries worked.

(d) Contestants running 150 watts input or less at all times may multiply the result of (c) by 1.25 (low-power multiplier).

(e) S.s.b. contestants running 300 watts p.e.p. or less at all times may multiply the result of (c) by 1.25 (low-power multiplier).

Logs: Copies of all phone and c.w. logs, showing claimed scores and signed by operator must be postmarked not later than March 31, 1965, and

Irma, K6KCI, of Santa Barbara will remember 1964. The lucky winner of the grand bedspread made from all hand embroidered YL Club certificates at the YLRL convention in June, she went on to win the cup for 1st place honors in the phone portion of YLAP. Since becoming licensed in 1955 her activities have ranged from membership in six radio clubs to very adept traffic handling on both amateur and Mars frequencies. Her OM, Lou, K6GHU, and son Lynn, WA6IBR, make theirs an all-ham family.

received no later than April 15, 1965, or they will be disqualified. Please file separate logs for each section of the contest. Send copies of logs to Kayla Bloom, WØHJL, 175 S. Jasmine St., Denver 22, Colorado.

Awards:

1st place phone:	YL — Cup	OM — Cup
1st place c.w.:	YL — Cup	OM — Cup

The winner of the phone cup is also eligible for the c.w. cup. Certificates will be awarded to c.w. and phone winners in each district and country.

No logs will be returned. Be sure it is a copy of your log you send for confirmation.

NEW RULES FOR V.H.F. STATIONS

Scoring: Number of contacts times low power multiplier. There is no multiplication by ARRL sections and countries. Use of both high and low power for any portion of the contest will not allow your use of the low power multiplier. No ARRL section and country multiplier applies to the v.h.f. section of the contest only.

Awards: 1st place phone and c.w., both YL and OM, will receive a special award.

YL Clubs

Ohio's Buckeye Belles' new certificate custodian is Lillian Richardson, W8HWX, 3709 Starr Ave., Oregon, Ohio 43616. This certificate is available to those who have contacted 10 Buckeye Belles for U. S. stations; 5 if DX; or 20 if in Ohio. Your list should include full log data, Buckeye Belle number and 25¢.

Using a straight key and with no directional antenna system, this YL has taken 1st place honors in the YLAP c.w. contest and is also the 1st to win the new cup for highest combined scores among Northern DX YLs. Jan, VE3BII, and her OM, Gord, VE3CRI, run 120 watts on c.w. and 70 watts on a.m. If Jan's dream comes true regarding a keyer and rotating quad, just imagine her next year's score!

25 Years Ago this month

February 1940

. . . The editorial this month concerned experimentation and applications of frequency-modulated voice transmissions to amateur radio. The 2½-meter gang was asked for their cooperation in building and testing f.m. gear under practical operating conditions. . . . Immediately following the editorial was a Stray reporting the results of a test made using a mobile flea-power m.o.p.a. that could be either frequency- or amplitude-modulated. Receivers were set up side by side in a noisy location and comparisons were made between the readability of the f.m. and a.m. signals as the transmitter was sent out on the road. "Results confirmed the most optimistic expectations. With the car going straightaway from the receiving point and over fairly level ground, a readable f.m. signal could be obtained at distances in the order of four or five times that at which the a.m. signal was just strong enough to be understood through the noise." . . . By Goodman, W1JPE (now W1DX) was busy building f.m. equipment in the ARRL lab and described a "Practical 112-Mc. F.M. Transmitter". . . . Other technical articles included a treatment of voice-wave polarity and its effect on transmitter operation, "Lop-Sided Speech and Modulation" by George Grammer, W1DF; a "Compact Battery Receiver for Station or Portable Use", by Don Mix, W1TS; an instant band-changing transmitter with motor-driven switches by Leon Linn, W9LHF; and John Williams, W2BFD, described a carrier current (wired wireless) transmitter and receiver for remote control of a transmitter or other device. . . . Joe Moskey, W1JMY, reported the interesting results of the 2nd u.h.f. relay. The longest route was 1150 miles on five meters — between Boston and Chicago. It took ten stations and about 24 hours to complete the hop! . . . The oldest and youngest hams in 1940 (at least as far as we knew) were presented in a picture Stray in the February issue. The young squirt was W9FTV, age 11. The old timer was W9CAB, who was 82 years young! QST

I.A.R.U. News

JAPAN

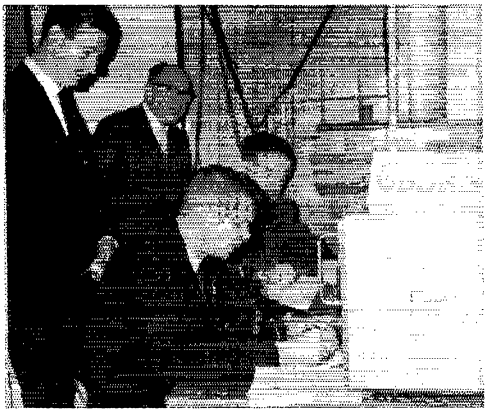
Japan has more than 200,000 blind persons. Amateur radio is of course an excellent activity for the blind. Once they have received licenses blind amateurs can meet with the sighted on terms of equality. Recognizing this, the *Japan Amateur Radio League* five years ago assisted in the formation of the Japan Blind Ham Club, now boasting a membership of 300.

Borrowing a leaf from the book of the TB Association the Blind Ham Club is raising funds for Braille literature on electronics through the sale of stamps like Christmas seals. Amateurs wanting information on the club or wanting to help should contact the Japan Blind Ham Club, c/o JARL, Box 377, Tokyo, Japan; attention of Mr. K. Shirai.

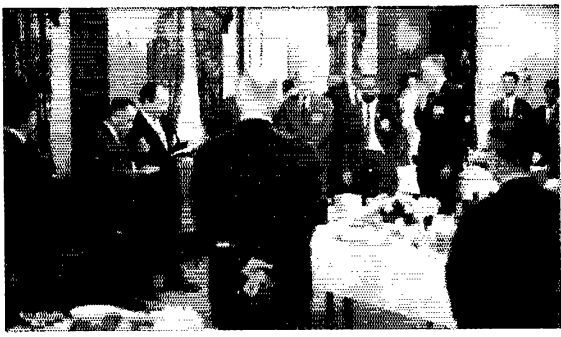
ECUADOR

The People-to-People Health Foundation, sponsors of Project HOPE, has presented a Certificate of Merit to the Guayaquil Radio Club, the IARU society in Ecuador, in recognition of the successful completion of service aboard the hospital ship SS *Hope* from December 1963 to September 1964 in providing an amateur radio network to facilitate communications for the project.

The SS *Hope* is currently in Conarky, Guinea and is operating as W8BZB/7G1.



At the recent RSGB exhibition in London special permission was secured for foreign radio amateurs to operate the h.f. and v.h.f. stations on display. Pictured at the h.f. station are Jeff Stone, G3FZL, president of RSGB, John Boyce, G4NI, Chet Lambert, W4WDR, operating and Ron Vaughn, G3FRV, Secretary of the Exhibition, logging.



In conjunction with the 14th International Scientific Radio Union convention in Tokyo this year the JARL held a "URSI Ham" meeting. Present were more than 30 Japanese amateurs, Dr. Smith Rose, President of URSI and former President of RSGB, and W6QYT, W9QYU, W6POH, W1OUN, K2HJU, OK1WI, DL6DS, DL3LJ and ZL3LT. Pictured are several of the JARL officials and guests.

SWITZERLAND

As a special feature of the forthcoming centenary celebration of the International Telecommunications Union the International Amateur Radio Club, whose station is in the ITU building, will operate 4U1ITU continuously in most bands May 16th and 17th, the actual anniversary date. Radio amateurs from throughout the world will operate the station and a great many distinguished communications officials are expected to visit and observe. A special QSL card will be issued commemorating the event.

The IARC is once again seeking articles concerning any aspect of amateur radio development or significant operating achievement for the 1965 edition of *4U1ITU Calling*. This will be a special centenary edition distributed to prominent communications officials in all countries and to world wide amateur radio societies. The deadline for manuscripts is March 31, 1965.

DX RESTRICTIONS

United States amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the International Telecommunications Union under the provisions in Article 41 of the Geneva (1959) conference.

Cambodia, Indonesia (including West New Guinea), Thailand and Viet Nam forbid radio communication between their amateur stations and amateur stations in other countries.

Correspondence From Members-

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

REAL TRIBUTE

¶ From one who knew John Reinartz, please let me congratulate you on such a fine, magnificent tribute to one of the truly great people in amateur radio. All of us OOTs were greatly enriched by his developments and his forward-looking mind.

What he considered one of his minor accomplishments was mining a piece of Connecticut quartz, sawing out and grinding a crystal, which he always added with one of his great smiles, "It really oscillated!!" — *W1AII*

DEAD LETTERS

¶ I would like to recommend that you put a conspicuous article in *QST* magazine emphasizing the importance of addressing QSL cards the same way as any other mail.

Over half of the cards that I get do not show my last name. Some show my call letters only or preceded by the letters "ARS". Sometimes they show my first name on the next line preceded by the letters "CH OPR."

One day we did not get our mail for the whole family because when we called for it at the post office the first item was a QSL card without my name and the postman did not recognize it.

In large apartment houses and college dormitories which have one mailing address, it is important that the last name appear on the card as it is needed to get it to the right person. The *Callbook* does not show apartment numbers or room numbers, and these are not needed anyway if the last name is used.

The average family moves every few years and the post office goes by last name when forwarding mail. This February I will move into the college dormitory and if cards come addressed to my old address they will not be forwarded unless they show my full name. — *WA4UXZ*

BUILD OR BUY

¶ For over thirty years I have taken *QST* without ever being provoked to write, but the provocation has come. "Do It and Rue It" did it!

All these years I labored under the assumption that Thomas Alva Edison not only "rolled his own" but thought it up. It is such a surprise to find that he merely purchased the items at the Northern New Jersey branch of a radio parts store. Too, it may be considered comforting to realize that that Italian fellow was just rich enough to pay the postage from the Chicago supply house.

I have a *Handbook*, which has soldering iron burns which shows only "amateur" allocation from about the f.m. broadcast band up, but all the time I could have saved myself the trouble by just ordering a kit. It now seems strange that I carried papers for two weeks to earn my first "99" tubes when, had I had the savvy of the author, I could have gotten a "Mark 1127.32" for only 10% down.

This, then is a confession. Like my ole 40-meter prewar buddies all over the world who built their own version of the "QSL-40", we just didn't know how stupid we were. It is most gratifying to be brought up to date.

Seriously, my profound sympathy is extended to the author. He qualifies for more pity than any amateur I have ever known. No amount of pain inflicted by labor for the love of "rolling your own" can possibly equal the abysmal ignorance of amateur radio which he has expressed.

To him, my sincerest thanks for making my hobby even more enjoyable. — *W4FKE*

A SIGN OF THE TIMES?

¶ In a recent issue of a ham magazine I see where the Hallicrafters Company has a contest where you are asked to complete in 50 words or less, "What I can do for Amateur Radio".

In five words — "Clean up the Novice Bands."

However, the explanation of those words takes well more than 50 words, which is why this letter is in your hands.

I am a Novice. I have had my ticket for not even a month now, but long enough to draw some definite conclusions about the state of the frequencies alloted to the Novice.

I got my ticket without ever seeing another Novice. Most of my dealings were with either Old Timers, holders of Advanced Class or Amateur Extra Class, or hams considered in high circles of the ARRL.

After working 40 and 15 meters a few weeks, I began having my first eyeball QSOs with other Novices around Miami. The first one I visited had swapped in a 90-watt transmitter for a Heath 2-er. The second one, a Novice who had given me consistent 5 and 9 reports on 15 meters, was surprised to learn I was not using a v.f.o. He was even more surprised to learn that I only used 75 watts.

Why were they so shocked that I wasn't operating illegally? Because any Novice who puts out a good signal can't be all honest!

I imagine the following scene is carried on quite often. The new Novice full of enthusiasm, is ready to go on the air. His equipment is not the best, but he bats out a few contacts. Up to now he has followed FCC regulations religiously. After a few weeks or so, he finds he is working the same crowd all the time, and why use Morse Code when you can pick up a phone and talk to the person just as easily. So the drive and the buffer knobs become more appealing. After a week or so, in slow stages he has his transmitter up, to say 100 watts, the full capacity. Still, he makes only a few new contacts. The band is too crowded, or at least the frequencies where his crystals are, are too crowded. The next step is obvious.

When you try to weed out every Novice who is infracting on regulations, probably 25% would go. But even one out of every four Novices losing their license is better than an indefinite suspension of the entire class of license. — *WN4VSY*

TRAFFIC HANDLING HINTS

¶ It should hardly be necessary to remind traffic-minded hams that they can invariably get a response to a delivered message for the mere asking at the time of delivery.

Far too often my correspondents have mailed to me the message I sent to them as in turn sent to them by the delivering ham. It was typed but nary a single word about being willing to accept a reply. Again I have been informed that so and so ham phoned my message but did not say a word about a "reply message."

Wake up, gang, and increase your originations. True, you may even have to assist in the composition of that reply message; but that is easy. — *W3RV.*

¶ In a recent experiment, I traced just how many pieces of traffic that originated at my station actually arrived at their destination. To my shock and surprise, I discovered that just 60% arrived, and that the other 40% were seemingly discarded by other stations handling them.

Being a traffic operator myself, I know that delivery cannot be guaranteed in all cases. However, I believe that it would not be an imposition for the stations, unable to deliver the traffic for any reason, to originate a service to the station-of-origin telling him so. No one knows how important a message is to the person it is meant for!

And secondly, no one with the exception of the station-of-origin reserves the right to QTA a message. — *K1VPJ*

QST CHEESECAKE

¶ Wow and double wow! I had missed the "Galaxy" ad in October *QST*, but when that poor soul's letter appeared in December deploring "Cheesecake" I just had to look it up.

I know you just printed it to get a rise out of me, and be advised you did. I have only one question? Who is she? ? ? — *W6QYR*

¶ I disagree with K8UKH's objection to "Cheesecake". After all there are still some of us who are not too old to enjoy a little "spice" now and then, and that ham radio is not our only pastime. More power to the Galaxy people. — *W6KJ*

TECH C. W.

¶ I was a technician for two years and I know how WB2HVF must feel, however, I managed to operate m.c.w. above 145 Mc. and I have my General to show for it. If one finds no activity on m.c.w. on two or six meters, there are such things as code practice oscillators and listening to W1AW to perk up code speed. The expension of the restriction of two and six meters would probably do more harm than good. — *W1AW2VPQ.*

¶ I have a Technician rather than a General class of license because of my code speed. The W1AW code practice sessions are great but I, and probably many others, could improve my speed easier by having some good c.w. contacts.

Presently, I am converting my six-meter transceiver for c.w. operation. The only thing that worries me is that after the conversion is complete, I may not have anyone to talk with. During the time that I have had my license, I have only heard one c.w. station on six meters in this area (near Milwaukee, Wisconsin).

Six meters is an excellent band for c.w. with its low noise level and uncrowded frequencies. It does not seem logical that other technicians aspiring to earn their General Class ticket should pass up such an opportunity to increase their code speed. By using c.w. there is also the added benefit of getting more signal output for your dollar compared with a.m. transmission.

I hope that more amateurs feel the way I do about this, and c.w. activity on six meters will be increasing in the future. — *W1JNCZ*

MEMBERSHIP DRIVE

¶ After reading the letter from WB2AVI (Dec. Corres.) I am getting busy to get you a half dozen membership-subscriptions to replace him. — *K4AET*

QSY — TO WHERE

¶ There may be many reasons, excuses or rationalizations for the existence of amateur radio, but certainly a large segment of hams enjoy the sound of their own voice — the writer included. All of the most used phone bands have a total of about 500 kc. available to 200,000-plus amateurs, so congestion is the rule rather than the exception. It becomes a matter of live and let live — no one owns any particular frequency at any particular time.

Lately the writer has been requested numerous times to get off such and such a frequency, that thus and so was in progress. One Arizona ham asked a clear frequency for "possible traffic" to one of the small Eastern Seaboard states. He repeated this request for one hour and five minutes, at least once every two minutes. Another requested a clear channel for an operation already in progress. In a few minutes he let it be known that it had lasted three hours.

The number of "nets" requesting a clear channel has climbed to such heights that one net had to ask another net to get off such and such a frequency. I have been asked to vacate frequencies for the Mid-West Net, the Prairie Dog Net, the Transpacific Net, the Transatlantic Net. As of today, I was invited to join the Intercontinental net and await my turn at the pleasure of the net coordinator or get off the frequency.

This was by a very American voice outside the U.S. He was really having a ball hearing his voice check in all the net stations. Other than checking all the stations in and Rogering everyone, no traffic was passed. Even the "hurricane" nets of the last few weeks admitted over the air that all the info they had was via TV.

In all my years of ham radio, I have never heard a real authentic SOS, MAYDAY, or QRRR. Guess I'm always at the wrong place at the wrong time.

Ham radio has something for us all, so I will QSY down 2 kc., and move my QRM from the Hair net to the Fish net while the Tennis net puts in a request for a clear frequency for traffic to the Dragnet at 0600 hours Zulu. — *W4MBM.*

CHOICE OF TERMS

¶ There is a growing tendency on the amateur bands to refer to a linear amplifier as "a linear."

Not only is this grammatically incorrect (using an adjective as a noun) but also it is technically incorrect (presumably of greater interest to amateurs). When an operator announces the use of an additional stage of power amplification, it is the amplitude of the signal that is under discussion; linearity, or the lack of it, it is readily apparent to the receiving

(*Continued on page 152*)

Operating News

F. E. HANDY, W1BDI, Communications Mgr.
GEORGE HART, W1NJM, Natl. Emerg. Coordinator
ROBERT L. WHITE, W1WPO, DXCC Awards
LILLIAN M. SALTER, W1ZJE, Administrative Aide
ELLEN WHITE, W1YYM, Ass't. Comm. Mgr.

Observer Suggests Close Frequency Observance. Andy Moore, W3FJF-OO, writes "Many operators load up their transmitters one kc. inside our band edge and make it a point to transmit there." W3FJF invites attention to the following. "FCC monitoring stations operate on the principle that no emissions should be *outside* the specified amateur bands. Since the audio applied to a phone transmitter normally requires up to 3 kc. and can result in emissions outside a band it is, of course, contrary to FCC regulation to place a signal with its center carrier so close to a band edge that emissions can be logged outside by the FCC monitors."

Operating Sideband. This month we would like to pass along some principles as set down by the Western Single Side Band Association, one of whose aims is to improve operating techniques. Courtesy and attention to accepted principles of operating can greatly enhance the pleasure and effectiveness of amateur operation. Brown Wiggins, W6ONY, of the association notes that there are several ways to be really unpopular. One *can* open up with 'break, break' on a round table or try to take over a round table if a weak mobile. It's possible to use 'go' or 'go ahead' excessively (you *do* say 'go ahead' to the weak or mobile signal). Also it's a disturbing element to invite double or multiple transmissions by making broad undirected statements, such as remarking that the band is noisy, inviting two to five people to answer with their band conditions. Another way to be unpopular is to hog or monopolize the frequency. Here are some formulated procedures that our association uses as a guide and which may answer questions about entering a round table or group in operation. W6ONY bases this on the premise that you have just an hour to operate. You listen and select a group. You listen until the ID. The first station to identify pauses at completion of his ID, *then* you give the station that started the ID cycle a call and your own call.

1. About 'break-break' — you would *not* walk into a group of people on the street and start conversing this way. We do not recommend the utter exclusion policy but new operators in our group are informed we do not enter round tables this way, but courteously as above.

2. Your time is limited and you wish a report. Listen until you get a name. Then call the fellow by name. Be courteous. Ask and thank the specific station for its report, or wait for the ID cycle and clear at that time. Be prompt and log the one station. A better way . . . you can always call CQ on a clear frequency to get reports.

3. You are looking for a certain city. Wait for a lull in the QSO. Ask a specific station about it. Thank him and move on. You wish to correct a statement. Call one station; after its response state you can add something on the subject if desired. You will be welcome.

4. In emergency: Don't clutter up the frequency. Let the control station in the area call you. Keep your receiver on the frequency for calls but the transmitter off. Report any traffic but observe precedences — no ingoing inquiry messages 'til messages coming out of a disaster area have been cleared. Report any formal traffic you have to the control, then shut up. If there's no control station in an area, ask an appropriate station there to act as control.

Novice Roundup. The ROUNDUP this year can list all Novice QSOs completed February

ANNOUNCEMENT OF SOUTHWESTERN DIVISION RESECTIONALIZING

Operating territory within ARRL divisions is apportioned into ARRL Sections by the Communications Manager for field organization purposes. *QST* carries the list of Sections (and officials) *each month* on page 6. Appointee and amateur population studies of the Southwestern Division in progress for nearly a year have been completed. This is now to announce and define the operating territory comprising *five* ARRL sections by their county areas in place of the present four sections in this division. The change for all except '65 DX contest purposes becomes effective March 1, 1965:

Arizona: All Counties, no change.
Los Angeles: Los Angeles county.
Orange: Orange, San Bernardino, Riverside, Inyo.
San Diego: San Diego, Imperial.
Santa Barbara: Santa Barbara, San Luis Obispo, Ventura, no change.

Members in the Orange Section each have been notified that their section is "official" as of March 1. Letter solicitation of nominating petitions for the new Section was completed in late November. The Station Activities reports compiled at the end of March will be the first in which members in the four-county Orange section will mail their reports to a new official — address to be available, we expect, for March *QST*, page 6 listing. The SCMs resident in L.A. and S.D. continue in office, and will process all reports from L.A., Orange and S.D. as usual for their end-of-February reports. There will be a call for nominations from L.A. and S.D. coming up normally for the next two-year term of SCM office later in the year . . . see notice for L.A. members elsewhere in this issue.

For this year's *International DX Competition* all logs and reports will be classified as of the current (instead of new) sectionalizing, since this annual activity dates from February, regardless of when the participant starts.

6-21. For full information see page 65, January '65 *QST*. Use the general call CQ NR *if you are a Novice* looking for these contacts. The activity starts at six p. m. local time. Put in just a little operating time daily and your contest results can be surprising! How many states can you "round up" in the test?

For senior amateurs the contest is a refresher, also a chance to make some new acquaintances and demonstrate proficient procedure and patience. We do agree with some suggestions from WA9CIO who will be in it this year and recalls the need for these generally agreed upon rules for senior operators taking part. (1) Generals will *not* call CQ NR in the Novice sub-bands but will only answer CQ NR as sent by the Novice. (2) Old timers will for the most part work near, but outside the Novice sub-bands; when so operating they may then call CQ NR to show they are looking within Novice territory for contacts.

—*F. E. H.*

MONITOR PREFERABLY WITH GEAR THAT *DIRECTLY SAMPLES* YOUR ON-THE-AIR SIGNAL

1964 A.R.R.L. SWEEPSTAKES

High-Claimed Scores

Following are the high-claimed scores for the 1964 ARRL Sweepstakes Contest held in November. Included are only those *claimed* c.w. scores over approximately *69,000* points, and those *claimed* phone scores over *70,000* points *received* by mid-December copy deadline. *QST* will carry the full *official* Sweepstakes Results as soon as checking is completed. Figures below show the score *claimed*, number of QSOs, and the number of different sections worked.

C.W.

W4KFC	155,955	846	74
K6EVR[1]	143,005	788	74
W7ESK[2]	133,316	734	73
WA4NGO	122,443	735	67
W0AIH	115,796	638	73
W3BES	110,145	600	74
W3YLJ	108,780	590	74
W3MSK[3]	107,115	591	74
W6KG	106,283	383	74
K5LZO[4]	103,879	717	73
K4BAI	103,295	566	73
W3FLY	98,875	566	70
WB2ALF	96,700	513	68
W9RQM	95,850	542	71
W8CJN	94,146	442	71
W9RCJ	93,802	514	73
WB2APG	92,122	523	73
W3MSR	91,958	550	67
W2VJN	89,820	504	72
W1JYH	88,750	625	71
W8RSW	88,147	511	69
W0JPH	86,615	514	68
KØSLD	85,775	618	73
KZ5OP	85,509	524	67
W3GHM	85,042	494	69
K5RUO	84,315	446	67
K2KTK	83,402	457	73
K6VVA	82,125	471	70
W4PTR	82,080	458	72
W9GFF	81,165	387	70
K1WJD	81,000	563	72
W3ZKH[5]	80,660	555	74
W3GAU	79,390	447	72
K9KGA	79,310	470	68
K5OCX	79,144	428	67
W3TMZ	78,840	540	73
W8FGX	78,798	572	69
W3GRF	77,879	574	69
W3GQF[6]	77,848	529	74
W6RW[6]	77,770	556	70
K2EIU/5	75,880	422	72
WA5CBL	75,701	520	73
W7TDK	75,260	535	71
K4TEA	73,723	400	74
W2NNL	72,371	460	63
W1BGD	71,280	432	66
W1WPO	71,139	518	69
W9QQG	70,975	421	68
WA9AUM	70,958	424	66
W2SZ[4]	70,244	525	68
VE3CVX[7]	70,200	390	72
W1ECH	69,793	494	71

PHONE

K6EVR[1]	162,837	754	74
W7ESK	132,273	610	71
K5LZO	130,356	614	71
W3TMZ	122,962	585	70
W3AZD	122,100	550	74
W4KFC	118,860	567	70
W3ZKH[5]	108,188	731	74
KØCVA	107,226	506	71
W2SZ[4]	106,080	555	65
K4BAI	101,745	485	70
W9IOP	100,669	504	68
W3HHK	94,868	439	65
VE2AUV	94,248	473	68
K4LPW	92,528	430	73
W3BES	86,292	425	68
K8TIG[8]	85,782	424	68
K9VKH	85,260	415	70
WA4NGO	82,524	601	69
WA5ALB	81,473	383	71
K9BGL	80,400	401	67
W7WLL	79,900	590	68
WB2APG[4]	76,512	410	64
W6KG	75,375	375	67
W7AYY	74,973	375	67
KØBUU	74,571	371	67
K1DIR	73,840	524	71
K8YCM/5	73,440	365	68
K2IML	71,386	349	69

[1]W9WNV, opr. [2]W7WJB, opr. [3]K3EST, opr. [4]Multiple-Operator station [5]W6HOH, opr. [6]K9ELT, opr. [7]VE3FUX, opr. [8]W8FAW, opr.

FREQUENCY MEASURING TEST FEBRUARY 12 (GMT)

ARRL invites every amateur to try his hand at frequency measuring when W1AW transmits signals for this purpose starting at 0230 GMT, Feb. 12. *CAUTION:* Note that since the date is given in Greenwich Mean Time, the early run of the frequency measuring test actually falls on the evening previous to the date given. *Example:* In converting, 0230 GMT Feb. 12 becomes 2130 EST Feb. 11. The signals will consist of dashes interspersed with station identification. These will follow a general message sent to help listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3510, 7047 and 14,137 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 0236. It is suggested that frequencies be measured *in the order listed*. Transmission will be found within 5 or 10 kc. of the suggested frequencies.

At 0530 GMT, February 12, W1AW will transmit a second series of signals for the Frequency Measuring Test. Approximate frequencies will be 3522, 7055 and 14,059 kc.

Individual reports on results will be sent to all amateurs who take part and submit entries. When the average accuracy reported shows error of less than 71.43 parts per million, or falls between 71.43 and 357.15 parts per million, participants will become eligible for appointment by SCMs as Class I or Class II OOs respectively.

This ARRL Frequency Measuring Test will be used to aid qualification of ARRL members as Class I and Class II observers. Present observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required accuracy. Class I and Class II OOs must participate in at least two FMTs each year to hold appointments. SCMs (see listing, page 6) invite applications for Class III and IV observer posts, good receiving equipment being the main requirement. All observers must make use of cooperative notices, reporting activity monthly through SCMs, to warrant continued holding of appointment.

Any amateur may submit measurements on one or all frequencies listed above. No entry consisting of a single measurement will be elibible for *QST* listing of top results. Listing will be based on over-all *average* accuracy, as compared with readings made by a professional lab.

ELECTION NOTICE

To all ARRL members residing in the Sections listed below:

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

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

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

Petitions must be received at ARRL on or before 4:30 P.M. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

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

Communications Manager, ARRL [place and date]
225 Main St., Newington, Conn. 06111

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

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

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

— *F. E. Handy, Communications Manager*

Section	*Closing Date*	*SCM*	*Present Term Ends*
West Indies	Feb. 10, 1965	William Werner	Aug. 10, 1963
Brit. Columbia	Feb. 10, 1965	H. E. Savage	Apr. 10, 1965
Michigan	Feb. 10, 1965	Ralph P. Thetreau	Apr. 10, 1965
Alberta	Feb. 10, 1965	Harry Harrold	Apr. 10, 1965
North Carolina	Feb. 10, 1965	Barnett S. Dodd	Apr. 10, 1965
Idaho	Feb. 10, 1965	Raymond V. Evans	Apr. 10, 1965
Los Angeles	Mar. 10, 1965	John A. McKowen	Apr. 18, 1965
Canal Zone	Mar. 10, 1965	Thomas B. DeMeis	May 10, 1965
Washington	Mar. 10, 1965	Robert B. Thurston	Resigned
Maine	Mar. 12, 1965	Arthur J. Brymer	Resigned
Nebraska	Apr. 9, 1965	Frank Allen	June 10, 1965
Oregon	Apr. 9, 1965	Everett H. France	June 10, 1965
E. Penn.	Apr. 9, 1965	Allen R. Breiner	June 15, 1965
Iowa	May 10, 1965	Dennis Burke	July 2, 1965
South Dakota	May 10, 1965	J. W. Sikorski	July 3, 1965

ELECTION RESULTS

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

Mississippi	S. H. Hairston, W5EMM	Dec. 15, 1964
Conn.	Fred Tamm, K1GGG	Feb. 6, 1965
Colorado	Donald Ray Crumpton, KØTTB	Feb. 14, 1965

In the San Francisco Section of the Pacific Division, Mr. Hugh Cassidy, WA6AUD, and Mr. Leonard Roy Geraldi, K6ANP, were nominated. Mr. Cassidy received 170 votes and Mr. Geraldi received 108 votes. Mr. Cassidy's term of office began Nov. 19, 1964.

In the Southern Texas Section of the West Gulf Division, Mr. G. D. Jerry Sears, W5AIR, and Mr. Frank Edwin Stewart, K5ANS, were nominated. Mr. Sears received 454 votes and Mr. Stewart received 229 votes. Mr. Sears' term of office began Dec. 10, 1964.

In the Delaware Section of the Atlantic Division, Mr. Roy A. Belair, W3IYE, and Mr. M. F. Nelson, K3GKF, were nominated. Mr. Belair received 64 votes and Mr. Nelson received 55 votes. Mr. Belair's term of office began Dec. 10, 1964.

Meet the SCMs

Arkansas SCM, Curtis Williams W5DTR, creates plenty of interest with his popular section in many ARRL-sponsored events. In addition to the section leadership spot, Curt holds the posts of EC and Assistant Director.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for November Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W3CUL	456	3094	2719	366	6635
K6BPI	72	2306	2196	112	4686
KØONK	115	927	919	37	1998
W1PEX	142	821	750	54	1767
WØLGG	129	647	570	32	1378
WØOHJ	48	562	547	15	1172
W3VR	47	529	498	17	1091
K9KZB	24	494	474	20	1012
K7JHA	13	473	440	5	931
WA6CCP	70	431	383	20	904
WB6RBO	61	428	362	35	886
W3EML	39	462	360	3	864
W7BA	13	398	354	41	806
WA4BMC	337	187	166	60	750
K2TXP	1	369	359	4	733
WA4JYB	218	244	231	8	701
K1BQB	9	337	332	2	680
K9IVG	10	334	266	15	625
W6GYH	96	265	256	6	623
WB6JUH	36	275	281	29	621
W9IDA/5	12	314	286	0	612
W6YKS	14	307	251	29	601
WA9CNV	48	231	91	219	589
W6JXK	21	274	38	236	569
W6RSY	19	273	200	73	565
WØBDR	17	267	256	11	551
W7NPK	525	12	2	10	549
K6MDD	10	260	210	60	540
W8UPH	9	262	215	46	532
K2VNL	11	256	228	24	519
WØZWL	2	366	8	141	517
W6EOT	1	259	243	4	507
WA2UZK	106	202	182	14	504
WA9BWY	53	226	192	32	503
Late Report:					
W6YKS	11	261	220	36	528

More-Than-One-Operator Stations

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W6LAB	888	1172	732	440	3232
W6YDK	1189	819	796	23	2827
W6BKZ/6	1640	0	0	0	1640
KR6NB	623	15	4	15	657

BPL for 100 or more *originations-plus-deliveries*

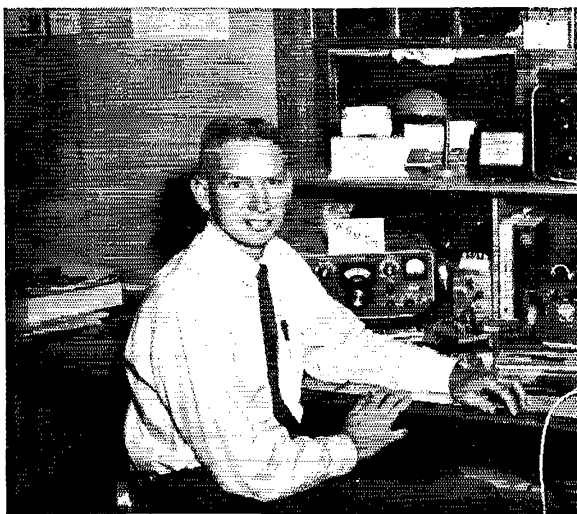
W1BGD 154	K3OWS 124	WA8FIC 105
WA4BSC 146	WA9CCQ 118	WA6BRG 104
WA9EMX 145	W3RV 117	W9NZZ 104
W1LES 144	WA8ECN 115	W4RHA 102
W1AFD/4 133	WA4DYL 112	Late Reports:
W5GHP 131	W7APS 111	K3OWS 118 (Oct.)
W2OE 130	W8DAE 110	K4VFY 110 (Oct.)

More-Than-One-Operator

KR6GF 204 WØCTV 188 WØYC 137

BPL medallions (see Aug. 1954, p. 64) have been awarded to the following amateurs since last month's listing: K3PYS, WA9BWY.

The BPL is open to all amateurs in the United States, Canada, and U.S. Possessions who report to their SCM a message total of 500 or a sum of origination and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.



A.R.R.L. ACTIVITIES CALENDAR

(Dates are shown in GMT)

Feb. 4: CP Qualifying Run — W6OWP
Feb. 6–21: Novice Roundup
Feb. 12: Frequency Measuring Test
Feb. 13–14: DX Competition (phone)
Feb. 17: CP Qualifying Run — W1AW
Feb. 27–28: DX Competition (c.w.)
Mar. 5: CP Qualifying Run — W6OWP
Mar. 13–14: DX Competition (phone)
Mar. 18: CP Qualifying Run — W1AW
Mar. 27–28: DX Competition (c.w.)
June 12–13: V.H.F. QSO Party
June 26–27: Field Day

OTHER ACTIVITIES

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

Feb. 7: Tennessee QSO Party, Radio Amateur Transmitting Society (p. 100, last month).

Feb. 20–21: YL/OM Phone, YLRL (p. 83, this issue).

Feb. 20–21: Vermont QSO Party, Central Vermont ARC (p. 112, this issue).

Feb. 21: Saskatchewan QSO Party, Regina Amateur Radio Society (p. 136, this issue).

Feb. 27–28: French Contest, REF (p. 80 last month).

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 Feb. 17 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on 3555, 7080 and 14,100 kc. The next qualifying run from W6OWP only will be transmitted Feb. 4 at 0500 Greenwich Mean Time on 3590 and 7129 kc. *CAUTION:* Note that since the dates are given in Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0230 GMT Feb. 17 becomes 2130 EST Feb. 16.

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

Daily tape-sent code-practice transmissions are available on an expanded basis this season. These start at 0030 and 0230 GMT and are sent simultaneously on all c.w.-listed W1AW frequencies, with about 10 minutes practice given at each speed: 5, 7½, 10 and 13 w.p.m. on Sun. Mon. Wed. Fri. (GMT date) from 0230–0320; 15, 20, 25, 30, 35 w.p.m. on Tues. Thurs. Sat. (days in GMT) from 0230–0320, 10, 13 and 15 w.p.m. daily from 0030–0100 GMT.

To make the practice more beneficial the order of words in each line of the text is sometimes sent reversed. The 0230–0320 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending *in step with W1AW* and to allow checking strict accuracy of your copy on certain tapes, note the GMT dates and texts to be sent in the 0230–0320 GMT practice on those dates:

Date	Subject of Practice Text from Dec. *QST*
Feb. 1:	*It Seems to Us* . . . , p. 9
Feb. 9:	*Transistor Keyer* . . . , p. 16
Feb. 10:	*Which Way?*, p. 26
Feb. 18:	*A Heterodyne-Type Transmitter for 144 Mc.*, p. 38

Date	Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Feb. 24:	*Circuits with External Loading*, p. 27
Feb. 26:	*Load Resistance and Circuit Q*, p. 27

SUGGESTED OPERATING FREQUENCIES

RTTY 3620, 7040, 14,090, 21,090 kc.

WIDE-BAND F.M. 52.525, 146.94 Mc.

GMT CONVERSION

To convert to local times subtract the following hours:

ADST —3, AST —4, EDST —4, EST —5, CDST —5, CST —6, MDST —6, MST —7, PDST —7, PST —8, Hawaiian —10, Central Alaka —10.

W1AW SCHEDULES

Operating Hours

Daily: 2330 to 0530 GMT.

While the reconstruction program is in progress, there is *no* provision made for visiting of the station. Visitors to the ARRL headquarters building, located on the same premises, are of course welcomed during regular office hours from 8:15 A.M. to 4:30 P.M. EST Mon. through Fri. The station will be closed Feb. 22, Washington's Birthday.

Operating Frequencies

C.w. 3555 7080 14,100 **Voice** 3945 7255 14,280

Frequencies may vary slightly from round figures given; they are to assist in finding the W1AW signal, not for exact calibrating purposes.

Official Bulletins

Bulletins containing latest information on matters of general amateur interest are transmitted on the above frequencies according to the following schedule in GMT:

C.W.: Mon. through Sat., 0100; Tues. through Sun. 0500.
Voice: Mon. through Sat., 0200; Tues. through Sun., 0430.

Caution; Note that in the U.S. and Canada bulletin hours usually fall on the evening of the previous day by local time.

W1AW NOTE

The ARRL Headquarters Station, W1AW, is still undergoing extensive reconstruction. Operation during this period (2330 to 0530 GMT daily) will be conducted from temporary positions in the basement of the building on a curtailed schedule on 80, 40 and 20 meters only. Full W1AW services will be continued for the transmission of voice and c.w. bulletins, as well as both periods of tape-sent code practice, as noted elsewhere on this page. During most of this period, with the building in disarray as construction progresses, it will not be feasible to invite visitors.

We hope you will bear with us in these slight but necessary inconveniences with the expectation of renewed and extended complete schedules when the changes are completed, from a rebuilt and better W1AW.

DX CENTURY CLUB AWARDS

Honor Roll

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC credits given, including deleted countries. Positions in cases of ties are determined by date and time of receipt. All totals shown represent submissions received through November 30, 1964.

W6CUQ....312/337	W8DMD...310/332	HB9J.....309/333	W8HGW...306/331	W1HZ.....304/322
W1FH.....311/337	W7PHO....310/328	W8KML...309/320	W7ENW...306/330	G3YF.....304/326
CX2CO....311/332	W8MPW...310/328	W1CLX....309/332	W2OKM...306/324	W5AFX....304/329
W9RBI....311/336	W8BF.....310/331	W2SUC....309/326	W2FXN...306/320	W2HMJ....304/324
W8BRA....311/334	W2LV.....310/329	W7GBW...308/332	K4LNM....306/320	W8PUD....304/321
W8JIN....311/336	W9YFV....310/334	W4TM.....308/330	W2TVR....306/324	K2OEA....304/320
W4GD.....311/332	W1ME.....310/333	WØAIW....309/331	W2AYJ....306/325	DJ2BW....304/321
G4CP.....311/335	W4OGW....310/327	W6EHG....308/333	W9AMU...306/323	W5UX.....304/319
G3AAM....311/335	W6AM.....310/335	W8LKH....308/328	5Z4AQ....306/324	W3GAU....304/327
W2AGW....311/335	W8EWS....310/334	W4AIT.....308/331	W2WZ.....305/328	W3RNQ....304/322
W4DQH....311/335	W6YY.....310/330	W4ML.....308/328	WØSYK....305/323	W5ASG....303/327
W8UAS....311/332	W1JYH....310/333	K2DCA....308/325	W1ZW.....305/322	W2SAW....303/320
W8PQQ....311/328	W3KT.....310/334	VE7ZM....308/332	K6ENX....305/322	W9KOK....303/327
W2TQC....311/330	W1BIH....309/333	LU6DJX...308/332	W4LYY....305/325	W8IRN....303/321
4X4DK....311/329	W9LNM....309/332	W6GPB....308/329	W3ECR....305/322	PAØFX....303/323
W7GUV....311/334	WØQVZ....309/330	W5KC.....308/331	W2LAX....305/322	I1AMU....303/322
W3GHD....311/335	G3FKM....309/326	W5ABY....307/324	W4GXB....305/326	W3WGH....303/318
W1GKK....311/336	W3JNN....309/333	W2ZGB....307/323	W4VPD....305/322	W2FZY....303/316
W2LPE....311/332	DJ1BZ....309/327	WØBFB....307/325	WØNTA....305/325	G3FXB....303/321
G2PL.....311/334	W9HUZ....309/329	OE1ER....307/329	W1MV.....305/322	W4PLL....303/318
KV4AA....310/334	W5MMK...309/330	K2BZT....307/324	W4OPM...305/320	HB9MQ....303/320
PY2CK....310/333	K3UPG....309/333	WØELA....307/330	K6EVR....305/322	W7WVE....303/320
W9NDA....310/334	W8JBI....309/328	W3JTC....307/330	K2GFQ....304/325	K2LWR....303/316
W2JT.....310/329	DL3LL....309/325	WØQDF....307/324	W5ADZ....304/326	K4RID....303/317
W9KIA....310/334	WØDU.....309/331	W2UVE....307/325	W6CYV....304/322	WØPGI....303/318
W3LMA....310/332	CE3AG....309/333	W5CKY....307/326	W4MR.....304/324	W8NGO....303/320
W2BXA....310/334	W2BOK....309/326	G8KS.....307/325	W2GUM....304/326	K4AIM....303/317
W2DEC....310/326	W2ZX.....309/328	W8DAW....307/330	W7AC.....304/328	

Radiotelephone

CX2CO....311/332	W7PHO....310/328	W4DQH....309/331	W3JNN....307/328	WØAIW....304/325
W9RBI....311/334	4X4DK....310/328	5Z4ERR...309/331	W2JT.....307/321	W4QCW....303/316
PY2CK....310/333	W8BF.....310/331	W6YY.....309/329	PY4TK....307/324	W8HGW....302/324
W3RIS....310/335	W1FH.....309/330	W8PQQ....308/325	W2BXA....306/328	I1AMU....302/321
W8GZ.....310/333	W2ZX.....309/328	W8KML...308/329	W6AM.....305/329	TI2HP....302/324

New Members

From November 1, through November 30, 1964, DXCC Certificates and Endorsement based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

YV5BX.....308	OH3TA.....133	W8EGR....115	9Q5TJ.....107	UT5FI.....103	SM3CJD....101
W2EXH....240	UA3FU.....132	DJ4SO.....113	W3VTT....106	W2FZJ.....102	UA1ND....101
W8FKY....213	WØKZJ.....127	WB2HXD..110	G3OIZ.....105	DL1NC.....102	K1VKY....100
W2OIB.....194	K4RSY.....124	WA2YWI...110	OE5PWL...104	DJ6OG.....102	W6WAW...100
WA2MNQ..152	LA9CE.....120	JA7JI.....110	W7NPU....103	SM5DKH...102	KØARS....100
DLØFT.....141	VE4EVK....119	ZD3A.....110	JT1AA.....103	WB2BEV...101	G3RDX....100
	W1WLZ.....116	UA4PX.....107	SM5BGK...103	WB2BGM..101	

Radiotelephone

W2EXH....217	VE6TP.....123	K1MOD....109	K1JGW.....106	K1POA.....101	W3KJ.....100
W4VMS....124	DJ4XE.....110	YV5BX.....107	WA5ATM..104	UA3BT.....101	WØCMD....100
					DJ8II.....100

Endorsements

W5EGK....320	W9FKH....250	W1KXP....210	W4VMS....180	VE4DB.....151	WB2BAL...130
W7ADS.....312	WØSMV....250	K2DBN....210	HK3RQ....180	SP5AFL....151	W5EGS.....130
W6KZL.....310	W4EJN....241	W7LZF.....210	W1NEP....179	W9BZW....150	W6GSV.....130
K4ASU.....292	W7NRB....233	DL3TJ.....210	W5MUG....177	VE2BCK....150	W1BU.....128
W2CWK....290	W1HWH...231	DJ5IM.....203	W1BPY....172	DJ1QP.....150	K4RCS.....124
W2AES.....287	W4RVW....230	VR2DK.....203	UA3FT.....171	ON4ZY.....150	K4WMB.....123
SM7QY.....284	K6HOR....230	K2PKT.....202	K8AJK.....170	SM5AM.....150	WA2RMP..120
K2JGG.....273	WØQMD....230	WØQKC.....202	K8GJD.....170	VE3AU.....141	W4NTE.....120
W2PDB....270	CR6AI.....226	CR7BC.....199	K4ISV.....162	K5QHZ.....140	W7FLD.....120
SM5WJ.....266	K5DGI.....225	I8IFIC.....196	K2LAF.....161	K5RUO.....140	K9LIH.....120
W8LY.....261	UA3CT.....220	ON4QJ.....195	K9YOE.....160	W7TVF.....138	W1WLZ.....116
W5MBB....250	I1BAF.....218	W2LJF.....191	WØHNA....160	K7BVZ.....135	OZ5MJ.....115
W6ERS.....250	W1YYM....214	W9QVF.....190	ZL1QW.....160	KØMIC.....135	W1MRQ....110
K6JIC.....250	W6PQT.....214	UA4PA.....188	K1KPS.....156	I1NT.....135	W6RGG....110
W8YCP....250	W1FJJ.....210	W1MX.....181	W3LIV.....151	W9NVJ.....132	

Radiotelephone

W2HTI.....310	K4ASU.....228	W1BHP....200	VE2BCT....161	I1TMG.....143	EP2AU.....130
DJ2YI.....300	W8HBI.....220	I1ZFT.....197	SM5ATN...155	WA4JOS....141	W7MKI.....125
5Z4AQ.....300	I1BAF.....218	ZS5PG.....192	PY3AHJ....153	K4SBH.....140	WA2IEK...122
W4TDW....290	W4HUE....211	K2OEA.....180	WB2FSW...152	I1LCF.....135	K4PQV.....115
G3AIZ.....267	OA4CV.....209	VE3BTI....180	K2YIY.....152	9Q5AB.....134	K8ZPK.....111
K2JGG.....251	K6EXO.....205	OA4KY.....180	W8JFD.....152	K5OPT.....131	VE2ANK...111
SM5WJ.....244	OA4PD.....205	DL5AO.....178	EP3RO.....152	TN8AA.....131	WA5EFL...110
W2FGD....240	DL3TJ.....205	I1BPW.....170	VE3CJ.....151	W1FJJ.....130	WØQUU....110
W4PJG.....230	XE1CE.....201	PY2QT.....170	F2FO.....147	W5EGS.....130	

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

DELAWARE—SCM, M. F. Nelson, K3GKF—PAM: K3LEC. RM: W3EEB. DEPN meets Sat. on 3905 kc. at 1830 local time; DSMN meets Tue. on 50.4 Mc. at 2100 local time. Appointment: K3MPZ as OBS. DSMN certificates for 1964 went to K3AZH, K3MPZ, K3RRT, K3SWE, K3UHU, K3URP, K3VWX, W3CGV and WA2SFY. All had at least a 70 per cent QNI for the year. Other news: K3OPF is a new dad. K3OWS, aided by traffic associated with the Delaware QSO Party, picked up two more BPL certificates and has earned his BPL medallion. Darrel moved to Florida Dec. 1. After losing part of his beam in a storm W3EEB is trying to get the Newport Fire Company to put it back up. This ends my term as SCM. Give Roy your support and help, so that we maintain the section. Traffic: (Nov.) K3OWS 165, K3YZF 114, W3FJF 30, W3EEB 6, K3YHR 6. (Oct.) K3OWS 149.

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: W3ELI. RMs: W3EML, K3MVO, K3YVG. PAMs: W3SGI, W3SAO. November E. Pa. QNI was 334 with a QTC of 369. PTTN had QNI of 66 with QTC of 106. New appointments: K3KTY for Philadelphia Co., K3LQM for Lycoming Co., WA3BYH for Lehigh Co. as ECs.; W3PN and K3AOH as OOs. K3YQJ added a beam to snag that 20-meter DX. Bucks has added a number of Navy MARS stations. K3MNT is now Army MARS. Three days after the SS Test the rig, receiver and antenna went blooey at K3RZE. W3JKX will be QRT a spell because of surgery to his right hand (ever hear of QLF?). K3HTZ is attending Temple University Dental School. W3EU has lately been handling a lot of cupid-type traffic on E. Pa. W3YPF, IRC-ARC club station, has been having receiver and power supply troubles. New Gear Dept.: K3PWM and K3MHD share a new Eico scope. K3WEU added a 2-meter transmitter and beam. K3LPT has the Heath sideband twins, SB-300 and SB-400. K3MVO got a new tube checker and is looking for your old tubes to check out the checker. WA3BFR is now General Class. The Philadelphia Children's Hospital is getting an amateur training program under the leadership of W3ELI and K3NSN. The following lists our present county ECs: W3AHZ Montgomery, K3AKN Juniata, WA3BYH Lehigh, W3RUR Bucks, W3BKF Bradford, K3CKB Tioga, K3EUE Adams, W3FLP Delaware, K3JLG York, K3KTY Philadelphia, K3LQM Lycoming, W3LXM Northumberland, K3PBU Susquehanna, W3QDW Lackawanna and K3ZDK Lancaster. All applications for AREC should be sent to your EC. If your county has none send it to W3ELI, the SEC, 4607 Convent Ave., Philadelphia, Pa. Within a few short weeks we shall be holding our first section quarterly meeting. Any club and net not on our regular mailing list that wishes to be represented should drop us a line with its address. The announcements will be mailed the last week in March. Are you ready for Field Day? It will be upon us before you know it. Traffic: W3CUL 6635, W3VR 1091, W3EML 864, K3MVO 474, K3MYS 355, W3RV 162, K3YQJ 159, W3ELI 145, K3FHR 145, W3QDW 131, K3MQE 87, K3WEU 83, W3ZRQ 81, K3HNP 73, K3KTH 70, W3FLP 56, K3HHY 53, K3PIE 44, K3YVG 44, K3PWM 43, K3RZE 42, K3RUA 35, W3VAP 34, W3OY 30, K3OMP 23, K3MNT 21, K3MHD 18, W3BFF 9, W3HKW 9, W3ID 8, K3SFP 8, W3BUR 7, W3AHZ 6, W3JKX 2, W3EEN 1, K3HTZ 1.

MARYLAND—DISTRICT OF COLUMBIA—SCM, Bruce Boyd, W3QA—SEC: W3CVE. RMs: W3QCW, K3JYZ, W3ZNW. PAM: W3RKK. Nets: MDD, daily on 3643 kc. at 0000Z; MDDS (slow), on 28.1 Mc. at 0130Z; MEPN, on 3820 M-W-F at 2200Z and Sat.-Sun. at 1700Z. W3ECP reports the following three relocations: K3LDN retired at West Hollywood, Fla.; K3HDQ is in Idaho with the Dept. of Agriculture: K3TSW has moved to Illinois. W3EOV is taking a MARS course on transmission lines. K3DNO (OES) has built an s.w.r. bridge and is exploring transmission line phenomena. K3OAE, K3QDD, W3QA, K3URZ, K3VCG and K3ZYP all enjoyed working in the S.S. K3LLR has his 80-meter antenna working on 160 meters. W3QCW also is working on 160 back-up for the MDD. He has moved the MDD to 3643 kc. to escape commercial RTTY QRM on 3649. K3TQI and K3ZYP have new s.s.b. rigs. W3HQE says he was away most of November. Even so, his traffic total is No. 2. K3TJE has been hunting DX while W3JZY has been hunting game in the Maryland hills. K3GZK is active with the Hartford County Civil Defense on 2 meters. K3MO had to replace an antenna which had been in use only 30 years! WA6TUE/3 is attending American University in D.C. W3EAX is experimenting with microwaves and going for ORS. W3RKK (PAM) is looking to v.h.f. for increased phone traffic. Your new SCM appreciates the many expressions of welcome included in this month's activity reports. Traffic: (Nov.) K3UFV 84, W3HQE 69, K3VHS 68, K3TJE 49, K3URZ 43, W3QCW 41, W3ECP 28, K3OAE 26, K3GZK 24, W3EOV 18, K3ZYP 17, K3NCM 16, K3QDD 14, W3RKK 3, K3VCG 3, W3LLR 1. (Oct.) K3UFV 215, K3LLV 52, K3KMO 11.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—SEC: K2ARY. PAM: W2ZI. RMs: WA2BLV and WA2VAT. WB2KEL, Trenton, has been appointed OES. W2LVW succeeds K2JKA as EC for Gloucester County. K2JKA will serve as Asst. EC in Gloucester County. The Rancocas Valley ARA elected WB2CRT, pres.; WB2CWZ, vice-pres.; WB2LWS, secy.; WB2LXA, treas. Gloucester County ARC elected K2JKA, pres.; WA2KWM, vice-pres.; W2PAX, rec. secy.; W2AFZ, corr. secy.; W2LVW, treas. N.J. Emerg. Phone & Tfc. Net totals for Nov.: QNI 462, sessions 30, traffic 306. WB2GUK, Atlantic City, succeeds WA2OZQ as editor of the Southern Counties ARC monthly paper. W2BEI, Audubon now has a DXCC total of 130. WB2CGW, Cherry Hill, is building a new s.s.b. exciter/transmitter and s.s.b. receiver. W2BZJ, Pennington, still needs the help of operators for Mercer Co. C.D. The Southern Counties ARA Annual Dinner was held at Smithville Inn Jan. 15. The SJRA had a Christmas Party and installation of officers. The Burlington County Radio Club's new officers will be listed next month. WA2BLV, NJN Manager, is erecting a new tower. The SJRA placed first in the 6-transmitter class Field Day 1964. WA2GSO was SJRA's Sweepstakes chairman. There are openings for ECs in Camden, Cape May and Cumberland Counties. Monthly reports are solicited from *all* appointees and club secretaries. Traffic: WA2WLN 154, W2RG 125, W2ZVW 103, WA2KIP 86, WB2FJF 72, W2MMD 46, K2SHE 28, W2ZI 16, WB2GUK 15, W2BEI 8, WB2CGW 8.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2ICZ. RMs: W2RUF, W2EZB and W2FEB. PAM: W2PVI. NYS C.W. meets on 3670 kc. at 1900, ESS on 3590 kc. at 1800, NYSPTEN on 3925 kc. at 2200 GMT, NYS C.D. on 3510.5 kc. and 3993 kc. (s.s.b.) at 0900 Sun. and 3510.5 kc. at 1930 Wed. TCPN 2nd Call Area on 3970 kc. at 1900, 1PN on 3980 kc. at 1600, 2RN on 3690 kc. at 0045 and 2345 GMT, NYSCN on 3510 Sun. at 1000 and 3670 kc. at 1700 Sat. Note the change in the county net listing. Orleans and Warren County have been added for a total of 42 counties with 66 net members. W2RUF is net mgr. This is a joint RACES-ARPSC effort. Your SCM would like to hear of any local arrangements resulting from the announcement last year of the cooperative understanding between the American Red Cross and ARRL. Congratulations to the Nichols School RC upon receiving club affiliation with ARRL. WA2AHP is pres. A BPL certificate goes to W2QE for November traffic. Congratulations. WB2NNA has been appointed OO. Section net certificates went to WB2FPG, WB2HLV and WA2BPQ, all from NYSPTEN. (Note time change of this net above.) The Erie County Eergency Net elected K2MQN. K2EQB and W2SSG to office for 1965. WB2DPR, an ORS appointee, has moved to Pennsylvania.

K2KLP and W2UTH have a new tilt tower for their 2- and 6-meter beams. W2FDI has been experimenting with a J-Slot beam; a 56-element job is working fine. K2DNN received WAC. Welcome to new licensees, WB2MDL and WB2PQQ. W2ABV has a new HT-44. WA2YPV is building an s.s.b. rig for 6. Syracuse C.D. *has a 6-meter repeater all set to go when they get a* license. W2RPO and W2CVI gave a talk on linears to the ARATS. W2RUI addressed the GRAMS relative to "New Trends in NYS C.D. Communications." Various reports have been received regarding "Exercise Blade II." The consensus is that while hams are generally well organized, there is much room for improvement. Specifically, many networks were organized years ago and maybe a new look at the local RACES plan is in order. Traffic: W2GVH 411, W2OE 384, WA2KQG 344, WB2GAL 290, W2RUF 208, W2HYM 152, WB2HLV 120, W2FEB 70, K2JBX 70, WB2IJF 62, K2RYH 44, K2OFV 33, W2MTA 31, K2IMI 25, W2RQF 21, WB2DPR 14, W2PVI 11, W2PNW 10, WA2GLA 8, WA2BPQ 6, K2DNN 6, K2MIP 6, WB2JQS 3.

WESTERN PENNSYLVANIA—SCM, John F. Wojtkiewicz, W3GJY—SEC: K3OTS. PAM: W3TOC. RMs: W3KUN, W3MFB, W3UHN, K3OOU. Traffic nets: WPA, 3585 kc. 0000 GMT Mon. through Sun., KSSN, 3585 kc. 2330 GMT Mon. through Fri. K3ZMH advises that the Allegheny County AREC Net operates at 1300 GMT Sun. on 7155 kc. and invites participation. W3RUL has a new Heath v.f.o. W3SMV, with a new antenna, has a big signal on 80. W3IDO is inactive because of moving. K3PYJ uses the outboard v.f.o. with his TR-3. K3SNV moved to Gary, Ind. W3GQJ will marry in May. K3AET gained membership in the Nittany Amateur Radio Club. New officers of the Uniontown ARC are K3SAA, pres.; K3SCH, vice-pres.; W3CAV, treas.; W3UUZ, secy. New directors at the Etna Amateur Radio Club are W3OJM, W3TZW and W3BEC. A special "thank you" to the Etna Radio Club for supplying a copy of its club bulletin to the SCM without a break since 1958. W3OEO put in limited time during the SS. New officers for the Cumberland Valley ARC are K3EDH, pres.; K3IDJ, vice-pres.; W3ZQU, secy.-treas.; K3FFJ and W3ZUX, co-act. mgrs. The club's AREC net operates at 0300 GMT Mon. on 29,400 Mc. Participation is invited. K3ZGI built a crystal calibrator for his HW-32. A new licensee up Erie way is WN3CDL. K3HVU is now a General. K3SMB's father-in-law passed away. W3LOS enjoyed his best traffic total month. K3TEZ says his school plays restrict his on-the-air activities. Newly-elected officers of the Monessen ARC are K3UET, pres.; K3TSD, vice-pres.; W3DJM, secy.-treas.; K3HQM, W3WSX, K3ZEQ, W2IWD, trustees. New appointees: W3MFB as RM: K3ZGI as EC for Erie County. W3KWO as ORS. W3UHN reports that his Friendly Amateur Radio Transmitting Society DX group found band conditions poor during the World-Wide DX Contest. Westmoreland amateurs *interested* in AREC c.w. operations may contact K3WFZ, EC for the county, for details. W3GJY is building RTTY equipment. K3PQK is the only female amateur in Somerset County. Her son, K3PQL, is in Germany with the USAF. Need code practice? K3KLW advises to check 28.4 Mc. Mon., Wed. and Fri. at 2030 to 2200 and 0030 to 0200 GMT. Traffic: (Nov.) W3KUN 135, W3LOS 109, K3PYS 98, K3SOH 55, W3SMV 41, K3TEZ 32, K3ZMH 31, W3KWO 29, W3GJY 27, W3IYI 21, W3UHN 16, W3LOD 10, K3SMB 10, W3YA 6, W3OEO 5, W3RUL 5, K3EDO 4, W3TOC 3. (Oct.) W3JHG 45, W3UHN 15, K3PQK 4.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: Grace V. Ryden, W9GME. SEC: W9RYU. RM: WA9DXA. PAM: W9VWJ. Cook County EC: W9HPG. Section net: ILN, 3515 kc. Mon. through Sat. at 1900 CST. K9EIV is on s.s.b. with an HT-37 and soon will go to KAZ-Land. WA9MWN has a new 14-ft. AVQ high-tower antenna. K9FNI is looking for the 50-Mc. signals again after erecting a new antenna which was damaged by wind. The Chicago Suburban Radio Association won the Chicago Area Radio Club Council Field Day contest. W9BOD, K9EWV and K9ZOO are experimenting in RTTY. K9ZXM has gone mobile on 6 meters. The mobile rigs of the Skokie Six Meter Indians participated with the Police Dept. during Halloween and helped cut down on the juvenile destruction. K9LGE and WA9EYT have built 6-meter linears. WA9FMT has moved to WØ-Land and is employed by Galaxy Electronics. The Six Meter Club of Chicago, Inc., was approved for ARRL club affiliation by the League's Executive Committee. WA9FIH received his CHC Award. The North Central Phone Net traffic for November was 673 messages, and the Interstate Single Sideband Net reported a traffic count of 553. Now that the cold weather has set in, it would be appreciated by your SCM if you would look at the expiration date of your appointment and if it has expired please send the certificate in for endorsement. WA9FZB lost his 40-ft. tower in a recent wind storm. The Rho Epsilon Amateur Radio Association of the Illinois Institute of Technology has erected a new tribander 70 feet high. WA9NKQ is a new call in the Carmi area. The Southern Illinois University Amateur Radio Club's newsletter is now under the helm of W9IDQ. The Villa Park Amateur Radio Club cooperated with the Villa Park Civil Defense during Halloween in curbing malicious mischief. Lee Weddig spoke on "New Uses For Electronics" at the recent North Shore Amateur Radio Club. New appointments are W9IDQ as ORS, W9PNE and K9DEV as OOs. The Ninth Regional Net handled traffic in the amount of 331 messages. K9KZB, WA9CCP, WA9CNV and WA9CCQ are recipients of the BPL award for November traffic. Traffic: (Nov.) K9KZB 1012, WA9CCP 904, WA9CNV 589, WA9CCQ 124, W9AXR 93, W9JXV 69, K9BTE 59, K9FFB 54, W9EUN 31, WA9GUM 31, K9HSK 30, K9UOV 23, K9CYZ 22, WA9AJF 21, W9PRN 10, W9QQG 6, WA9FIH 5, W9LNQ 4, WA9DXA 3, K9RAS 2, K9UIY 1. (Oct.) K9UOV 34.

INDIANA—SCM, Ernest L. Nichols, W9YYX—Asst. SCM: Donald Holt, W9FWH. SEC: K9WET. RMs: W9TT, W9DGA. PAMs: K9CRS, K9GLL, K9IVG. Net skeds in GMT: IFN 1330 daily and 2300 M-F on 3910 kc. ISN 0000 daily and M-Sat. on 3910 kc. QIN daily at 0000 and RFN at 1200 Sun. on 3656 kc. New appointments: K9WQJ as EC of Tipton Co., WA9HVD as EC of Greene Co., K9AJC as ORS. BPL winners: K9IVG, WA9BWY, W9NZZ. QIN honor roll: K9VHY and K9HYV. The Indiana Postoffice Net meets at 1300 GMT Sun. with K9EFY as net manager on 3885 kc. K9WST has a new 2-meter "J" slot antenna. K9UIF is erecting a 50-ft. tower for a 432-Mc. antenna. W9RTH traded for a TR3. Michigan City has six f.m. rigs on 146.94 Mc. K9ILK made the headlines for her work in the Gibson General Hospital Auxiliary. WA9BWY and WA9AUM have been active in spite of a heavy school sked. Gibson ARC officers for 1965: K9IIV, pres.; W9ZZR, vice-pres.; and W9FJI, secy. Elkhart ARC officers: K9ZAW, pres.; K9DOF, vice-pres.; W9AKJ, secy. *Amateur radio exists because of the service it renders.* Nov. net traffic: ISN 807, IFN 259, QIN 81, RFN 51. Hoosier V.H.F. 92, 9RN 331 with Ind. represented 100 per cent. Traffic: (Nov.) K9IVG 625, WA9BWY 503, W9MM 302, WA9FDQ 197, W9NZZ 179, W9QLW 152, WA9AUM 136, W9TT 123, K9CRS 84, W9YYX 64, W9VAY 63, K9HYV 52, K9VHY 43, K9EFY 40, W9DGA 36, W9EWH 34, W9CC 33, WA9ECX 32, K9FHQ 30, W9SNQ 30, W9BUQ 28, WA9DXY 21, WA9BRD 20, W9FZW 20, K9QVT 20, K9AJC 19, W9RTH 19, W9BDP 12, WA9BGI 10, K9BSL 10, W9DZC 10, W9ENU 10, K9ILK 10, K9VZQ 8, K9KTL 7, K9RWQ 7, K9HMC 6, WA9PDO 6, K9WET 6, K9UEO 5, K9QJT 2, WA9ASZ 1, K9MAN 1, K9TFJ 1. (Oct.) K9BSL 4, W9AB 3, WA9JFG 2.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: K9ZPP. PAMs: W9NGT, W9NRP and K9IMR. RM: W9IQW. V.H.F. PAM: WA9EZT. Nets: WIN, on 3535 kc. daily at 0045Z; BEN, on 3985 kc. Mon.-Sat. at 1300Z and 1800Z; WSBN, on 3985 kc. daily at 2315Z; SWRN, on 50.4 Mc. Mon.-Sat. at 0300Z. New appointment: K9ZPP as SEC. Renewed appointments: W9WJH, W9RQM and W9DYG as ORSs, K9DTK, K9LGU and W9RQM as OPSs. W9RQM as OES, K9GDF as OO and W9AXS as EC. A net certificate went to W9QQQ for WIN. Thanks to W9BCC for the fine job as SEC during the past four years. New WNA officers: W9NGT, chairman; K9AGT, secy.; W9NRP, treas. K9HJS and K9WVM are new delegates to WNA from WSBN. W99W certificates No. 10 and No. 11 have been issued to K9IMR and W9VAJ, respectively. The Milwaukee AREC assisted in the ALSAC fund drive. W9VSO led the OOs for Nov. with 16 notices sent. WA9FUH is on 1296 with an APX-6 and looking for someone to QSO. Net reports: BEN, 14 offered, 4 cleared in 8:46 by 204 check-ins; WSBN, 614 offered, 499 cleared in 23:30 by 1251 check-ins; WIN, 52 offered, 42 cleared in 8:20 by 176 check-ins; SWRN, 9 cleared in 7:41 by 362 check-ins. W9CXY took over as acting manager for the CAN while W9DYG was moving his QTH. Traffic: (Nov.) W9CXY 175, K9IMR 159, K9HJS 109, W9AOW 91, W9DYG 67, W9IQW 41, W9GOC 31, W9CBE 29, W9YQH 29, W9VT 28, WA9IVH 21, W9HWQ 15, WA9EDZ 13, W9HPC 10, W9FNT 9, W9QQQ 9, K9QKU 8, K9GSC 7, W9OTL 5. (Oct.) W9CBE 23.

DAKOTA DIVISION

MINNESOTA—SCM, Helen Mejdrich, WØOPX—Asst. SCM: Herman R. Kopischke, Jr., WØTCK; SEC: WAØBZG. RMs: WAØEPX, KØJFJ. PAMs.

KØFLT, KØVPJ. MSSB PAM: WØHEN. V.H.F. PAM: WAØCQG. MSPN meets M-S on 3820 kc. at 1800Z and 2300Z; MSSB M-Fri. on 3805 kc. at 1730Z; 3812 at 0045Z; MSN (c.w.) M-S on 3595 kc. at 0030Z; MJN (slow speed c.w.) 3595 kc. at 0100Z; 6-Meter Net M-Fri. on 50.25 Mc. at 0200Z; North Star YL Net on 3820 kc. at 1500Z each Tue. Appointments issued: WAØETR as OBS; WAØCQA, WAØFUR, WAØACI and WAØGOS as ECs; club station WØYC as ORS. Endorsed: KØZRD and WØOPX as OPSs, WØRIQ and KØOTH as ORSs, WØHEN as EC. The St. Paul Radio Club has begun code and theory classes conducted by WØQKJ and WØHKF. Hennepin Co. EC KØZZR and Ramsey Co. EC WAØFUR are combining their efforts to reorganize AREC in their area. They are looking for new as well as old members with renewed interest. PAM WAØCQG is building an all-transistor 10-meter transceiver. WØOJG returned to the Vet's Hospital for corrective surgery. We all wish Bill, who is now home recuperating, a speedy recovery. Welcome to new North Star YL Net members WAØDAQ, WAØENV and WAØEHY. WØOPX was host to Asst. SCM WØTCK and his family. New MSPN NCSs are WAØFAA and WØFVZ. New teacher NCS KØFTB at St. Charles, has KØIJU and KØTXT, jr. operators, in his class. MJN members WAØDOT, WAØGES and WA4DYL qualified for net certificates. Active S.S.B. and A.M. Net member, OPS WØATO, proudly announces arrival of her 12th grandchild. Traffic (Nov.) WØYC 246, KØZZR 74, WØHEN 63, WØATO 56, KØVPJ 54, KØFLT 46, WAØEPX 45, WAØEBN 40, WAØBZG 30, WØKJZ 27, KØZRD 26, KØIJU 20, WØUMX 18, KØMIA 17, WØTCK 17, KØSXP 13, WAØAAM 11, WAØDFT 10, WAØDSH 9, WØOPX 8, WØMXC 7, WAØIEF 6, KØZKK 6, WØFKC 5, KØICG 5, WAØEZQ 4, KØEGQ 3, WØLIG 3. (Oct.) WAØDSH 6.

SOUTH DAKOTA—SCM, J. W. Sikorski, WØRRN—Asst. SCM: Jene H. Melton, WAØDEM. SEC: WØSCT. RM: KØGSY. WØJDO is operating from Conde with a DX-20 and an AR-3 and has received an ORS appointment. KØTXW has been appointed EC for Deuel County. KØBSY, formerly of Iowa, now is living in Sioux Falls. The SFARC sent proceeds of its October auction to the hospital ship Hope fund. WØOOZ has returned to Sioux Falls after several months work near Rapid City. KØCER and WØCUC provided a program for the SFARC on v.h.f. propagation. WØZWL made the BPL. Traffic: WØZWL 517, WAØAOY 107, KØAIE 48, WØSCT 48, KØBMQ 36, WØDVB 23, WØHOJ 23, WAØBWJ 22, WAØFPR 18, KØYGZ 18, KØVYY 13, WAØCIJ 8, WØIGG 7. WAØCVZ 4, KØYJF 4, WAØFJG 3, KØCXL 2, KØZBJ 2.

DELTA DIVISION

ARKANSAS—SCM, Curtis R. Williams, W5DTR—SEC: W5NPM. RM: K5TYW. PAM: WA5GPO. NMs: WA5AVO and K5IPS. Several counties in Arkansas need ECs. How about *you* helping in this valuable service to your community? How about RACES? Are you helping your local civil defense director plan his emergency communications? Can you originate a message in the correct form; send and receive messages in the proper form efficiently and accurately? These are a few of the questions we had better be able to answer in the affirmative if we plan to keep our present frequencies! Net reports for Nov.:

Net.	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*QNI*	*Tfc.*	*Ave. Month*
OZK	3790	0100Z	Daily	30	153	255	5.1	
QAN	3695	0400Z	Daily	29	43	112	1.5	
RN	3815	0001Z	Daily	30	(report delayed)			
APN	3885	1200Z	Mon.-Sat.	27	28	901	1.0	(Oct.)
APN	3885	1200Z	Mon.-Sat.	25	17	879	0.7	(Nov.)

Congratulations to WA5GUL on his appointment as ORS. WA5HNN has a TCC sked now with WA4PDS (Mary). K5TCK and some of the gang at W5YM are building a linear for the club. The Central Arkansas Radio Emergency Net elected WA5FAV, net mgr.; WA5FFU, asst. net mgr.; W5DTR, secy.-treas. K5AKS has moved to a new location in Harrison. K5JXC ordered a new SBE-33. A tri-state Novice net for Ark.-La.-Miss.? Maybe. Traffic: W9IDA/5 612, W5DTR 224, WA5HNN 217, WA5CBL 215, WA5AVO 194, K5TYW 63, K5ALU 38, K5TCK 38, WA5GUL 16, K5AKS 1.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUK. RM: W5CEZ. PAM: W5TAV. New officers of the Lake Charles Amateur Club are K5OPN, pres.; W5DEA, vice-pres.; WA5DES, secy.; K5HAH, treas. W5BUK, our SEC, gave his objectives in emergency work and then held a round-table discussion on emergency problems with the Lake Charle gang. Vacancies exist as OBS, OO, ORS, OPS and we urgently need some PAM V.H.F. ramrodders. WA5DES is a new OBS. WA5DRP is busy building emergency set up as the new EC for Baton Rouge-Port Allen. W5RV is a new OPS in Abbeville. We request that all Louisianans interested in a Louisiana Phone Net patterned after the NTS please send me your ideas. At present we have only a State C.W. Net (3615 daily at 2330) and a few small area local nets. WA5JAY is a new OO. K5WWR, EC for the Shreveport Area, held an SET consisting of a tornado. 6 meters was used with K5BDN, K5LGM, WA5EBB, WA5KBS and WA5JAY participating. W5LQV, WA5GJO, WA5JEQ, K5FKT, WA5KJP, WA5KBS, K5BDN and WA5HTY contributed on election night. The Bossier High School Amateur Radio Club needs a receiver. If you can help, please contact W5ZBC. W5CEW has moved to a new QTH. WA5EID is originating traffic from out-of-town boys at Tulane. W5MXQ reports rig trouble. WA5FNB continues to find new recruits for LAN. W5PXV is busy with LAN and is now NCS Sat. nights. W5CEZ as Scout Master spends as much time camping as he does on c.w. WA5ITW is looking for 40-meter skeds. WA5HRD is very active on c.w. and phone, 80 to 10 meters. K5OKR, Alice, checks into four nets daily handling traffic. W5IQH is another netter and was honored at the Lafayette Hamfest for his work during "Hilda." W5UQR is on 2 and 6 meters every week end. W5EA is back on c.w. after QRM from a busy work schedule. W5JFB wants W1ICP to design a good s.w.r. bridge for 6 meters. K5FYI is on daily on 3900 kc. and 54.4 Mc. W5GHP, fast becoming our outstanding c.w. traffic handler, is one of the La. representatives on CAN and RN5. K5OPN is busy on DX phone with a total well over a 100. We need more activity reports from the Baton Rouge and Alexandria areas. You can contact me every morning on 3900 kc. Don't forget the Delta Convention Mar. 27-28 in Memphis. It is with regret that we report that K5DMA has joined the Silent Keys. WA5DZH is New Orleans anchor man for the Eve-Bank Net. Traffic: W5CEZ 347, W5GHP 279, WA5FNB 159, W5IQH 83, K5OKR 51, W5PXV 34, WA5ITW 32, W5MXQ 23, W5PM 23, W5ZBC 22, W5EA 14, WA5EID 12, K5FYI 5.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. Mighty glad to know the Mississippi State University ARC, W5YD, is back going strong. New officers: K5VBA, pres.; WA5FGZ, vice-pres.; K5VSG, rec. secy.; K5ZUW, corr. secy. The club has generators, a kw. rig on 75 meters spearheaded by K5UYK and has developed a 6-meter net. Congratulations to the Hub City Club, in Hattiesburg, on becoming an ARRL affiliated club. W5JDF has done a fine job in helping coordinate designations for shared and exclusive frequencies for "MISS." RN5 and other nets. All you good c.w. operators start checking in with "MISS" on 3647 kc. at 0045Z. I need more information on the Magnolia Net activities. W5WZ has a new HW-12. K5RIX is active on phone. WA5GHF and WA5IMU are doing fine jobs as NCS for the Miss. C.W. net. Traffic: WA5GHF 101, K5RIX 26, WA5IMU 25, W5WZ 22, W5EMM 17.

TENNESSEE—SCM, William A. Scott, W4UVP—SEC: W4RRV. PAMs: K4WWQ, W4RMJ, WA4AIS. RM: W4MXF. WA4OXL now is putting out the bulletin of TN. Greeneville RC is in the process of reactivation and the net meets on 50.7 Mc. Thurs. at 1930E. K4SXD has antenna problems at TPI. New MARA officers: K4JXG, pres.; K4RCT, vice-pres.; WA4GPW, secy.; K4PSH, treas. K4FZJ and W4WBK were tied for the "Ham of the Year" award by the MARA. WA4RUT is the new pres. of the Bristol RC. Mid-South V.H.F. officers: WA4DPJ, pres.; WA4KOG, vice-pres. and WA4ISC, secy. W4RRV has a new final for 6. The Tenn. QSO Party will be held Feb. 7 and all logs should be sent to WA4NZE by Mar. 6. The Delta Div. Convention will be held in Memphis Mar. 26-28. Full details are now available from Memphis net members.

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
ETPN	3980	M-F	0645L	21	407	28
TSSBN	3980	M-Sat.	1830C	25		78
TN	3635	M-Sat.	1900C	24	136	52
TPN	3980	M-Sat.	0645C	30	927	191
		Sun.	0800C			

Traffic: W4OGG 217, W4PQP 168, W4MXF 102, K4SXD 88, WA4GQM 54, K4WWQ 54, W4UVP 50, W4WBK 44, WA4IBZ 36, K4EWI 26, K4NRZ 22, W4TZJ 20, WA4IUM 19, W4PFP 18, WA4HGQ 15, W4RMJ 15, W4VNU 14, W4TYV 13, W4YAU 13, WA4LAX 11, W4CVG 10, W4PKJ 9, WA4OXD 7, K4RCT 6, WA4EWW 5, K4LTA 3, W4UIO 3.

(*Continued on page 98*)

WHEN THE NEW HRO-500 solid state receiver was first announced on this page some months ago, we mentioned that it incorporated a front-panel *AGC Threshold Control.*

WE BELIEVE that this is a feature you will see on more and more high quality SSB receiving equipment, since *AGC Threshold Control* comes very close to completely eliminating AGC-emphasized high background QRM.

THE PROBLEM, of course, is that of the receiver AGC "pumping up" relatively weak background signals until they are as loud to the ear as the desired signal. The better the AGC in the receiver, the greater the effect. When this problem is encountered, the usual procedure is to back down the receiver RF gain control to reduce or minimize AGC action. This approach is bad news in at least two respects: loss of AGC action requires constant "riding" of the audio gain control to keep from being blasted out of the shack, and S-meter action (which depends on AGC) is destroyed. Another "cure" sometimes employed with a receiver using a manually tuned front end, or preselector, is to detune the preselector to reduce the sensitivity of the receiver. Unfortunately, this technique destroys front-end selectivity and emphasizes adjacent channel interference since the preselector is tuned to an *adjacent* channel — not the desired channel.

THE *AGC Threshold Control* provided in the HRO-500 does an effective job of reducing or eliminating AGC-emphasized background QRM, and does it while retaining full AGC action, S-meter accuracy, and front-end selectivity. Rather than *reduce* AGC action, the *AGC Threshold Control* in the HRO-500 reduces the signal strength of *all* incoming signals before they reach the R.F. stage — by 10 db, 20 db, or 30 db as selected by the operator. Weaker background signals are thereby dropped out so that there is nothing for the AGC to pump up, or are so reduced in amplitude that they stay below the AGC threshold of the receiver and are not amplified in proportion to the stronger wanted signal. Full AGC action is retained on the desired signal, so it is not necessary to touch the A.F. gain control as attenuation is cranked in or as band conditions change. Additionally, the S-meter still reads accurately — it is only necessary to add db to the meter indication equal to the attenuation in db inserted. An important extra benefit is that dynamic range (resistance to cross-modulation) is improved because of the combination of full AGC and the lower amplitude signals being handled by the RF and mixer stages. Of course, front-end selectivity is maintained at peak effectiveness since the preselector is peaked on-channel at all times.

THE APPLICATION OF *AGC Threshold Control* to an evening 75 meter SSB roundtable, for example, is frequently only slightly short of amazing. Background QRM comprised of foreign RTTY, skip interference from distant call areas, etc., is often loud enough to make copy extremely difficult, if not objectionable to the point of QRT in favor of watching TV. Remember that the problem is not that the wanted signals are not loud enough — it's the background that is boosted by the AGC to the point where the background is as loud as the desired signal — and the better the AGC, the more pronounced the effect. As attenuation is inserted with the *AGC Threshold Control*, background QRM dies a sudden death — and the wanted signal seems to pop right out of the mess.

WHEN THIS feature is combined in the solid state HRO-500 with one-Kc dial calibration, 10 Kc per turn tuning rate, a phase-locked frequency synthesizer for superb frequency stability from 5 Kc to 30 Mc., and *Passband Tuning* for 500 cps CW and 2.5 Kc SSB selectivity, the result is extraordinary amateur band performance. And the performance is the same whether you tune the 20 meter amateur band or any other 500 Kc segment in the VLF or HF spectrums.

YOUR FAVORITE National dealer should have the new HRO-500 in stock just about the time you read this. Why not see him and ask for a demonstration?

MIKE FERBER, W1GKX

National Radio Company, Inc.


For Once
You Can Afford The Rig
Other Hams
Are Talking About!

1 Deluxe HEATHKIT® SB-200 KW Linear Amplifier!

• 1200 watts P.E.P. input SSB—1000 watts CW • 80 through 10 meter band coverage • Built-in SWR meter—Antenna relay—Solid-state power supply • Automatic Level Control (ALC) • Shielded, fan-cooled amplifier compartment • Pre-tuned cathode input circuit for maximum efficiency & low distortion • Circuit-breaker power supply protection—no fuses • Designed for 120/240 volt operation. Neat, compact and transportable (only 35 lbs.). The sturdy, yet lightweight construction of the SB-200 is achieved through the use of a heavy-gauge one-piece aluminum chassis that is partitioned for extra strength and isolation of circuits. Easy assembly is assured with clean, open circuit layout and high quality, well-rated components. The modern low-profile styling of the SB-200 makes it a neat, compact desk-top linear that is ideal for use anywhere!

Kit SB-200, 42 lbs.....$200.00

Note: Unit suitable for overseas operation.

SB-200 SPECIFICATIONS—Band coverage: 80, 40 20, 15 & 10 meters. **Maximum power input:** 1200 watts P.E.P. SSB, 1000 watts CW. **Driving power required:** 100 watts. **Duty cycle:** SSB, continuous voice modulation; CW, 50% (key down time not to exceed 5 min.). **Third order distortion:** 30 db or better at 1000 watts P.E.P. **Output impedance:** 50 to 75 ohm unbalanced; variable pi-output circuit. SWR not to exceed 2:1. **Input impedance:** 52 ohm unbalanced; broad-band pre-tuned input circuit requires no tuning. **Meter functions:** 0-100 ma grid current, 0-1000 ma plate current; 0-1000 relative power, 1:1 to 3:1 SWR, 1500 to 3000 volts high voltage. **Front panel controls:** Load; Tune; Band; Relative Power Sensitivity; Meter Switch, Grid-Plate-Rel. Power-SWR-HV; and Power Switch, on/off. **Tube complement:** Two 572B/T-160-L (in parallel). **Power requirements:** 120 volts AC @ 16 amperes (max.), 240 volts AC @ 8 amperes (max.). **Cabinet size:** 14⅞" W x 6⅝" H x 13⅜" D. **Net weight:** 35 lbs.

2 Deluxe HEATHKIT® SB-300 Receiver!

• Complete coverage of 80 through 10 meter amateur bands • All crystals included, plus provision for VHF converters • Hermetically sealed 2.1 kc crystal bandpass filter • Built-in 100 kc crystal calibrator • Smooth, non-backlash vernier dial mechanism • 100 cps stability after initial warmup • 1 kc dial calibrations—100 kc per dial revolution (provides bandspread equal to 10 feet per megacycle) • Provision for transceive operation with SB-400 Transmitter • Prebuilt linear master oscillator (LMO), wiring harness and two heavy-duty circuit boards for fast, easy assembly.

Kit SB-300, less speaker...22 lbs.....$265.00

SBA-300-1 Optional AM Crystal Filter (3.75 kc) 1 lb.....$19.95

SBA-300-2 Optional CW Crystal Filter (400 cps) 1 lb.....$19.95

SBA-300-3 6 meter converter, 2 lbs.....$19.95

SBA-300-4 2 meter converter, 2 lbs.....$19.95

Export model available for 115/230 VAC, 50-60 cps; write for prices.

SB-300 SPECIFICATIONS—Frequency range (megacycles): 3.5 to 4.0, 7.0 to 7.5, 14.0 to 14.5, 21.0 to 21.5, 28.0 to 28.5, 28.5 to 29.0, 29.0 to 29.5, 29.5 to 30. **Intermediate frequency:** 3.395 megacycles. **Frequency stability:** 100 cps after warmup. **Visual dial accuracy:** Within 200 cps on all bands. **Electrical dial accuracy:** Within 400 cps on all bands. **Backlash:** No more than 50 cps. **Sensitivity:** Less than 1 microvolt for 15 db signal plus noise-to-noise ratio for SSB operation. **Modes of Operation:** Switch selected: LSB, USB, CW, AM. **Selectivity:** SSB: 2.1 kc at 6 db down, 5.0 kc at 60 db down (crystal filter supplied). AM: 3.75 kc at 6 db down, 10 kc at 60 db down (crystal filter available as accessory). CW: 400 cps at 6 db down, 2.5 kc at 60 db down (crystal filter available as accessory). **Spurious response:** Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **Power requirements:** 120 volts AC, 50/60 cps, 50 watts. **Dimensions:** 14⅞"W x 6⅝"H x 13⅜" D.

3 Deluxe HEATHKIT® SB-400 Transmitter!

• Built-in power supply • Complete transceive capability with SB-300 Receiver • Linear Master Oscillator frequency control • Built-in antenna change-over relay • All crystals supplied for complete 80-10 meter coverage • Automatic level control for higher talk power, minimum distortion • 180 watts P.E.P. SSB, 170 watts CW • Crystal filter type SSB generation • Operates SSB (upper or lower sideband) & CW • VOX & PTT control in SSB operation, VOX operated CW break-in • Crystal controlled heterodyne oscillators • 1 kc dial calibration—100 kc per dial revolution • Dial bandspread equal to 10 feet per megacycle • 500 kc coverage per bandswitch position • Switched 120 V AC for external antenna relay • Sturdy, lightweight, heavy-gauge aluminum construction throughout • Neat, modern "Low-Boy" styling! • Variable loading!

Kit SB-400, 33 lbs.....$325.00

Export model available for 115/230 VAC, 50-60 cps; write for prices.

HDP-21, Special SSB Mike, 4 lbs.....$29.40

SB-400 SPECIFICATIONS—Emission: SSB (upper or lower sideband) and CW. **Power Input:** 170 watts CW, 180 watts P.E.P. SSB. **Power output:** 100 watts (80-15 meters), 80 watts (10 meters). **Output impedance:** 50 to 75 ohms—less than 2:1 SWR. **Frequency range:** (mc) 3.5-4.0; 7.0-7.5; 14.0-14.5; 21.0-21.5; 28.0-28.5; 28.5-29.0; 29.0-29.5; 29.5-30.0. **Frequency stability:** Less than 100 cps per hr. after 20 min. warmup. **Carrier suppression:** 50 db below peak output. **Unwanted sideband suppression:** 55 db @ 1 kc. **Intermodulation distortion:** 30 db below peak output (two-tone test). **Keying characteristics:** Break-in CW provided by operating VOX from a keyed tone (Grid block keying). **ALC characteristics:** 10 db nominal @ 0.2 ma final grid current. **Noise level:** 40 db down from single tone output. **Visual dial accuracy:** Within 200 cps (all bands). **Electrical dial accuracy:** Within 400 cps (all bands). **Audio input:** 600 ohms or high impedance microphone **Audio frequency response:** 350 to 2450 cps at 6 db. **Power requirements:** 80 watts STBY, 260 watts key down @ 120 V AC line. **Dimensions:** 14⅞" W x 6⅝" H x 13⅜" D.

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Insula Nuevo

BY R. W. JOHNSON,* W6MUR

NOT LONG after the FCC started issuing four-letter calls the DX bug bit Jules Silvergold III, W2BUKS, at his Long Island estate. He had lots of company, of course, for on the ARRL countries list were an even 500 "countries" and there were many opportunities for the Honor Roll Addicts (HRAs) to enlarge their habit. As though trying to keep pace with the national debt which soared during the early years of the Cold War, ARRL had made the goal line an elastic affair, in keeping with the instability of the times.

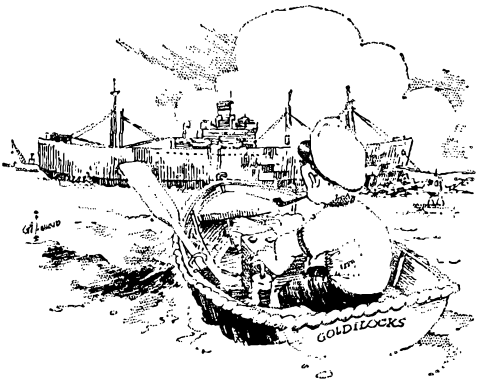
Jules of course had the best — and the most — of everything. Harvard education in keeping with the family tradition, a different sports car for each day of the month, "Big Bertha" arrays scattered over the estate, and the latest that Art Collins could provide to his best customer. Jules Silvergold III was also an intelligent young man, in spite of his Harvard education, and his DX skill developed rapidly.

Only a few of the rarer Asian countries gave him any trouble on his way to the top. This problem was solved by his father, who gave Jules on his twenty-third birthday an expedition to those places. Jules had even worked the island about 550 miles from Hawaii that appeared briefly after a suboceanic volcanic eruption back in 1965, by financing a helicopter expedition out there from Honolulu. That one was close, for he had just finished the QSO when the island disappeared again. But Jules was still tied at the top of the Honor Roll, for he had missed the other island like that because of plane trouble. So Jules was *there*, along with several dozen others, with no place to go but down. For a Silvergold, this was intolerable.

Jules discussed his problem with ARRL during the dedication ceremony for the new station his father had donated to W1AW, but with little satisfaction. The bitter truth was that there were simply no more countries until the U. N. could finally succeed in its proposal to rearrange the world boundaries. Every rock had been designated. Jules was apparently stalemated.

But Jules Silvergold III had not gone to Harvard without acquiring ingenuity and determination; a tie was not the place for him. His inheritance from Grandfather's estate came to him on his 25th birthday, and he was independently wealthy for the first time in his life. With inspiration, he set about to solve his problem in typically American fashion. His first step was to obtain the latest hydrographic maps of the world's oceans, and pick out all the charted reefs. Down in Texas someplace he located one of the famous wanderers of the late 50s who had discovered a few new uncharted reefs the hard way, and plotted these too. Jules then organized the most ingenious DXpedition ever devised. He hired one of the country's largest construction contractors and commissioned him to a series of projects far more useful than the Foreign Aid people had yet conceived. The idea was brilliant, and even Jules' classmates were proud of him. A number of Liberty ships were bought from their mothball berths, and outfitted. One by one, the ships were towed out to the reefs Jules had selected, and carefully grounded. Using the grounded ship as headquarters, the construction crews unloaded barges full of rock and concrete around the ship until an island began to form as a long, slender tenacle of rock leading away from the grounded ship. An antenna mast was placed at the far end, and the wire run to the ship. There, from the comfort of an air-conditioned radio room, the transmitters were fired up and a prearranged, unidentified signal was sent to Jules listening back in Long Island. Jules set his automatic control equipment with pre-recorded message, bade his servants goodbye, and headed for Idlewild.

Hours later, Jules arrived by his private helicopter at his newly-made island, and calmly settled down in the radio room to call his first CQ. This triggered his automatic equipment in Long Island, which called him (10 up, of course). He replied with the usual "599, QSL via bureau." The second automatic transmission came through loud and clear, "Sure gld to be the first to wrk u as new country OM BT PSE QSL for my DX5C BT 73 es pse listen fer W1FH es W6CUQ." Jules then settled back with a cool Martini in one hand to enjoy the music of the din, trying to see how many HRAs he could pick out of the pile. With his other hand he calmly turned off the transmitter.



As the last man left the reef, he pressed the detonator button setting off a chain of TNT charges planted under the rock and the grounded ship, and Insula Nuevo was no more. Jules was back at Long Island, filling out QSL cards and deciding which reef would be next in his new-found masochism. QST

* 9372 Hillview Road, Anaheim, California.

How red the rose?

(Or 599X Color TV)

We have a magnificent new color TV picture tube at Sylvania. And a colorful story to tell on how it was developed.

To begin with, you might say that the picture tube has been the industry's biggest bottleneck in color TV. Partly because the red phosphor has been a weak and shifty character. Give it half a chance and it turns orange or refuses to cooperate with the blue and green phosphors. To compensate for this weakness, it has been necessary to damp down the blue and green phosphors to achieve some semblance of color balance---at the expense of brilliance.

You'll get the picture if you'll view the screen of a color tube as islands of phosphor dots. Each island is made up of a red, a blue and a green dot in the form of a triangle. The dots in each triangle are optically coupled. If all three are equally excited, you get a pure white. If they are unequally excited, you achieve the same results as you would by mixing paints.

Great---except for that weak link in the color chain. If the red won't stay red, you're bound to come up with some odd hues that bear no relation to reality.

Well, it so happens that our research people, among others, had successfully developed a laser capable of generating an intense beam in the red spectrum. The "lasing" material used is europium, a metallic element of the rare-earth group, first discovered in 1896. And, as one idea follows another, it became obvious that a europium-base phosphor would also solve the red problem in color TV.

The trick was to find a suitable "host" material for europium...and we finally did. The resultant red phosphor came through with flying colors. This, in turn, permitted us to upgrade the blue and green phosphors and, all together, resulted in a measured brightness some 43 percent greater than the industry standard. And, for the first time, a picture that could be viewed in daylight. But the most spectacular thing is the ability of the tube to reproduce faithfully what it "sees."

At the same time, we came up with a new screening process. We call it dusting. The result is something like making a stencil with a spray gun, and it makes possible larger particle size. It's the broader crystalline surface of these particles that largely accounts for the increase in overall color intensity. And it all adds up to far better picture definition and color control. Monochrome pictures are superior for the same reasons.

Funny thing about europium---it's never had any really useful purpose in life until now. Which leads one to wonder about the riches of the earth and man's mind, and the way they come together.

73,

Bob Lynch

K2RMN

SYLVANIA

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GENERAL TELEPHONE & ELECTRONICS GT&E

(Continued from page 92)

GREAT LAKES DIVISION

KENTUCKY—SCM, Mrs. Patricia C. Schafer, K4QIO—SEC: K4URX. PAMs: W4BEJ, K4YZU, W4SZB. V.H.F. PAM: WA4IUM. RM: WA4LCH. In checking my appointment file I find 14 certificates that are late for renewal. Why do I have to remind you to send them in? Nov. net reports:

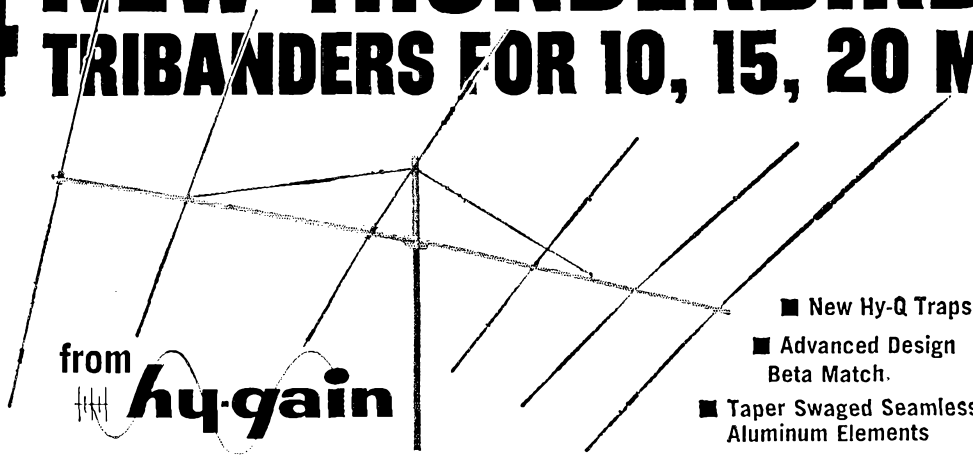
Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
EMKPN	3960	0630	M-F	21	279	42
MKPN	3960	0830	Daily	31	485	60
KTN	3960	1830	Daily	30	370	86
KYN	3600	0900&1900	Daily	60	475	382
LATN	21.150	2000	M-F	16	31	11

Louis and Jeff, Co. Section 2 Net held 13 sessions with QNI 132 and QTC 15. WA4MEX has been working the KC4s on 20 meters. Bill received the Mammoth Cave certificate. WA4VHY is a new call in Somerset. W4JUI is building again, this time an s.s.b. final for 80, 40 and 20. W4JP, the U. of K. station, has new 2-meter equipment installed. WA4QLK broke his wrist by falling off a ladder. WA4LCH is back from a vacation in Michigan so our 9RN representation suffered. We made it for 83.3 per cent for Nov. The Kentucky Council of Radio Clubs elected WA4IUM, chairman; WA4KFO, vice-chairman; K4DMU, secy.; WA4ETS, treas. Traffic: (Nov.) WA4AGH 305, W4BAZ 287, WA4BSC 207, WA4DYL 193, WA4LCH 123, K4QIO 76, K4ZRA/4 67, K4YZU 48, WA4MEX 32, K4VDO 16, W4KJP 15, K4LOA 14, W4BTA 11, W4CDA 11, W4SZB 11, W4BEW 10, WN4RVP 9, W4PLN 8, WA4HLW 7, W4YYI 7. (Oct.) WA4QLK 20, W4YYI 8.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: K8GOU. RMs: W8EGI, K8QLL, W8ELW, K8KMQ. PAMs: W8CQU, K8LQA, K8JED. V.H.F. PAM: W8PT. Appointments: W8DCT, WA8GRI, W8QFQ, W8RWK, K2VRQ/8 as ECs; W8AHV as OBS; W8RTN as ORS; W8AHV and K8JED as OPSs; W8EMD as OO and OES. New officers—Genesee County ARC: W8DTZ, pres.; K8ACQ, 1st vice-pres.; WA8FYF, 2nd vice-pres.; W8HIT, 3rd vice-pres.; WA8BLS, 4th vice-pres.; K8ROI, secy.; W8GJH, treas.; W8RTN, EC. Central V.H.F. Club: WA8ICN, pres.; WA8JGQ, vice-pres.; WA8GBG, secy.-treas.; WN8MWS, prog. Hillsdale ARC: WA8ANO, pres.; K8GKX, vice-pres. and treas.; WA8BJD, secy.; W8EGR, act. mgr. S.E. Mich. ARA: W8KAZ, pres.; W8NXT, vice-pres.; K8EQC, secy.; WA8EMJ, treas. Grand Rapids ARA: K8ILR, pres.; W8HIN, vice-pres.; W8OIY, secy.; K8ZVG, treas. Hills ARS (Rochester): WA8EZI, pres.; W8EZX, vice-pres.; WA8JFQ, secy.; WA8ELM, treas. The Kalamazoo ARC is conducting training class. Instructors are W8DM, W8ELW, W8EMD, K8EMT, K8CIQ and W8CVQ, who was top scorer in the Great Lakes Division ARRL V.H.F. Party. The Michigan 6-Meter Club again pulled its famous "Operation Hospital" Thanksgiving and Christmas. Tied into this were AF MARS, Metro Ragchewers, Tin Lizzy Clubs, V.H.F. Mobileers, V.H.F. society and Oak Park RC. The Elbow Benders C.W. Net meets Wed. on 1880 at 0100 with W8KAZ as NCS. G3MZY from Yorkshire, England, and W8AUD were shown W8SH, the M.S.U. station, by K8MFO. W8ENT retired from GM Corp. Michigan PON still gets out a nice little newsletter. The Hillsdale County Net is on 50.29 Mc. Fri. at 0100. WA8MEE and W8SWF are both waiting for their NCX-5 delivery. K8YEK (OO) wants to start a "Harmonic Dishonor Roll" to get OOs to cover 7.4 to 7.5 Novice second harmonics. WA8CGT, WA8MCD and WA8MOA made General Class. The Pictured Rocks RC has a very nice bulletin. New officers of the Hiawatha RC are W8ZUL, pres.; K8ACV, vice-pres.; Nelinberg, secy.; W8IOC, treas. W8FYX, W8QGQ and W8HAU are all back from surgery and doing well. The W8HK's head for Florida. Traffic: (Nov.) K8QKY 393, WA8ECN 331, K8HLR 329, K8FDV 269, K8KMQ 254, K8LNE 211, K8TDJ 201, WA8CPH 142, W8ELW 117, K8LUY 99, K8GOU 84, K8NJW 67, K8QLL 57, K8TIG 57, W8BEZ 56, W8EU 51, K8BYX 50, W8RTN 48, K8MFO 44, WA8DZP 38, K8JED 34, W8FX 33, W8YAN 32, K8IUZ 31, K9RHU/8 30, W8FJR 28, WA8KXO 25, K8KQV 21, K8YGH 20, W8ZHB 20, W8FWQ 19, WA8HGE 17, WA8CTE 15, W8DSE 15, W8EGI 12, W8HKT 12, W8PGW 12, W8WVL 12, W8AUD 11, WA8GRI 6, W8AHV 4, W8FDO 4, K8GJD 4, W8SH 4, K8VDA 4, W8AAM 2, W8SS 2. (Oct.) K8HLR 345, WA8CPH 185, W8SS 69, WA8CXF 43, W8PGW 13, W8HK 10, WA8ANO 9, W8SH 8, WA8GBN 5.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE and K8LGB. PAMs: W8VZ, K8BAP and K8UBK. Columbus ARA's *Carascope* informs us

4 NEW THUNDERBIRD TRIBANDERS FOR 10, 15, 20 M



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- New Hy-Q Traps
- Advanced Design Beta Match.
- Taper Swaged Seamless Aluminum Elements

Famous Hy-Gain Thunderbird Tribanders have been improved...to give you even greater total performance. Each new Thunderbird is equipped with separate new Hy-Q Traps for each band—to give you peak performance on each band whether working phone or CW. New advanced design Beta Match insures optimum transfer of all available energy—allows precision broadband matching and a high degree of electrical and mechanical reliability...comes to you completely factory pre-tuned. Mechanically, new Hy-Gain Thunderbirds are rugged...large diameter, heavy gauge aluminum boom...taper swaged seamless aluminum elements...heavy gauge, machine formed boom to mast and element to boom brackets...non-corrosive full circumference compression clamps at tubing joints. They're available in four models...

1 ALL NEW 6-ELEMENT THUNDERBIRD DX MODEL TH6DX

Superb DX performance. Features wide spaced elements on a 24 ft. boom. New Hy-Q Traps provide true full-sized performance. Feeds with 52 ohm coax—Beta Matched for optimum gain—maximum F/B ratio without compromise. SWR less than 1.5:1 on all bands. Longest element, 32 ft.—weight, 47 lbs. Model TH6DX, **$139.95** Net.

2 NEW, IMPROVED 3-ELEMENT THUNDERBIRD MODEL TH3Mk2

Outstanding performance on 10, 15 and 20 meters. Separate and matched new Hy-Q Traps for each band. Feeds with 52 ohm coax—Beta Matched for optimum gain—maximum F/B ratio without compromise. SWR less than 2:1 on all bands. Boom length, 14 ft. Longest element, 26 ft. Weight, 36 lbs. Rotates with heavy duty TV rotator. Model TH3Mk2, **$99.75** Net.

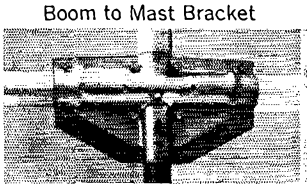
3 NEW, IMPROVED 2-ELEMENT THUNDERBIRD MODEL TH2Mk2

Compact...installs almost anywhere... delivers excellent performance. Features new Hy-Q Traps. Feeds with 52 ohm coax—Beta Matched for maximum gain. Rugged lightweight construction compatible to rotating with standard TV rotator. Boom length, 6 ft. Longest element, 26 ft. Weight, 21 lbs. Model TH2Mk2, **$69.95** Net.

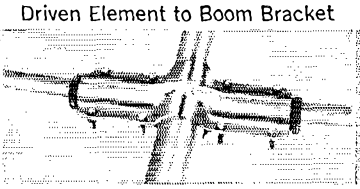
4 IMPROVED 3-ELEMENT THUNDERBIRD JUNIOR MODEL TH3JR

A compact 3-element beam that delivers outstanding performance. Excellent directivity. SWR less than 2:1 at resonance. Hy-Q Traps—Beta Match—seamless heavy gauge aluminum construction. Rotates with standard TV rotator. 12 ft. boom. Longest element, 27'6". Turning radius, 15'11". Model TH3JR, **$69.95** Net.

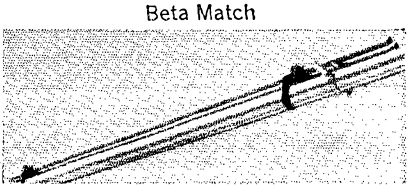
Boom to Mast Bracket



Driven Element to Boom Bracket



Beta Match



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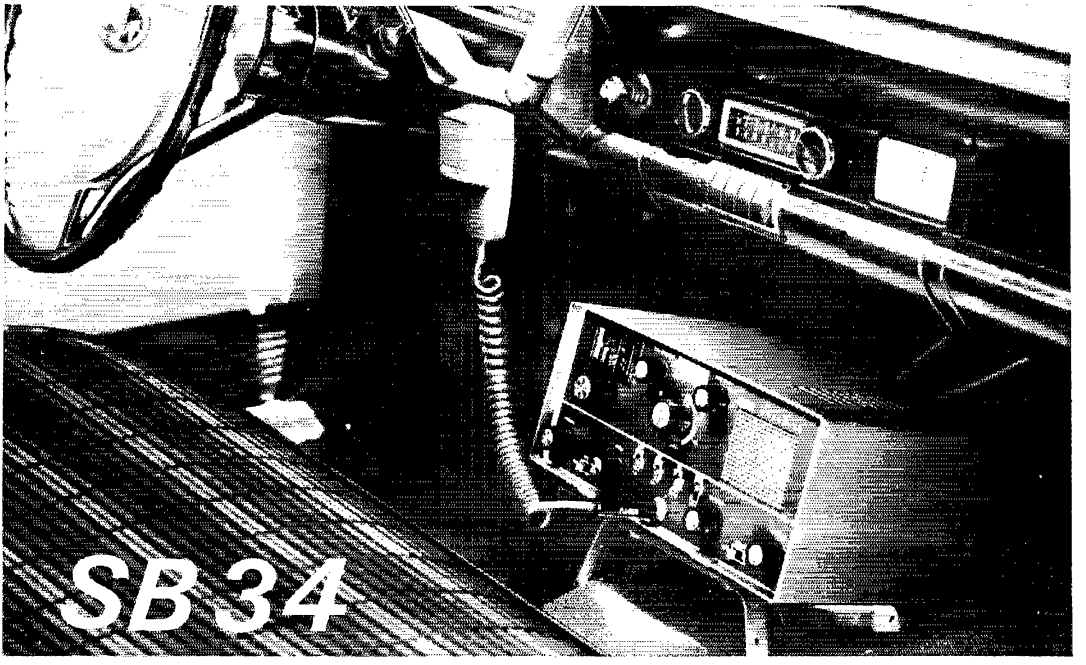
that ANX has joined the Silent Keys. Toledo's *Ham Shack Gossip* relates that the Toledo Mobile RC toured the Champion Spark Plug factory. WA8OBH received his General Class license. Warren ARA's *Q-Match* heard a talk on electronics by W8HAO. K8JUZ has joined the Silent Keys. Received a new bulletin called *Clerco Comments* from the Clermont County ARC which states that the club toured the Hamilton County Communication Center. The club puts out three certificates—the Southwestern Ohio Counties Award for working Clermont County and one station in each of the four bordering counties of Clermont County, for working seven stations in Clermont County and to obtain the CCARC Award for working five members of the Clermont County ARC. Send log data and a dollar for each to Comanche Noble, WA8BOZ, 3602 Lewis Rd., Amelia, Ohio 45102. The club's 1965 officers are W8CWP, pres.; W8ZRL, vice-pres.; K8ADM, secy.; WA8EKV, treas. Babcock & Wilcox ARC's 1965 officers are W8BUL, pres.; K8RDJ, secy.; W8MKF, treas. The 20/9 ARC of Youngstown sends us this news: WA8AGV has a new HQ-170B receiver. WA8FHP has a new Ranger 2, WA8KQD has a new Clegg Venus, K8TVO is attending O.S.U., K8ORG vacationed in Canada, WA8ARZ is attending Case Tech., K8BSH received his 1st-class telephone license, K8NMG passed the Extra Class exam and W8STD was in South Africa and Lebanon. Parma RC's *P.R.C. Bulletin* tells us that W8GHO spoke and demonstrated on 2-meter repeat stations operated by RACES. South East ARC's *Ham Fax* reports that K8AXC spoke on the human side of TVI and W8TGX spoke on the technical side and the club toured the Naval and Coast Guard Center. Findlay RC's *W8FT News* states that WA8GAU has a new Johnson Adventurer, WN8OFR is a new Novice. W5-MHB/8 is back in Findlay and K8LEU is attending O.S.U. Queen City Emergency Net's *The Listening Post* informs us that WA8GRR has a new baby boy. W8TW and K8NXD joined the Silent Keys. W8ZEI has a new NCX-3. K8LQM has a new HW-12. The Ohio S.S.B. Net in Nov. had 55 sessions, 759 QTCs with 13.8%. WA8EAI has a new tower and Long John beam on 2 meters. WN8NUN has a new Drake 2B. W8BZX is on 2 meters. W8WEG is using an HQ-110A now. The Ohio Phone Net held 30 sessions in Nov. with 144 QTCs and 5.0 average. Traffic: (Nov.) W8UPH 532, W8DAE 379, WA8CXY 229, K8BHF 200, K8UBK 159, K8BAB 156, W8BZX 110, W8CHT 105, K8VBO 100, K8DIU 97, K8VBH 96, WA8FQW 92, W8MGA 73, W8TV 65, K8LGA 58, W8QCU 48, K8YDR 48, K8WNW 43, W8IEP 42, W8PZS 34, WA8AJZ 31, WA8AJD 26, K8ZCZ 25, W8NAL 24, K8PBE 24, K8BAP 22, K8DDG 17, W8LZE 17, W8IXZ 16, K8RXD 15, W8DIH 13, W8FTX 13, W8WEG 11, K8LGB 8, WA8JXT 8, WA8AWH 5, W8EEQ 5, WA8ETX 3, WA8FIF 3, WA8IHFN 2. (Oct.) WA8JXM 110, WA8AJD 63, WA8IVT 21, K8BAP 16, WA8MHR 2, W8WEG 1.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RMs: W2PHX and WA2VYS. PAM: W2IJG. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT; Emergency Coordinators on 146,550 kc. Fri. at 0130 GMT. Appointments: K2LSX as OO; WA2VYT and WB2-CPU as ORSs. Endorsement: WA2WGS as ORS. Congratulations to K2TXP and WA2UZK on making the BPL on November traffic. Because of long skip, all section nets have been starting early; in some cases as much as an hour. We congratulate new Vice-Director K2SJO, also K2SJN, for a very spirited election. WB2-HZY reports 27/23 states worked during Nov. Very successful auctions were held by the Albany and Schenectady Clubs. The Westchester Club had a speaker from Technical Materials Corp., who discussed differences between amateur and commercial s.s.b. equipment. The Schenectady Club reports 192 active members with hopes for 200 by 1965. A representative of Waters Mfg. Co. was guest speaker at the New Rochelle Club. The clubs' SET became realistic when a lost mobile was directed to Bronxville Hospital for an emergency blood donation. Assisting were WA2OOO, WB2FXB and WB2GMN. All appointees are reminded to check the expiration date on their certificates and return them to the SCM for endorsement if more than a year has elapsed. Your SCM is about to clean out the "deadwood" so please return those certificates if you wish to retain your appointment. Traffic: K2TXP 733, WA2UZK 504, WA2VYS 297, WB2CPU 97, WB2FVD 79, K2SJN 78, W2ANV 38, WA2VYT 30, W2URP 29, WA2-JWL 21, WA2WGS 17, W2EFU 16, WB2FXB 16, WB2-DXL 15, WB2FYP 11, WB2HZY 7, WB2HYA 6, WB2-HGB 1.



...but where's the power supply ?

The power supply—and it's universal for both 12V DC and 117V AC—is neatly tucked in a corner inside the exceptionally small cabinet that mounts easily in the front section of the car—and leaves plenty of room for the driver and other members of the family.

And **SB-34,** 4-band SSB transceiver, goes mobile on a moments notice!

Two power cables come with your SB-34. Use one when you are operating the '34 as a fixed station on 117V AC. Use the other for 12V DC mobile. No strapping—no conversions. There's even a handle on the case for easy carrying.

Convenient certainly—but dollar-saving too because the very low price **includes** this universal supply—saves you the cost of a separate inverter. And it's assuring to know that '34 is easy on the battery—that the all transistor receiver draws only 500ma on standby.

Suggested price.

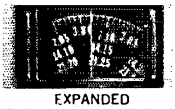
$395

HIGHLIGHTS: 135 watts p.e.p. input (slightly lower on 15). **Freq. range:** 3775-4025 kc, 7050-7300 kc, 14.1-14.35 mc, 21.2-21.45 mc. 23 transistors, 18 diodes, 1-zener diode, 1-varactor diode, 2-6GB5's PA, 1-12DQ7 driver. **Speaker built** in (external speaker provisions)

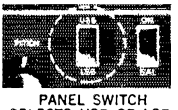
Pre-wired receptacles on rear accept VOX and Calibrator—both optionally available.

SIZE: 5"H, 11¼"W, 10"D. Approx. 20 pounds.

THE BIGGEST SSB TRANSCEIVER VALUE!



EXPANDED FREQUENCY COVERAGE



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NO RELAYS— SOLID-STATE SWITCHING

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Export sales: RAYTHEON Raytheon Company, International Sales & Services, Lexington 73, Mass. U.S.A.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—SEC: K2OVN. Section nets:

NLI	3630 kc.	1915 Nightly	WA2EXP	— RM
VHF Net	145.8 Mc.	2000 TWTh	W2EW	— PAM
VHF Net	146.25 Mc.	1900 FSSnM	W2EW	— PAM
NYCLIPN	3932 kc.	1600 Ex. Sun.	WA2QJU	— PAM
NLS (slow)	3630 kc.	1845 Nightly	WA2RUE	— RM

NYC-LI AREC Nets: *See Dec. 1964 column for schedules.* WA2YLU is the new president of the Five Towns RC. WA2SDQ is with the sailors at the Bainbridge Naval Base. WB2NDI made CHC No. 1456 while WA2QPC made CHC No. 150 on v.h.f. K2IJL is an Air Force guy at Biloxi, Miss. Air Base. K2RPW is trustee for the Five Towns' new call of K2KQG. WA2-YNH is sporting a LeMans-type mobile. WB2DBT is going to N.Y.U., Stoney Brook. WA2KSP helped WB2-JVF erect his 60-ft. tower which helps the Amplidyne 621 on 6 and 2. WA2GPT reports that The Ladies of 2-Land meet every Tue. on 3925 kc. at 1000 local time to discuss YL-type stuff. WB2DZZ finished building the HA-20 and is ecstatic over all the new signals now coming in! WA2WAO built a station control panel and everything is piped through it except the hot water. WA2VKK is now using a Viking II, an HQ-150 and an 18-ft. Dangle antenna (it dangles out the window). BPL certificates went to WA2GPT, WA2TQT, WA2RUE, WB2HWB, W2EW and WA2QJU. New appointments: WB2OTT and WB2DBW as ORSs; WB2-HJT as OBS; W2DJQ as OO. WA2VLK, who is in his first year at U. of Buffalo, has found out what studying really is! WA2RKK has a new Twoer and nuvistor preamplifier and is building an r.f. monitor scope. WB2EUH has a new CP-35 sticker. W2DBQ suggests that we call our section traffic nets as follows: NL12, NL175, NL180 and NLS80. What do you think? WB2-LUK finished the keyer O.K., but it sits there without a paddle. WB2OTT put up a new 80-meter dipole for his traffic work. WA2PMW moved up to 2 meters and is looking for ground-wave skeds. WB2AWX has switched to City College. *Retraction:* In December I said that W2PF was in the hospital. Wasn't so! All the while he was journeying through Tampa, Miami and Nassau in the Bahamas. Hey, here are some of the club papers heard from: *QTC* of Suffolk County RC, *QSX* of Larkfield RC, *Break-In* of Five Towns RC, *Spurious Radiations* of Rockaway ARC, *Grid-Leaks* of Jamaica Amateur UHF Club, *Feedback* of Mid-Island ARS, *Sizer* of Mid-Island Net and notices from the Radio Club of Brooklyn and the New York Radio Club. These clubs are heard from regularly with news of their members. How about your club? The V.H.F. Traffic Net is in urgent need of stations in Queens, Nassau, Suffolk, Richmond, Bronx and New York Counties. Traffic-handling is a very satisfying enterprise and is much enjoyed by those who engage in it. Just check in and say, "I want to engage in the satisfying enterprise of handling traffic!" You will be pleased to find yourself "snapped-up." With all the 2-meter stations around here, we should be able to provide section-wide coverage. How about it? Traffic: WA2-QJU 410, WB2EUH 291, W2GKZ 137, WB2AEK 107, W2DBQ 99, WB2MLN 91, WA2EXP 87, WB2DBW 64, WB2LUK 62, WB2IQG 53, W2BXK 46, WB2JHK 46, WA2LJS 43, WB2NSQ 37, WB2OTT 36, WB2IGU 28, WA2PMW 20, W2EC 15, WA2OOL 15, WB2AWX 11, WA2WAO 10, WA2DTY 8, WB2EGV 7, WA2VKK 6, WB2EXI 4, W2PF 2, WA2RMP 2.

NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW—Acting SCM: Louis J. Amoroso, W2LQP. SEC: K2ZFI. NNJ ARPSC Nets:

NJN	3695 kc.	7:00 P.M. Daily	WA2BLV—RM
NJ Phone	3900 kc.	6:00 P.M. Ex. Sun.	W2PEV—PAM
NJ Phone	3900 kc.	9:00 A.M. Sun.	W2ZI—PAM
NJ 6&2	51150 kc.	11:00 P.M. M-W-Sat.	K2VNL—PAM
NJ 6&2	146700 kc.	10:00 P.M. Tu-Sat.	K2VNL—PAM
NJNN*	3725 kc.	7:30 P.M. MTWTh	WB2HLH—RM
16N	1880 kc.	7:30 P.M. Tue.	WA2UOO—RM

* Novice & slow speed. All times local. AREC net skeds and information available from SEC K2ZFI. New appointments: W2JDH and WB2GFY as ORSs. W2-CVW's job took him to W4-Land for a couple of weeks. Ed expects to be back with us for the next report. The N.N.J. section certainly made a fine showing in the recent SS Contest on both phone and c.w. WB2-DDA reports FB results with his eight-element 2-meter beam at 45 feet. K2RXQ/MM made over 200 phone contacts while on a 4-month tour with the Navy in the Mediterranean sea. WA2ZQH is looking for KL and KH to complete his WAS. WA2ZKT had an FB AREC meeting with his group and reports things look good for 1965. While we are on the subject of AREC, how about looking up K2ZFI, our SEC. He is looking for some new ECs in certain areas. W2NKD, a former N.N.J. SCM, writes that he hopes to be finished with the extended sales trips and expects to be back on

NOW

DIRECT CRYSTAL CONTROL TO 160 mc
With AOC Plug-In Transistor Oscillators

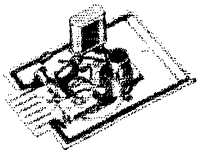
- Portable Signal Standards
- Signal Generators For Receiver Alignment
- Band Edge Markers
- Frequency Markers For Oscilloscopes
- Quick-Change Plug-In Oscillators
- Accessory Cases

HIGH FREQUENCY (20 mc – 160 mc)

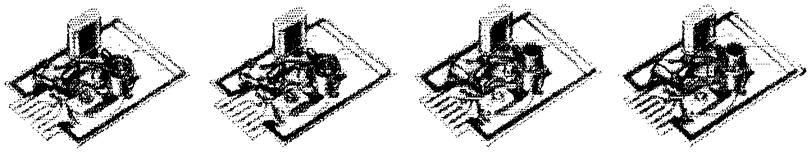
Five transistor oscillators covering 20 mc - 160 mc. Standard 77°F calibration tolerance ±.0025%. The frequency tolerance is ±.0035%. Oscillator output is .2 volts (min) across 51 ohms. Power requirement: 9 vdc @ 10 ma. max.

OSCILLATOR TYPE	OSCILLATOR RANGE	CRYSTAL TYPE	TEMPERATURE TOL. —40°F to 150°F	OSCILLATOR (LESS CRYSTAL) PRICE
OT-24	20-40 mc	CY-7T	±.0035%	$ 9.10
OT-46	40-60 mc	CY-7T	±.0035%	9.10
OT-61	60-100 mc	CY-7T	±.0035%	15.00
OT-140	100-140 mc	CY-7T	±.0035%	15.00
OT-160	125-160 mc	CY-7T	±.0035%	15.00

CRYSTAL FREQUENCY	CRYSTAL PRICE
20-60 mc	$ 6.90
60-100 mc	12.00
101-140 mc	15.00
141-160 mc	18.00



Order direct from International Crystal Mfg. Co.

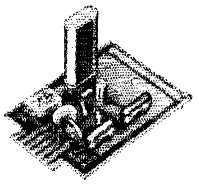


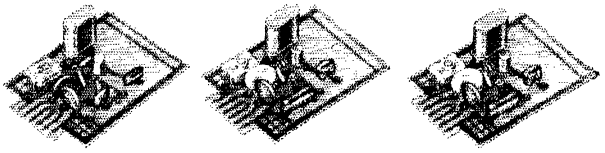
LOW FREQUENCY (70 kc – 20,000 kc)

Four transistor oscillators covering 70 kc - 20,000 kc. Trimmer capacitor for zeroing crystal. When oscillator is ordered with crystal the standard will be ±.0025%. Oscillator output is 1 volt (min) across 470 ohms. Power requirement: 9 vdc @ 10 ma. max.

OSCILLATOR TYPE	OSCILLATOR RANGE	CRYSTAL TYPE	TEMPERATURE TOL. —40°F TO + 150°F	OSCILLATOR (LESS CRYSTAL) PRICE
OT-1	70-200 kc	CY-13T	±.015%	$7.00
OT-2	200-5,000 kc	CY-6T	200-600kc ±.01% 600-5,000kc ±.0035%	7.00 7.00
OT-3	2,000-12,000 kc	CY-6T	±.0035%	7.00
OT-4	10,000-20,000 kc	CY-6T	±.0035%	7.00

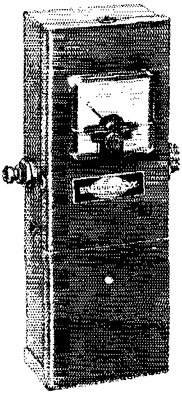
CRYSTAL FREQUENCY	CRYSTAL PRICE
70-99 kc	$22.50
100-200 kc	15.00
200-499 kc	12.50
500-849 kc	22.50
850-999 kc	15.00
1,000-1,499 kc	9.80
1,500-2,999 kc	6.90
3,000-10,999 kc	4.90
11,000-20,000 kc	6.90



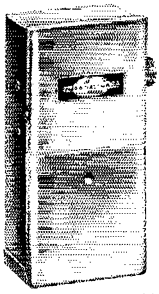


INTERNATIONAL CRYSTAL MFG. CO., INC.

18 NORTH LEE OKLAHOMA CITY, OKLA.



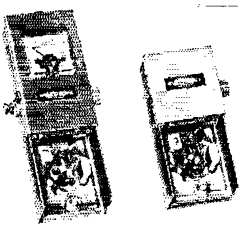
FOT-20



FOT-10

AOC OSCILLATOR CASES

Small portable cases for use with the OT series of plug-in oscillators. Prices do not include oscillators. (When oscillator and crystal are ordered with FOT-10 case a 77° F tolerance of ±.001% may be obtained at $2.00 extra per oscillator/crystal unit. When oscillator/crystal units are ordered with FOT-20 case, a single unit can be supplied with temperature calibration over a range of 40° F to 120° F. Correction to ±.0005%. Add $25.00 to the price of FOT-20 and oscillator/crystal unit.)



FOT-20 For high accuracy calibration requirements. Includes battery and output jack, output meter circuit and battery check, as well as thermistor temperature measuring circuit. **$87.50**

FOT-10 Basic case with battery and output jack for general wider tolerance applications. **$14.50**

MT-1 Oscillator board mounting kit. **$4.95**

soon. WA2UOO has a new 80-10-meter antenna up. WB2COZ is on with his new RTTY gear. K2EHR recently joined MARS and enjoys 2 meters. WB2LYD's 14-year-old son, WN2LOC, passed the General Class exam Nov. 13. The Englewood Amateur Radio Assn. is now incorporated (EARA, Inc.). Officers are WA2-CCF/UZH, pres.-treas.; W2OIV, vice-pres.; WA2NVG, secy. The club has '65 FD plans underway. WB2PUL has a new quad up. W2PEV's claimed score is 200 stations and 60 sections in the SS Contest. WB2DEP is trying out 40-meter s.s.b. K2VNL made BPL for the third time. The N.J. Phone Net is trying 5 p.m. each night because of winter skip conditions. WA2JVO is building a new high-power rig for 6 and 2 meters. WB2FYB is now on 220 Mc. WA2HGL is working on his DX-100 after the SS workout. W2PBZ put his tribander on a 60-ft. crank-up tower. The annual NJPN Dinner-Meeting near Heightstown, N.J., was again a very successful affair with some 35 in attendance. Traffic: (Nov.) K2VNL 519, WA2VID 385, WA2TEK 322, WB2AEJ 194, WB2ALF 161, WB2GFY 71, WA2UOO 69, W2LQP 67, WA2KAJ 54, WB2IYO 44, W2PEV 35, K2ZFI 35, WB2DEP 33, WB2KSG 22, K2JTU 20, WB2-LCH 20, W2TFM 18, WB2JWB 15, WA2TWS 15, WA2-PWI 12, WA2WHZ 12, WA2ZQH 12, WA2CCF 9, W2-NAK 9, K2HFL 6, WA2KRC 5, WA2ZKT 5, WB2BCS 4, WA2UDT 4, K2VVL 3, W2ZAL 3, W2NIY 2. (Oct.) WB2PPG 26, K2BEV 6.

MIDWEST DIVISION

IOWA—SCM, Dennis Burke, WØNTB—Asst. SCM: Ronald M. Schweppe, KØEXN. SEC: KØVBM. RM: WØLGG. PAMs: KØBBL and WØLSF. New ECs: WAØDVY, Montgomery County; WAØJBK, Monona County. Interest is picking up in v.h.f. WØGQ reports increased activity in N.E. Iowa. Prof. J. D. McMechan gave a talk on v.h.f. at the 10th Annual V.H.F. Conference at Kalamazoo, Mich. Jim is outstanding in his field. WØIII was written up in the Nov. issue of *News of Iowa State*. He is an outstanding educator and ranks with the other great amateurs in our State University. The Iowa section and all amateur radio is indeed fortunate to have a man like this in its ranks. WØNWX is a step closer to WAS, having recently picked up Nevada. He is working on DXCC. WØQGI has made DXCC, making four in the Iowa section. If you have not had a QSL from WØUSL your rig must sound pretty good. John is striving diligently to improve amateur signals and certainly is a great help to the amateur cause. KØPOI is rolling again after a long hard summer. 160 Meter Net: QNI 881, 75 Meter Net: QNI 1193, QTC 148, sessions 25. Hamilton County Net: QNI 264, QTC 4, sessions 30. Traffic: WØLGG 1378, WØBDR 551, WØNTB 70, KØQKD 50, WØUSL 48, WØLJW 29, WØGPL 10, WØYDV 10, WØBKR 8, KØEVC 7, WAØDYV 6, WØQVZ 6, KØTDO 6, KØ-KAQ 4, WAØGMC 1.

KANSAS—SCM, C. Leland Cheney, WØALA—SEC: KØBXF. RM: WØSAF. PAMs: KØEFL, WØBOR. V.H.F. PAMs: KØVHP, WØHAJ. Nets reporting for Nov. traffic:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*QNI*	*Avg.*
KPN	3920	1215Z	M-W-F	18	58	310	17.22
KPN	3920	1400Z	Sun.				
QKS	3610	0030Z	Daily				
KSBN	3920	0400Z	Daily				

NCSs: KØEFL, KØGII, KØUER, WØORB.

Would like to remind all clubs within the section to send a list of your new officers to your SCM as soon as they are elected. There often is information that can be sent to clubs if we have addresses to send it to. The Wichita ARC elected KØAGL, pres.; WAØGTD, vice-pres.; WAØCCX, secy.; WØTSY, treas.; WØEZE, director. There appears to be lots of v.h.f. activity lately. Why not contact KØVHP or WØHAJ and fill them in on your skeds? WØALA has been off 40 and 75 for the last few months because of lack of an antenna but should be back on now. No real excuse, just couldn't find time to raise one. Hi! Traffic: WØOHJ 1172, KØGII 157, WAØEDD 114, WAØAGF 49, WAØCCW 24, KØEFL 19, KØJDD 19, KØBXF 11, WØALA 10, WØZUX 6, WAØDZI 4.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: WØBUL. PAMs: WØBVL, WØBUL, WAØELL (V.H.F.), WØOMM KØONK. RMs: KØONK, WØ-OUD. Appointments renewed: WØKIK and WØOUD as ORSs; KØJWN as OES; KØONK as OPS. KØKIY was appointed Asst. EC for Davies County by EC WØGQR. KØLQH is now W9IDY in the Chicago area. The Mo. Section EC Net has been activated by SEC WØBUL on 3885 kc. at 1:30 p.m. Sun. Chuck also participated in a 4-state emergency effort to locate the par-

Unmatched versatility for communications, surveillance, systems design, or laboratory instrumentation . . .

NATIONAL'S NEW HRO-500 HF/VLF RECEIVER IS TOTALLY SOLID STATE... OUTPERFORMS CONVENTIONAL TUBE UNITS... AND IS FAR LOWER IN COST!

National's new HRO-500 receiver is totally solid state for versatility, portability, and reliability. It incorporates a phase-locked frequency synthesizer to cover the extraordinary range of 5 kilocycles to 30 megacycles in sixty bands, with identical stability, tuning rate, and high calibration accuracy throughout. Complete SSB/CW/AM facilities are provided, as well as all necessary outputs for operation of ancillary equipment. ■ Total solid state design provides remarkable versatility and reliability, as well as simplified power and cooling requirements. The HRO-500 operates directly from either 115/230 V.A.C. or 12 V.D.C. sources (12 volt current drain is only 200 ma at low audio output with pilot lamps switched off). Transistors provide instant-on operation without delay or warm-up drift. ■ Entire VLF and HF spectrums . . . from 5 Kc to 30 Mc . . . are tuned continuously with 1 Kc dial calibration and 10 Kc per turn tuning rate. The HRO-500 provides better than 1.0 μv for 10 db S/N SSB/CW sensitivity with 60 db minimum image rejection (optional LF-10 preselector is recommended for optimum VLF performance). Effective dial scale length is 24 feet per megacycle, with $\frac{1}{4}$" spacing between one-Kc calibrations. ■ Frequency is determined by a phase-locked crystal frequency synthesizer, which eliminates multiple crystal oscillators for high frequency oscillator injection. All HFO signals are synthesized from the output of a 500 Kc master crystal oscillator for maximum stability and elimination of band-to-band recalibration. Long-term stability from turn-on is equal to that of the best tube-type commercial receivers *after* warm-up. ■ Dynamic range and cross-modulation characteristics are equivalent to, or better than, many competitive tube-type receivers of similar sensitivity. ■ The HRO-500 provides superb SSB/CW/FSK performance with separate product detector, fast-attack, slow-decay AGC, and selectable sideband. The tunable filter provides four discrete I.F. bandwidths of 500 cps, 2.5, 5.0, and 8 Kc, with nominal 6-60 db shape factor of 2.5:1. *Passband Tuning* is provided in the 500 cps and 2.5 Kc bandwidths, for selectable sideband or single-signal reception without change in frequency or beat-note. ■ The HRO-500 is compact in size and light in weight: $7\frac{5}{8}$" H, $16\frac{1}{2}$" W, $12\frac{3}{4}$" D; weight only 32 lb. A rack mounting kit is available for standard $8\frac{3}{4}$" RETMA panel. ■ Write to National for detailed information, performance data, and complete specifications.

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DEPARTMENT H ■ 37 WASHINGTON STREET, MELROSE, MASSACHUSETTS 02176

ents of a disease-stricken child. The PHD (v.h.f.) Net lists 14 members eligible for Section Net certificates. Long skip is disrupting the low frequency nets so why not try for v.h.f. tues again? WNØGZM is back on the air with a new call, WAØKOO. KØJWN is enjoying mobile on 2 meters. KØLGZ blew his DX-100 the first weekend of the SS. KØONK's s.s.b. rig is in for repairs again. WAØEEU has a new 80-watt p.e.p. s.s.b. rig on 2 meters. WAØEMS is 125/93 toward DXCC. KØJPL worked country 199. Along with all the traffic KØFPC worked ZS6 and ON4 dx. KØONK, WAØEMX and WØCTV made the BPL in November. My thanks to WØEEE, WAØIAM and KØRXD for helping get your reports in to me. I try to make most of the nets near the end of the month but route your reports through them when you don't catch me. Net reports for Nov.:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2345Z	M-W-F	13	289	60	WØBUL
MON	3580	0100Z	Tu.-Sun.	25	136	98	WØOUD
MNN	3580	1900Z	M-Sat.	25	79	25	WØOUD
SMN	3580	2200Z	Sun.	5	23	14	WØOUD
PHD	50.4	1245Z	Wed.	4	68	6	WAØFLL

Traffic: (Nov.) KØONK 1998, K5LBG/Ø 400, KØFPC 243, WØCTV 188, WAØEMX 165, WØOUD 105, WØHVJ 92, WAØDGT 44, WØEEE 43, KØEQY 42, WØZLN 37, WØBUL 31, KØMMR 29, KØLGZ 24, WØBVL 21, WØKIK 19, WØTPK 19, KØWOP 16, WAØFKD 11, WAØFLL 11, WAØKNV 8, WØRTO 5, KØJPL 3, WØGQR 2, KØLQH 1. (Oct.) WØZLN 96, WAØEMX 41, WAØDGT 25.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØJXN. Net reports for the month:

Nebr. Mon. Phone	3982.5	1330Z	QNI 541	QTC 44		
West Nebr. Net	3850	1400Z	QNI 598	QTC 35	Wx 308	
Nebr. Emer. Phone	3982.5	1830Z	QNI 953	QTC 52		
Nebr. Storm Net	3982.5	2330Z 0030Z	QNI 986	QTC 18		
AREC Net	3982.5	1430Z Sun.	QNI 121	QTC 1		
Nebr. CW Net	3525	0100Z	QNI 181	QTC 28		
		0400Z	QNI 127	QTC 18		
Nebr. AREC CW Net	3782.5	0000Z	QNI 14	QTC Ø		

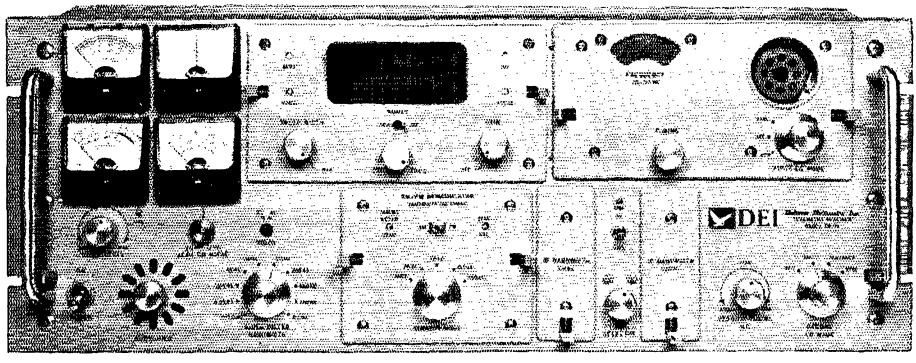
The 160-meter Weather Information and Traffic Service Net started the season Nov. 16. WØYQR is NCS, WAØCBJ ANCS. The net meets on 1995 kc. at 1930 CST each evening. A Tue. and Thurs. session has been added to the NACN, Nebr. AREC C.W. Net. WAØBYK is net manager. WAØGHZ NCS, on the sessions at 0000Z on 3782.5 kc. Traffic: WAØDOU 172, WAØGHZ 66, WØLOD 64, WØVEA 62, KØHNW 34, KØDGW 31, WØNIK 31, KØOAL 30, WAØBIE 29, WAØBID 28, WØBFN 25, KØFRU 25, WØZHV 25, WØGGP 22, WØFIG 20, WØFQB 20, KØRRL 19, WØMTI 12, KØJEN 10, KØBYK/Ø 9, WAØBOK 7, KØFJT 7, WØHOP 6, KØKJP 6, WØYFR 6, WAØDFS 5, WØNOW 5, WAØAES 4, WØEGQ 4, WØFTW 4, KØHNT 4, WAØBBS 3, KØUWK 3, WØHYD 2, WAØJCI 2.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Robert J. O'Neil, W1FHP—SEC: W1EKJ. H.F. PAM: W1YBH. RM: K1GGG. Traffic Nets: CPN—Mon. through Sat. 3880 kc. at 1800, Sun. at 1000. CN—Daily at 1845 on 3640 kc. CECN—EC Net Sun. at 0900 on 3880 kc. W1QV has been elected as New England Division Director. Good luck. Your clubs will see him as soon as time permits him to get around. K1RTS, Waterbury, will be taking over duties as V.H.F. PAM on 144 Mc. Possibly a new frequency will be picked to help get more stations to check in and handle traffic. OO reports show little in the way of violations lately. CN reports Nov. traffic, 269 messages, average of 8.9 traffic per sessions, in 30 sessions. CPN met 28 times, with 109 messages and an average of 10 stations per meeting. High QNI: K1OQG/1, K1AQE, W1LUH, K1EIC, W1YBH, K1OJZ, SRF, LFW and K1UQQ. High QNI CN: W1ZFM, W1FQT, K1OQG/1, with band conditions reported poor to average and RTTY giving its share of trouble. Endorsements: W1YBH as OBS, K1VMI as OES. New appointments: K1YGS as OPS, K1RTS as V.H.F. PAM. In Oct. CN handled 607 messages, with an average of 11.7 stations per session. CPN handled 110 messages with an average of 14 stations. BPL certificates went to W1BGD and K1WKK for October traffic and to W1BGD again in November. K1LAW, Stratford, was appointed Class II Official Observer. A Very Happy New Year to all, and many thanks for your help in the past. Trust you will help your new SCM, K1GGG. Support your local net and the Connecticut Net of your choice whenever you can. Traffic: (Nov.) W1BGD 427, K1LFW 314, W1-

This is DEI's Solid State Receiver

It's new
Tunes in the range of 100 to 2300 mc
Superior performance characteristics
The TR-711 is virtually spurious free
Sets the standard for comparison



The TR-711 Receiver is modular in construction and can be supplied with a complete complement of plug-in modules including RF tuning units from 100 to 2300 mc, IF amplifiers with 10 kc to 3.3 mc bandwidths, AM, FM, and phase demodulators, and plug-in spectrum display unit, oscilloscope, predetection up and down converter, or high capture ratio discriminator. Any combination of plug-in modules can be utilized, thus providing unlimited receiving combinations adaptable to any known or projected telemetry system.

Characteristics and accessories are described in Bulletin TR-711.

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EFW 190, K1OQG/1 119, K1FQT 102, K1RQO 95, K1EIC 73, W1ZFM 64, W1BDI 61, W1YBH 61, K1GGG 60, W1CTI 53, K1EIR 50, K1WXN 46, W1QV 28, W1BNB/1 16, K1PLR 13, W1OBR 11, K1NTR 10, K1AQE 8, W1CHR 8, WA1BER 4. (Oct.) K1ZND 383, W1ZFM 185, W1OBR 37.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—*W1AOG, our SEC, received reports* from K1s PNB, QAM, DZG, W1s STX, LVK, W1JVZ is EC for Melrose. W1YSX is a new OO. Appointments endorsed: W1s AUQ, BB, K1RPA, W1FZJ as OOs; W1BB as EC; W1EUJ as OES. Ex-W1QOI, now WB6-BZR, writes and sends his 73. K1QAM says that Foxboro, Mansfield and Norton are all working together now. Congrats to our new New England Division Director, W1QV. W1PEX made the BPL again. The Framingham and Middlesex Clubs held auctions and K1IGI spoke at this club and Milton on NCX-5. K1OGA has a G-50 on a 60-ft. tower and a six-element beam. The Pi-Net meets on 51 Mc. Fri. W1YSX is on 10 and 75. W1BB held the annual "netfest" at his QTH. Guests were W1s AIT, MPP, PS, ALP, DWY, RM and AAT, who demonstrated some of his old antique gear, especially the spark gaps. WN1DDO, in the hospital, had a *rig on 2 to talk with his XYL. WN1DDR, K1TZC has* been appointed Whitman Club pres. K1WYS is home from Colorado and on 2 and 6. W1EUJ has many beams up at his QTH. The Cape Cod & Islands ARA held its annual meeting and banquet. W1HWK spoke and showed his pictures on "Antarctica," introduced by W1PRI. K1YSE gave a talk, "Living with Radiation," at the Townsend AREC group meeting. W1s ZBT and FRR gave a talk at the QRA. W1ZMJ/KP4 is on 14.25-Mc. s.s.b. Wed. at 6 P.M. from Santuice, P.R. The Winthrop group helped out on election night. The Wellesley and Yankee Clubs held meetings. W1VUO is the new Radio Officer for Salem. The Marblehead HSRC will be on the air soon. W1VUO is advisor. K1GNE now is in the Boston area. WA1BSY is on 10. The 6-Meter Crossband Net had 21 sessions, 341 QNIs, 49 traffic. W1UCT will be on RTTY. W1BGW is DXing on 40. *EM1OMN had 4 sessions 21 QNIs. W1AMO's* rig blew up. W1THT has color TV with no TVI. W1-ZQQ has been elected treas. of a hypnotic society. W1MME is doing a lot of flying. The Needham Emerg. Net held 5 sessions, 33 QNIs, 17 traffic and now on 51.750 Mc. W1s ALP and BIO visited W1AKN. Ed has a Drake receiver and an NCX-5. He handles the Cape Cod & Island certificate. W1EAE presented W1QJB with his award for writing an article for ARRL at a meeting of the Bedford Club. W1UKT is on 2 and 6. WB2LOU/1, Belmont, is on several bands. K4RNH is pres. of the M.I.T. Club. W1MX, and says it will sponsor a Mass. QSO Contest in the spring. The T-9 Club met at W1MNK's QTH. Ex-K1s KTK and NGI are back from Hawaii and now in Rome, N.Y. WA1DAG had a net certificate from NYSPT&EN. W1AYG is working W1BW in Conn. on 2 and 10 has an SB33-SSB *rig for the car.* K1PNB is busy with classes, net and code. WA1CRK has an ARC-5 for 160. W1ZLX will put on code practice on 2. W1QJF is on 10. K1LJN went around the world in 4 days for his company. W1QA has an NCX-3. W1FFT is on 10 late at night. WN1CCD is on 2 with a 522. K1MOO is a busy man these days. W1DOM has a Utica 650 and a Squalo for 6. EM2MN reports 22 sessions, 217 QNIs 150 traffic. Heard on 75: W1s RP, ATX, BNS, ABA, K1s AFF, VTH, WA1AZW. K1VTH is attending the Univ. of Mass. K1VPJ reports groundwave into W2/3-Land on 6. W1BVL is on 15-meter c.w. W1NS has moved to W. Palm Beach, Fla. WA1CEV is in the nets on 6. K1DZG has an s.s.b. adapter for his Valiant and is a member of the Red Cross Disaster Comm. W1ALP has had his call for 40 years. Traffic: (Nov.) W1PEX 1767, W1LES 256, WA1CRK 211, W1EMG 173, K1ESG 140, W1OFK 105, K1VPJ 68, W1ZSS 68, W1DOM 64, WA1DAG 57, W1AOG 52, K1GKA 40, W1ZLX 20, W1BJE 19, W1CTR 18, K1LCQ 18, W4YAC/1 14, WA1CEV 12, WA1CLR 12, K1CMS 12, WA1CRI 8, W1THT 7, W1AUQ 3, WN1-CDD 1. (Oct.) WA1CLR 12, W1AUQ 1.

MAINE—Acting SCM, Herbert A. Davis, K1DYG—SEC: K1DYG. PAMs: K1BXI, K1ZVN. RM: K1NAN. V.H.F. PAM: K1QIG. Traffic Nets: Sea Gull Net, 3940 kc. 1700 to 1800 and 2000 to 2100 local time Mon. to Sat. Pine Tree Net C.W., daily 1900 on 3596 kc. AREC Net, Sun. on 3940 kc. at 1900. Two-Meter Phone and Traffic Net, 145.88 Mc, Thurs. 1930 to 2030. C.D. Nets, Wed. on 3530 kc. at 1900 and 1100, Sun. on 3993 kc. The Southern Exposure seems to keep in touch very nice and skeds are being kept. Up in our great North county 10 meters is used a lot. Also the International Net meets Sun. at 0930 around 3900 kc. for the VE stations and those from the Aroostock County area. About 50 stations check into the 2-Meter Net and they are doing a nice job, also passing some traffic. In case some stations have the time, all nets are open to you

and all are welcome. There are a few more new stations on and we hope they find a place and have many hours of pleasure. It is nice to see some of the older hams active again and with time to help our nets and younger people. We sure need them any time they have the time. The best to all in the New Year. Traffic: K1WAN 107, K1TMK 66, K1DYG 17, K1LNE 12.

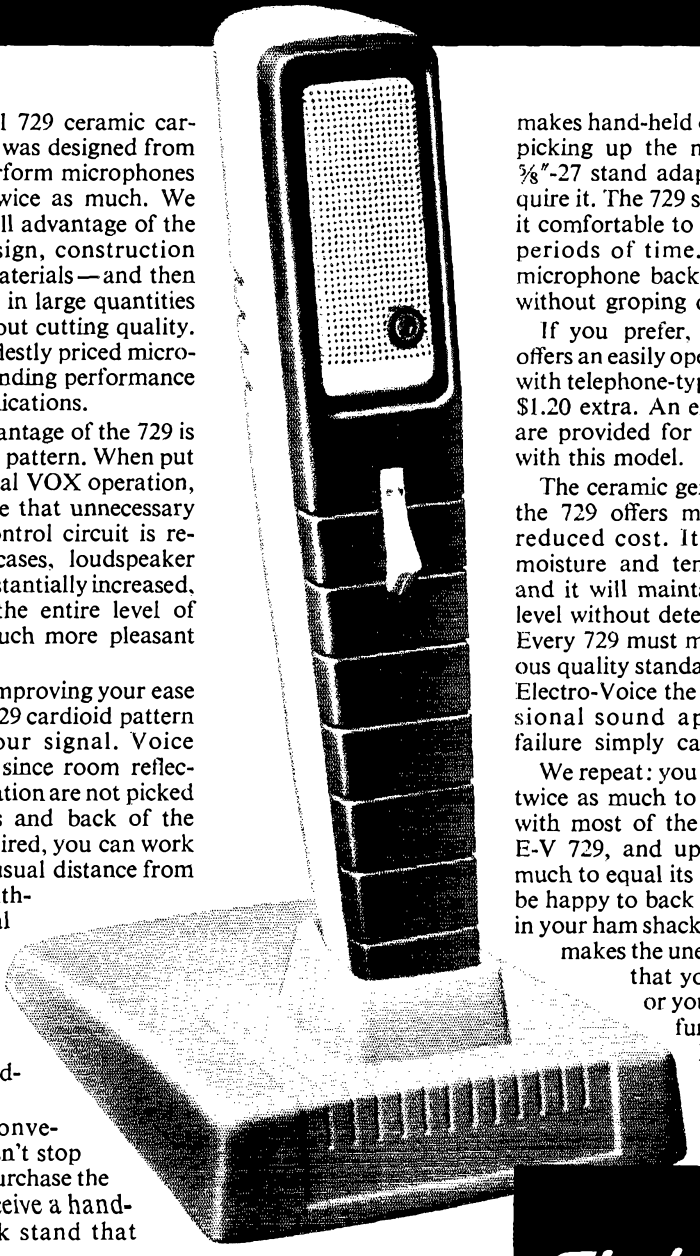
NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1SWX/K1DSA—SEC: W1ALE/W1TNO. PAM: K1APQ. RM: W1DYE. The Granite State Phone Net meets on 3842 kc. (alt. 3845) Mon. through Fri. at 2330Z and Sun. at 1430Z. VTNHN meets on 3520 kc. Mon. through Fri. at 2359Z. Endorsements: W1AIJ as ORS/OPS, W1EVN as ORS, W1YHI as OBS/OPS and K1HK as OO/ORS/OPS. K1APQ's GSPN had 394 stations and 31 traffic. W1CBB reports the new High-Tower works fine. K7APJ is chief op at W1ET. VTNHN reports 84 stations and 38 traffic. Welcome to new hams WA1DCA, WA1DCN, WA1DDH, WN1DEB, WA1DEI, WN1DEW and WA1DFM. W1TFS was active in the RTTY Sweepstakes. W1SWX is finally on the air with s.s.b., a new HW-12. K1AEG has a new SB-300 receiver. W1BXM is experimenting with planar triodes on 144 and 220 Mc. NH QSO Party logs still are being compiled. W1RCC and W1SWX are back in N.H. after being out of the state working. K1VLX has a new 40-meter beam up and reports excellent results. GSPN is having trouble with ship station interference. W1DYE would like more stations to check into VTNHN. W1EVN represented rare Cheshire County in the N.H. QSO Party. Hope to meet many of you at Swampscott this year. Traffic: W1DYE 65, K1BGI 43, K1HK 7, W1EVN 5, W1ET 4, W1SWX 2, K1AEG 1.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: W1YNE. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. New appointment. K1TVO as EC. Endorsements: K1HZN and K1JGF as ECs. RISPN reports 30 sessions, 657 QNI, 150 traffic. RIN reports 20 sessions, 121 QNI, 105 traffic. The NCRC of Newport announced the following committee appointments. Audit Committee: K1YQP, K1PTV and W1TXL. Christmas Party Committee: W1WLG, K1YQP and WA1CSO. Communications Committee: W1JFF, K1VQO, WA1ACP, WA1AUL, W1IAG, WA1AQZ, a former member of the club, wrote saying he has joined the Tri City Club of New London, Conn. Recently the members of the W1AQ Club of Rumford toured the Corning Glass Works in Central Falls, R.I. Members were K1s CZB, CZD, AMG, LXQ, SYM, AGA, PEL, LII, W1s LFW and WAC. K1s CZB and CZD, employees of the Glass Works, conducted the tour. W1YKQ has built a neon keyer for his c.w. rig. W1YNE has worked YV5BIG, LU8BAJ, HK3RQ and VP2KJ with the tribander on his new tower. K1TPK lost his tower during a recent wind storm. Traffic: W1TXL 309, W1YNE 251, W1BTV 181, K1TPK 179, W1YKQ 86, K1YVN 44, K1VYC 43, K1NJT 42, K1USD 42, W1VWR 33, K1YYI 33, K1BRJ 19.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: W1BYH/K1APR. C.W. RM: K1IJV. 75-Meter PAM: K1RYT. Hampden County 10-Meter Traffic Net Manager: K1PKZ. The only report on any of our organized activities (as usual) is from our C.W. Route Manager W1IJV. She reports that WMN handled 108 messages during November with the following stations reporting in (listed in order of activity): W1DVW, K1IJV, K1VPN, K1YMS, K1WZY, W1BVR, W1QKX, K1LBB, W1AMI, W1ZPB, W1YK, K1ZBN; W1ZEL, W1UYY, W1DWA, W1MNG and W1LLN. W1ZPB is putting up a new antenna system. K1LNC has a new quad. The speaker at the Berkshire County Amateur Radio Association was N. Steven Hubbard, ex-VQ4NSH. K1ZHJ has a new electronic keyer. K1SBW is having great luck working 6 meters from Mt. Greylock. K1AHJ, K1VPS and W1FKN are active in the Washington, Mass., Civil Defense Net. W1KQK has been building some equipment for the local Boy Scouts. WA1CRL is active on 6. W1GTO now has 64 countries confirmed. W1UUK has 215/227. K1CTK, of National Radio Company, spoke on the new NCX-5 and HRO-500 at the meeting of the Hampden County Radio Assn. At the same association W1NY was honored for his 50 years in ham radio. Our congrats too, Hank.—SCM. It is with the deepest regret that we must report the passing of one of our best-known West. Mass. hams, W1VBG. He is missed! Traffic: (Nov.) K1IJV 126, W1BVR 117, K1LNC 69, K1LBB 54, K1VPN 48, W1DVW 15, W1MNG 3, W1ZPB 1. (Oct.) K1IJV 168.

VERMONT—SCM, E. Reginald Murray, K1MPN—SEC: W1VSA. RM: W1WFZ The Green Mt. Net meets on 3855 kc. daily at 2230Z; Vt. Fone Net on 3855 kc. Sun. at 1400Z; VTNH Net on 3520 kc. Mon. through Fri. at 1830Z. (Note the new time effective since Dec. 2 because of band conditions); Vt. C.D. RACES Net on 3993 kc. (a.m.) Sun. at 1500Z. K1BQB made the BPL again. Welcome to new Novice WN1DAN in Randolph. We miss W1IZS, who is wintering in Florida as W4SCY.

Unless you pay $30.00 or more, you can't buy a microphone as good as the E-V 729...for only $14.70*!



The E-V Model 729 ceramic cardioid microphone was designed from the start to outperform microphones selling for over twice as much. We did it by taking full advantage of the most modern design, construction techniques, and materials—and then producing the 729 in large quantities that cut cost without cutting quality. The result is a modestly priced microphone with outstanding performance for voice communications.

The biggest advantage of the 729 is its cardioid pickup pattern. When put to the test of critical VOX operation, you'll quickly note that unnecessary tripping of the control circuit is reduced. In most cases, loudspeaker volume can be substantially increased, as well, making the entire level of your operation much more pleasant and effective.

But more than improving your ease of operation, the 729 cardioid pattern also improves your signal. Voice quality is crisper, since room reflections and reverberation are not picked up from the sides and back of the microphone. If desired, you can work at up to twice the usual distance from the microphone without losing essential audio clarity. This working flexibility simply cannot be matched by an omnidirectional microphone, regardless of price.

And the 729 convenience story doesn't stop there. When you purchase the Model 729 you receive a handsome slip-in desk stand that makes hand-held operation as easy as picking up the microphone, plus a ⅝"-27 stand adapter should you require it. The 729 shape and size make it comfortable to hold, even for long periods of time. And putting the microphone back in its base is done without groping or fumbling.

If you prefer, the Model 729SR offers an easily operated rocker switch with telephone-type contacts for only $1.20 extra. An extra set of contacts are provided for controlling a relay with this model.

The ceramic generating element of the 729 offers many advantages at reduced cost. It is impervious to moisture and temperature changes, and it will maintain its high output level without deterioration for years. Every 729 must meet the same rigorous quality standards that have made Electro-Voice the standard in professional sound applications where failure simply cannot be tolerated.

We repeat: you have to pay at least twice as much to find a microphone with most of the advantages of the E-V 729, and up to three times as much to equal its performance. We'll be happy to back up our claims right in your ham shack. For Electro-Voice makes the unequivocal guarantee that you must be satisfied or your money will be refunded. Write for free E-V catalog and list of the E-V distributor nearest you.

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VERMONT QSO PARTY

February 20-21, 1965

All amateurs are invited to participate in the Vermont QSO Party, sponsored by the Central Vermont Amateur Radio Club, K1YMZ. Vermonters are urged to work as many out-of-state stations as possible so that those interested can earn credit toward WAS, WANE, W-VT and USA-CA awards.

Rules: 1) Time, the 28-hour period from 2300 GMT Feb. 20 to 0300 GMT Feb. 22. 2) No power restrictions, all bands can be used and contact credit with the same station on different bands will be given. 3) Vermont stations score 1 point per contact and multiply by the number of ARRL sections and foreign countries worked. Outside stations score 3 points per Vermont station and multiply by the number of Vermont counties worked. 4) Certificates will be awarded to the highest scoring station in each ARRL section, plus a trophy to the highest scoring station outside Vermont. A trophy will also be awarded to the top Vermont scorer, with 2nd, 3rd and 4th place station receiving a gold-trimmed certificate. A special certificate to multioperator groups. 5) Suggested frequencies: 3520 3855 7030 7250 14.100 14,250 21,050 21,300 28,100 28,600 50,250 50.360 144-144.5 and 145.8. 6) Vermont stations send number of QSO, report and county. Others send QSO number, report and section. 7) General call to be used "CQ VT" on c.w. and "Calling any Vermont station" on phone. 8) Logs should be postmarked no later than March 31 and sent to the CVARC, c/o Ann L. Chandler W1OAK, RFD #2, Barre, Vermont. 9) the W-VT (Worked Vermont) certificate will be awarded to stations working 13 out of 14 Vt. counties, provided the station has not previously been issued the award. Party logs showing required data will be accepted in lieu of QSLs. Vermont stations are urged to be active and QSL promptly.

The CVARC is sponsoring another Vt. QSO Party Feb. 20-21 and asks that all Vermont hams be as active as possible during that week end. The chief complaint is "not enough Vermonters to handle the demand." The Catamount (Bennington) Radio Club now is a full-fledged affiliate with ARRL. The VTNH Net is being capably handled by K1UZG while our RM W1WFZ is busy with studies. The VTNH Net had 84 check-ins for Nov. Don't forget the Vt. QSO Feb. 20-21. Mark your calendar now. Traffic: K1BQB 680, K1UZG 27, K1RMG 20, K1IJJ 9, W1KJG 7, K1LLJ 6, K1MPN 5.

NORTHWESTERN DIVISION

IDAHO—SCM, Raymond V. Evans, K7HLR—The Eagle Rock Radio Club continues to be the only group sending in news for the SCM. K7KBY/9 is now editor of the Argonne Amateur Radio Club *Newsletter*. W7DQU, W7DMP and K7NUP soon will be on with homebrew kw. rigs. W7DMP, K7DZA, K7ZPQ, K7UAE, W7DZH, K7ZPQ and K7PGG all had a helping hand in turning in a real fine Sweepstake club score for the Idaho Falls gang. Also heard were K7CPC and W7GCL. There's nothing like the SS to find out how both the operator and the equipment stack up. The FARM Net was practically washed out during November. Perhaps a little more versatility such as band and/or time would be in order. Most NTS traffic is flowing as usual, but at the section level most traffic has to be mailed or passed by special sked. Traffic: K7HLR 112, W7EMT 16, K7OAB 2.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7KUH. L.F. PAM: W7YHS. V.H.F. PAM: W7TYN. Montana S.S.B. Net Mon. through Fri. on 3910 kc. at 0100 GMT, Missoula Area Emergency Net (AREC) on 3895 kc. Sun. at 1600 GMT. Montana PON Sun. on 3885 kc. at 1530 GMT. W7EGN sends us word of activity on 2 in the Missoula-Whitefish area. W7EGN and W7CJB made a contact at 6.30 P.M. via a signal bounce off of one of the Glacier Park peaks. The Anaconda gang sends word of its 2-meter repeater which is now on the air. The work-in frequency is 145.350 Mc. and the work-out repeat channel is 147.000 Mc. K7JBW won a $500 scholarship in the national 4-H competition. WN7AJR and K7RGI are members of the famous 46th Air Force Band of Bozeman, which recently won the National Guard Marksmanship Trophy, quite a feat for

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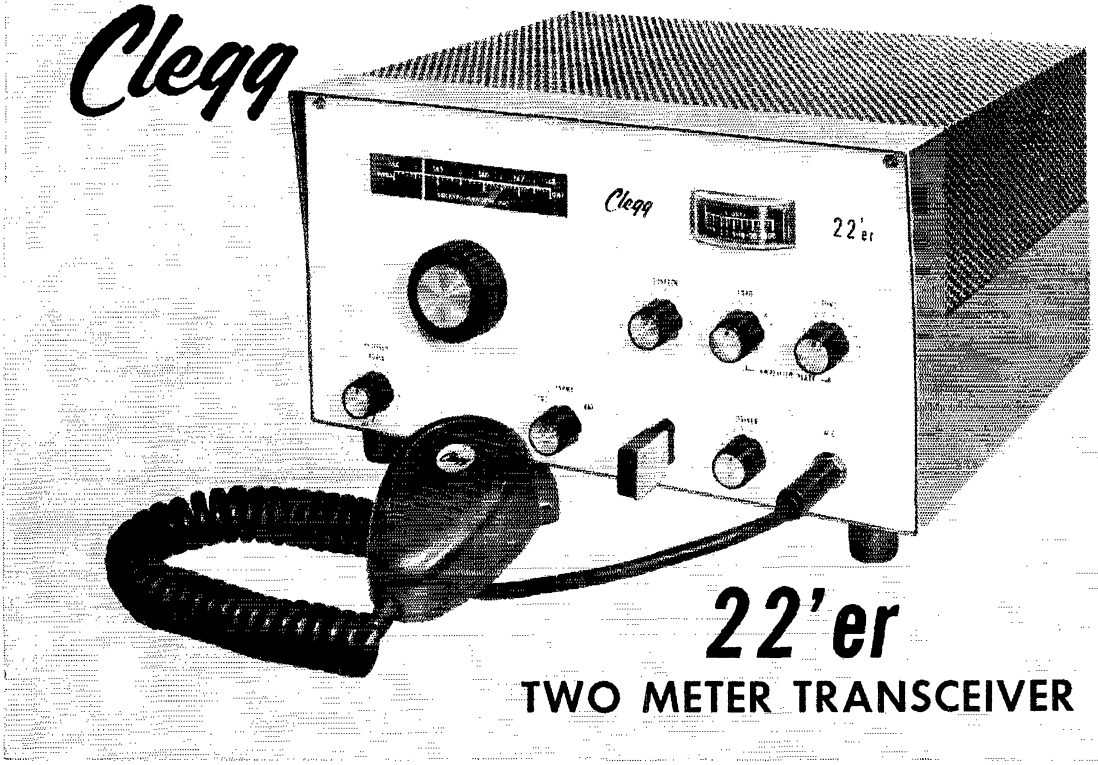

22'er

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6CW4	RF Amplifier	12AX7	AF Amplifier
6KE8	Tripler/1st Mixer	6AQ5	Rec. Audio/ Modulator
6EJ7	2nd Mixer		
6BA6	10.7 MC IF Amplifier	6AQ5	Modulator
		6KE8	VLO/Buffer
6BE6	3rd Mixer	6KE8	OSC/Tripler
6BA6	456 KC Amplifier	12BY7	72 MC Amplifier.
6AL5	Diode Detector/ Noise Limiter	12BY7	Doubler
		2E26	Power Amplifier

Other S-S Products: SS-1R HF receiver, SS-1S Noise Silencer, SS-1V Bandscanner; Venus, Thor VI, and 99'er Transceivers; Interceptor B VHF Receiver; Allbander HF Converter; Zeus Transmitter; Apollo Linear Amplifier

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a *band* unit. W7NML has the new Heathkit line on the air. The Butte Amateur Radio Club took part in the SS Contest as a club group and did real well. W7QCY and W7FLB said that it was just a practice run for the coming Field Day this June. W7TUO is on s.s.b. with a Swan 400. The Great Falls Club holds its weekly 75-meter hidden transmitter hunt even in the cold weather. W7FLB is back on 20-meter c.w. and renewing some of his old DX friendships. W7FL made a visit to Butte during November to see some of his long time friends. Traffic: K7SVR 71, K7EWZ 36, K7UPH 15, W7NPV 8, K7YNZ 5.

OREGON—SCM, Everett H. France, W7AJN—RM: W7ZFH. Net reports: K7IWD, net manager, reports OSN sessions 19, attendance 96-high 9, traffic 49-high 12, average 2.52. BRAT awards to W7ZFH, K7IWD, K7SGX. The ARRL Net Directory indicates that only 2 nets in Oregon are registered. They are the Oregon State Net (OSN) and the Oregon Post Office Net (PON). The Affiliated Council of Amateur Radio Clubs, Inc., held its regular meeting Nov. 18. Clubs represented were W7ZLC for Portland Amateur Radio Club, W7UVW for Tektronix Employees Radio Club, W7WWG for R.T.T.Y. Club, K7SUQ for Clark County Amateur Radio Club of Vancouver, Wash., W7MA for Lower Columbia-Willamette Valley, etc., W7NGW for AREC-Portland Area. W7DEM reports the Grants Pass hams, using 75- and 2-meter mobiles, assisted the local newspaper in collecting election returns and 21 outlying precincts were handled. Traffic: K7IWD 182, W7ZB 176, K7KBK 80, W7ZFH 69.

WASHINGTON—SCM, Robert B. Thurston, W7PGY Asst. SCM/SEC: Everett E. Young, W7HMQ. RM: W7AIB. PAM: W7LFA. The SCM and SEC visited the Mount Baker Amateur Radio Club in Bellingham, where twenty-five members were on hand for the discussion on the merger of the AREC and the NTS, along with the twelve major items achieved by the League. W7SFF hoisted his beam to the 70-ft. level. The Washington State Net (WSN) has moved to 1700 PST for starting time during the winter skip. WN7AUP, of Everett, is awaiting his General Class license. W7DQM is back from a trip to the East Coast. Bob, ex-G2BYA, received his U.S. call, WA7BSQ. He lives in Bellevue and is active on 20 meters. W7PSX recently lost his house in a fire and then wrecked his means of transportation the following day. The LCARA held a holiday party at the Odd Fellows Hall Dec. 12. W7AJV soon will be active on the phone bands again, thanks to W6BVY who found him a modulation transformer, and W7WCW and K7MGA, who delivered same to his doorstep. The NTN had 26 sessions with 1101 QNIs and 850 QTCs in November. The Puget Sound AREC Net check-ins are coming up as the winter season progresses. Net time is 2000 each Mon. W7BTB is checking in with the Inland Empire Net on 1995 kc. Wed. and Sun. at 0300Z. W7AIB reports that very special lodge work kept him so QRL that net QNIs suffered. He has a new 50-ft. steel tower supporting an inverted "V" antenna. K7MGA reports he has his Swan 240 working FB on 75 and 40. W7JEY went to Arizona for the holidays. K7CHH says he has his kw. working FB now and transmits Bulletins also on Sun. from 1845 to 1900 PST on 3600 kc. K7JRE was home for a Turkey Day feed from college and did a little operating on 80. W7EJD acts as NCS on the 2-meter Airforce MARS RTTY Net. W7FNA is net manager. W7HRC and his XYL made a vacation trip to Salt Lake City and San Mateo, Calif. While in San Mateo they took in the NCARTS dinner. Harold is an honorary member of the Northern California Amateur Radio Teltype Society. W7BA and his XYL and son took off for Hawaii for some sunshine and golf. The Lewis County Amateur Radio Club had an old-timers night with a good turnout and plenty of chow and door prizes. K7ATJ has a big five-element Telrex beam and only needs a tower to get operational on 20 meters. Traffic: K7JHA 931, W7BA 806, W7NPK 549, K7TCY 174, K7CTP 163, W7APS 134, K7IAE 92, W7BTB 75, W7AIB 23, K7RSD 22, W7AMC 19, K7MGA 16, W7GYC 13, W7JEY 5, K7JRE 4, K7CHH 2.

PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—The Central Contra Costa area is getting to be quite well covered on NCN with 4 fairly regular QNIs, WA6FBS, W6IPW, WA6MIE and K6LRN. Ex-W6KUN gave a talk at the MDARC on Cable TV systems. K6LRN operated in the SS, blew up the power supply in the Phone SS and just plain blew up in the C.W. SS. I think you need more than 35 watts to make out. Alameda County-Oakland-Berkeley area: WB6ILH is trying to get a vertical up for 80 meters. WA6PTU relayed a call to the CHP for WA6NWR OO. K6GK reports that some

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people are having trouble finding the low edge of the 40-meter band. WA6PUF assembled the Ham-Scan and WA6WNG is assembling a Heath Marauder for the Berkeley High School station. WA6VRF, WA6CVB is operating his S/Line on c.w. WA6WNG is liaison to RN6 from NCN on Sat. and finally got a QSL from New Hampshire to bring WAS total up. Hayward-San Leandro: WB6HET won the Cheyenne and P.S. at HRC. WB6CBA has a Waters dummy load. K6MHD is home after 5 months back east. WB6HXB just welcomed his fifth harmonic. W6IIF and WB6CUA were photoed in the *Oakland Tribune*. Livermore-Lark was first in 13A last FD. WA6KLL went through 4 rigs during the SS, the last one giving up 2 minutes before the end of the contest. Solano County: The North Bay Amateur Radio Assn is now incorporated. The club call is W6HTB. WA6PYP has his 1st class commercial ticket. W6JDO is waiting for the O.K. to operate from KG1-Land. W6WAH is assembling some heath gear. His daughter, WA6IEC, will be moving to Hawaii, with her new husband. W6OJW is rebuilding the rig. Let's hear from Fremont, Napa and Northern Solano Counties. Don't forget NCN at 0300Z daily on 3635 kc. V.h.f.ers might try SCVSN. Although this is the Santa Clara Valley Section Net, I am sure they would welcome QNIs from other areas. It meets at 8 P.M. on 146.7 Mc. nightly. These are the only NTS nets in Northern Calif. NTS nets have certain advantages over non-NTS affiliates. I am sure most of you are aware of them. Try a net, learn how to QSP a message. You may get hooked. QSO WA6WNG or K6LRN for more details. Traffic: K6GK 125, WA6WNG 62. K6TFT 58, W6IPW 42, K6LRN 36, WA6FBS 15, WA6PTU 10.

HAWAII—SCM, Lee R. Wical, KH6BZF—Asst. SCM/SEC: Ernie J. Kurlansky, KH6CCL. RM: KH6EWD. Acting PAM: KH6ATS. KH6BVS was observed placing his new antenna up recently. KH6NT has joined the ranks of a fellow AFCEA member. KH6DQ, our KH6-Land QSL Mgr. has been having a taste of high-power DXing. He's using a HT-32B, GSB 201 and his same reliable 75A-3 and TA-33. Johnnie says that QSL cards are regularly dispatched to all active local DXers who have their s.a.s.e. on file with him. Don't forget to file your s.a.s.e. with KH6DQ, P.O. Box 101, Aiea, Hawaii 96701. During my short stay in KG6-Land I had the pleasure of meeting Lt. Col. Willoughby and Maj. Bottari, both of whom are very enthusiastic hams and MARS members. They have set up quite a typhoon network on Guam. Many of the fellows use the 6-meter transceivers to communicate with their command station. Traffic: (Nov.) KG6ATS 16. KH6BZF 2. (Oct.) KH6ATS 14.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W7JU/K7JU. W7PC has a new SB-33. A new two-letter call is W7AM. A new amateur in Tenopah is K4FUM/7. A new Amateur in Las Vegas is K7OLP/7. The LVRAC's new officers are K7TNY, pres.; K7RBM, vice-pres.; W7FJN, secy.; W7ANW, treas. W7FTJ gave an interesting color slide program of his adventures and hamming in Ethiopia to the NARA. A new husband-and-wife team is WN7BSF and WN7BSE. Communications for the Nevada Admission Day Parade in Carson City were provided by W7AAZ, W7LHQ, W7PC, W7-SRM, K7MXM, K7NXF, K7QOP, K7QTX, K7TJV, K7UHC, K7ZKD and K7ZRR. K7GAG has a new 2-meter Sidewinder. K7DLP and K7KLO are operating /7 in Las Vegas on 6 meters. K7RKH and K7ZOK made contact on 2-meter RTTY. W7PBV and WA7BEU are on 2-meter RTTY. WA7ARZ is building a new ham shack. WA7BAV is working DX on 40 meters including KC4USB. WN7AVE is on 2 meters from Henderson. W7FJN is active on 20-meter RTTY. ARRL Forms I are being mailed to amateurs in various parts of the state in the hope of securing Nevada section news. Traffic: (Nov.) W4CJD/7 47, W7SHY 15, W7JU 12, K7-VHG 8, K7TNY 6, W7PBV 4. (Oct.) K7FER 365.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC: W6KZF. New officers of the HAMS Club in San Francisco are W6GGC, pres.; W6LVG, vice-pres.; WA6SAV, secy.; and W6GHI, treas. Joe Ouellette, at the Hamilton AFB MARS Station, retired at the end of December and returned to his home call of W1ZQI in Mass. W6YKS, in Fortuna, made the BPL in Aug. and Nov. The Marin Radio Club held its Christmas Dinner in Fairfax and 72 turned out for the event. WA6AUD was awarded a plaque as the "Marin Ham of the Year." WA6AHF is the new president of the Central California Radio Council. The San Francisco Radio Club held its Christmas Dinner at Caesars in San Francisco Dec. 12. New officers of the San Francisco Club are W6CTH, pres.; W6BIP, vice-pres.; W6HSA, secy.; and W6FAX, treas. W6FDU is back from the Army and is enrolled at the University of California at Berkeley. WA6RXM, top QO in the 6th call area, has moved to Marin and

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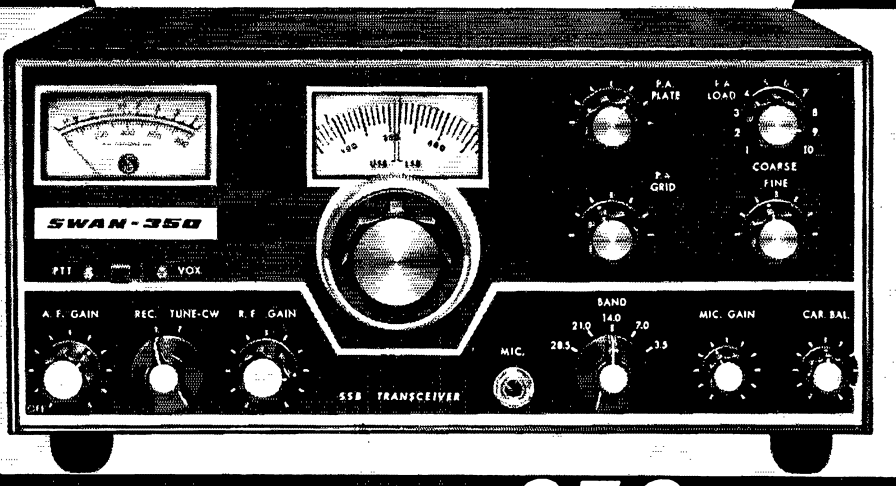

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is operating from the new QTH at San Quentin. WA6NDZ is working on a new operating console from an old telephone switchboard. Several new Novice calls are being heard. WN6LGM and WN6LMT are young YLs in Marin County. Sonoma County ECs had a busy time when forest fires swept across the county for a week this fall. Sonoma County EC WA6DQZ supplied 2-meter communications with her emergency organization. W6OPL put up a 60-ft. crank-up tower and says he's going to get those last twelve for DXCC. Wes and Edy Loudon are a new OM/XYL team on the Novice bands. Wes seems to be bound for WAS before he gets his General Class license. W6BWV, in Humboldt County, has converted his TBW and has it going. WA6SQP is active on 6 in Eureka. W6CYV, in McKinleyville, has a big 20-meter beam on an 80-ft. tower. K6TMY, at Ferndale, is back from the Army. Traffic: (Nov.) W6YKS 601, W6FZE 9. (Aug.) W6YKS 528.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—It is with deep regret that I must report that W6HYR has joined the long list of Silent Keys. Irwin was my social science teacher at Jr. High School, and was very instrumental in my getting my ham ticket. He drove me down to the visiting FCC examiner when I was 14 years old and we both took our examinations. He passed both the code and theory, but I passed only the code test, and missed the theory by 2 points. He was very helpful in teaching me the theory that I needed. WA6YDT has a GG-811 amplifier. WA6OGG is in Merced. WB6IFS is mobile on 6 meters. WB6DYS is heard on 6 meters. WB6GJG is building a GG-811 final. K6MPM is in Clovis and is checking into the NCN with WB6HVA. K6VWF has a Swan mobile on 40-meter s.s.b. K6QOK is going strong on 40-meter c.w. W6JPS has an HE-45 on 6-meter mobile. W6ARE reports that some of the members of the Porterville Radio Club are obtaining f.m. 2-meter gear. WB6HOT was a recent visitor in Fresno and is active in the NCN. W6QFR has ordered some test equipment the better to enable him to chase troubles. W6SMS is cleaning out his shack. W6IUX sent his gear back to the factory and it is now resting on the shelf. W6ADB reports that skip conditions make traffic skeds hard to keep. W6KTW was active in the SS Contest. Traffic: (Nov.) W6ADB 149. WB6HVA 63. (Oct.) WB6HVA 38. WB6FYH 13.

SANTA CLARA VALLEY—SCM, Jean A. Gimelin, W6ZRJ—Asst. SCM: Edward Turner, W6NVO. SEC: WA6HVN. RM: W6QMO. V.H.F. PAM: WA6RXB. The Santa Clara Valley Section Net again is active on 146.7 Mc. with WA6RXD as Net Control. During Nov. there were 6 sessions, 14 check-ins and traffic of 3. All stations in the section are invited to check into the net, which meets at 8 P.M. PST Mon. through Fri. W6QMO reports that the NCARTS held a highly successful luncheon Sun., Nov. 22 in San Mateo. Seventy-one members attended with W6HEK as guest speaker. WB6FHH is active on NCN and working DX. Tom racked up 5A1TW and took part in the Sweepstakes. W7NQF 6, at Moffet Field, reports that ZL2TAM and ZL2AS, members of the RNZAF, are on temporary duty and interested in contacts with the Wellington, N.Z., area. W6JNK leads the BPL list with activity on NCN and RTTY. W6RSY spent four days at Lake Tahoe. K6DYX and K6GZ are now running a high-speed traffic sked for MARS refile. W6DEF had receiver trouble. Hal reports that WA6YSY is now the papa of a baby boy. WB6IIX and WA6VVV worked portable in Phoenix, Ariz., Nov. 13 from the Arizona State Fair on 2 meters. The Palo Alto Amateur Radio Association's communications trailer is in the process of being built. New officers of the PAARA are W6UOK, pres.; W6PEQ, vice-pres.; Althea Honey, secy.; WB6CKQ, treas.; WA6QGX, W6HHN, K6PDI and W6DEF, board members. K6OTR, the Red Cross Station for Sequoia Chapter, has sent messages to selected members of the Red Cross Amateur Operator list with low results thus far. W6AUC is active as OO and is handling a weekly schedule to KA2GE in Tokyo on c.w. W6QMO is busy working on recruiting for NCN and ORS. WA6YSY is active on Navy MARS. EC W6PJW reports activity for the San Mateo AREC. K6EQE is active on MTN. K6YKG is QRL with business but QNI NCN when possible. K6MTX is building new gear for RTTY. K6UXV, in Santa Cruz, sports a new Ham Scanner. The Santa Cruz Radio Club held a Christmas Dinner in early December. The Monterey Bay Radio Club November Dinner was a success with W6HC, Division Director, attending. The Santa Clara County Amateur Radio Association is working on the new equipment at W6UW. Traffic: W6JXK 569, W6RSY 505, W6YBV 256, K6DYX 130, K6GZ 106, W6AIT 70, W6DEF 59, W6AUC 28, W6QMO 24, W6ZRJ 16, W6RFF 13, WA6YSY 1.

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NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK. RM: WA4FJM. PAM: W4AJT. V.H.F. PAM: W4HJZ. K4GNX says his son completed USMC communications training in California. K4GPL can now run a full gallon on 2 meters, c.w., a.m. and s.s.b. It's wedding bells and a new QTH to start the new year for K4IEX. W4SEO is the new net manager of CCEN, appointed by W4BAW, who had to resign because of ill health after several months of hospitalization and surgery. WA4FJM has moved to a new QTH. Now he can rotate his 2-meter beam, maybe. WA4JCS has moved from Technician to General class. W4BZL says the Triangle ARC meets the first Thurs. in each month at Chemstrand, in Research Triangle Park. W4VSJ reports that Hertford County AREC furnished communications for the Polio Immunization Plan. WA4JT reports a 2-meter net on 145.350 Mc. Sun. in the Greensboro area. The Triangle Net meets on 50.550 Mc. at 0200Z and on 144.260 Mc. at 2330Z each Thurs. After attending a Carolina V.H.F. Society meeting, W4EVN says it looks like a 2-meter state net is coming closer to reality. Net traffic: NCN (E) 217, SSBN 128, NCN (L) 81, THEN 50. Traffic: (Nov.) WA4PDS 319, W4EVN 231, W4LWZ 206, W4IRE 146, W4HJZ 120, W4BNU 93, WA4-RVF 82, WA4FJM 68, WA4LWE 66, WA4ANH 41, K4EO 19, W4COJ 14, W4AJT 10, K4GNX 9, K4QWQ 8, K4IEX 7. (Oct.) W4AJT 15.

SOUTH CAROLINA—SCM, Charles H. Wright, W4-PED—SEC: K4IJK. RM: K4LND. PAM (a.m.) K4-OCC. PAM: (s.s.b.) K4LNJ. Nets: C.W., 3795 kc. at 0000Z and 0300Z, A.M., 3820 kc. at 0000Z, daily and 3930 kc. at 1330Z and 2030Z Sun.; S.S.B., 3915 kc. at 0000Z. The first issue of the new *South Carolina Amateur News* (SCAN) was mailed to all League members in the section early in December. A regular monthly publication schedule is planned. The Charleston club held a "Triple Observance" meeting in December, observing the ARRL 50th anniversary, the commemorative stamp issuance and the club's annual special get-together. WA4ECJ is doing a fine job with "Carolina Classroom," a code course for prospective hams and those who want to brush up on their c.w. it may be such a success that the S.S.B. Net, which is sponsoring the course, will be deserted in the rush for 3795 kc. and the SCN! Helped by the long skip, ex-S.C. hams K4VVE/7 checked into SCN from Arizona and WA4-EPB/Ø from Iowa on the same night. Net traffic: c.w. 109, a.m. 33, s.s.b. 264. Traffic: WA4PFQ 216, K4LND 134, W4AKC 93, W4WQM 78, K4LNJ 69, K4OCU 53, W4PED 37, K4BAH 31, WA4UYY 19, W4YOH 16, W4-NTO 12, WA4JHD 9, WA4LPV 8, W4JA 5.

VIRGINIA—SCM, Robert L. Follmar, W4QDY—Asst. SCM and SEC: H. J. Hopkins, W4SHJ. PAM: W4DKP. RMs: W4ZM, WA4EUL, W4SHJ, W4QDY. Net Managers: W4OKN, W5VZO/4, K4DOR, W4ZM, WA4-EUL. New ORSs: W4MK Richmond, K4GRZ Cambria, K4VDL Alexandria. OES: W2ZUN/4. ECs: WA4HTI Covington, WA4EHM Staunton. OOs: W4IF Portsmouth, W4YZC Centreville. EC K4GRZ says he is working hard at establishing the Blue Ridge Emergency Net (BREN). W4MK is out of the hospital after an operation. W4PTR reports that contests are rough on family life—ran both c.w. and phone in the CQ DX and SS rat races. W4RHA spent Thanksgiving in N.Y. Richmond Contester W4JUJ was away a great deal but managed to catch the *Phone SS* for a few hours. The long skip these days is playing havoc with all of our nets and the VSBN is no exception, according to Mgr. W4OKN. W4WBC thinks that he has turned into a phone man. Oh me. K4ASU, though out of the Navy, still is standing around-the-clock watches. Hi. WA4-HQW moved to a new college dorm—no space for an antenna, so is off the air. Iron man, W4DLA may remain in the Virginia section. WA4EUL reports that the VBARC had fine scores in both the a.m. and c.w. Contests. W4NYX is burning the midnight oil gaining proficiency on the bug. The Alexandria Radio Club Station, W4HFH, ran up the impressive traffic count of 138 with SET messages! W4JXD has a new receiver, a 75S. VN Mgr. W4ZM worked the ARRL SS Phone and C.W. and CQ WW DX contests and lost a lot of sleep. W4SZT reports that he again is back in the Va. area. W4OID says there now are 6 Novices in his town. Traffic: (Nov.) W4RHA 214, WA4EUL 193, W4DVT 179, W4HFH 138, K4ITV 108, W4OKN 80, W4DKP 67, W4ZM 66, W4DLA 62, K4LJK 59, K4GRZ 58, W5VZO/4 50, W4MXU 49, K4SCL 48, K4FSS 41, W4BZE 31, K4ASU 26, W4SHJ 21, W4NYX 20, W4JUJ 18, WA4JRY 17, W4ZAU 15, K4MXF 14, W4TE 13, WA4KVR 12, W4PTR 12, W4MK 10, W4QDY 10, WA4JGA 8, W4JXD 8, K4-SDS 8, WA4HQW 6, W4KX 6, W4WBC 4, K4NOV 1.

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(Oct.) W4NLC 127, W5VZO/4 92, K4LJK 87, W4ZMT 59, W4OID 6, W4WRG 3. (Sept.) K4ITV 47, WA4JGA 26, W4BZE 12. (Aug.) K4ITV 77, W4SHJ 69, W4BZE 22, W4KX 3.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM —SEC: W8SSA. PAM: K8CHW. RM: W8LMF. S.S.B. Net Mgr.: W8EEO. Nets operate on 3570, 3890, 3903 and 3905 kc. I regret to report the passing of one of West Virginia's "ole timers," W8UNS, of Bethany. Newly-elected officers of the Kanawha ARC are WA8-AIN, pres.; WA8ICZ, vice-pres.; WA8FLF, secy.; WA-8APZ, treas.; WA8HBH act. mgr. Dave Vest, the new RM for W. Va., reports for WVN (c.w.) 16 sessions, 56 stations and 19 messages. W8CKX and WA8FIC want more c.w. operators. The State Radio Council Field Day Award goes to the Kanawha Amateur Radio Club. The plaque will be presented at the State Radio Convention in July. Officers for the State Radio Convention for '65 are W8JM, pres.; K8BIT, vice-pres.; W8DUV, secy.; W8SSA, treas. WA8CPY reports that W8IYD, K8BCJ, WA8FCZ, K8HQS and W8YFX are on 29.6 Mc. using f.m. K8CHW reports for WVN (phone) 19 sessions, 325 stations and 44 messages. For WVPON, K8-TPF reports 19 sessions, 280 stations and 158 messages. Those renewing ORS appointments are WA8CPY, W8-CKX and W8DUV. WA8NTL and WA8IHZ are new Generals in Fairmont. Traffic: WA8FIC 157, K8TPF 141, WA8KUW 41, W8CKX 23, K8CHW 19, W8HZA 13, W8LMF 9, K8WWW 5, K8ZDV 5, WA8DAU 3, K8WMQ 2, WA8ALI 1, K8CFT 1, W8HZH 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crumpton, KØ-TTB—SEC: WØSIN. WØHXB, TWN mgr. KØFDH. Phone Mgr. Plans have been started for the Annual South Fork Hamboree to be held June 4, 5 and 6, 1965, at South Fork, Colo. KØKUP is secretary of the sponsoring group, known as the "Sleepy Heads." The SEC reports a very fine meeting in Denver with George Hart. The Columbine Net has been plagued with an apparent jamming station on 3990 kc. FCC was contacted and it appeared to be Russian and so far as we are concerned, it's legal, so narrow down, boys. The Columbine Net and many other nets in the state, are very active in WX reporting to B.C. stations about road conditions on the mountain passes, such as Wolf Creek Pass, just 60 miles west of us with over 120 inches of snow. WØLYV is back home in Louisville, Colo., for a complete rest, as is WAØCZB of Center, both having suffered heart attacks. Recommended place to rest, in front of the ham rig. Net reports Columbine Net 159, with additional 136 phone reports on hospital patients. High Noon Net traffic: 217. Traffic: KØZSQ 210, KØDCW 115, WØSWK 36, KØLCZ 18, KØAID 8, KØMIC 2.

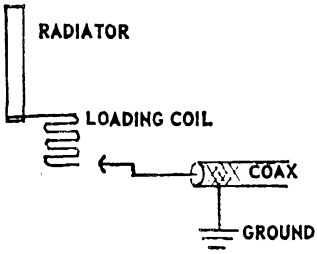
NEW MEXICO—SCM, Newell F. Greene, K5IQL —Asst. SCM: Kenneth D. Mills, W5WZK. SEC: K5QIN. The Breakfast Club meets week days at 0700 MST on 3838 kc. NMEPN meets Sun. at 0730 on the same frequency. The Caravan Club handled the road races at Bottomless Lakes Park Nov. 28 and 29. Eight stations set up after a hassle with CBers over whose job it was. The classes in Los Alamos graduated several new hams. Santa passed out s.s.b. transceivers this year. K5HTT is roaming the bands on his Swan. We have word that the Four Corners Missionary Net meets Tue., Thur. and Sat. at 1730 MST on 3850 kc. W5UWY, in Vander Wagen, is NCS. Several of those rare counties are heard on this net. WA5FFL is moving into his new house, after living in a trailer for several years. K5YRY, with help from K5ZCA, is mastering RTTY. Would like to see more a.f.s.k. on 2 meters. Traffic: WA5DUH 174, W5LUX 40, W5UBW 40, WA5FFL 17, W5WZK 7, K5-HTT 2.

UTAH—SCM, Marvin C. Zitting, W7MWR/W7OAD —SEC: W7WKF. The 1965 officers for the UARC are W7RDE, pres.; W7OVP, exec. vice-pres.; WA7AIA, vice-pres.; WN7AYE, secy.-treas.; W7JHM and W7-WKF, program chairmen; K7TEO, *Microvolt* editor; K7VEO, assistant *Microvolt* editor. The UARC's Annual Banquet was held at Andy's with 84 attending. Congratulations to W7WKF and the banquet committee on a job well done. Visiting dignitaries at the banquet included K7-HFV, S.L. County EC; K7COM, Asst. Director, and W7OCX, Vice-Director, who spoke briefly and presented W7VTJ with a BRAT Award. The 1965 UARC Ladies Auxilliary officers are Mary Carman, pres.; Ruby Green, vice-pres.; Barbra Woods, secy.-treas. Conditions on BUN have improved greatly and traffic is moving much smoother now. Don't hesitate. Send in your reports. Traffic: W7LQE 174, W7OCX 50, W7VTJ 38, W7JHM 32, W7MWR 6.

GOTHAM VERTICALS

MANUFACTURE CONTACTS

Thousands of 'em. Some near-by. Some thousands of miles away. On many bands. On any frequency within that band. Without traps. Without troubles. Without obtrusiveness. Just a strong, straight-forward design to perform its job: To manufacture contacts.



We are often asked if a Gotham vertical antenna will operate on MARS, C.D., C.B., MARINE, or other non-ham frequencies. Here is a simple method of tuning to any desired frequency within the range of the antenna: The inner conductor of one end of the coax is moved up the loading coil a turn at a time while the other end is coupled to a grid dipper tuned to the desired frequency. At one point, there will be a decided dip, and this is where permanent connection is made. With an SWR indicator, this point will indicate minimum SWR. With a field strength meter, maximum radiation will be achieved. Using a transmitter, this point will permit proper loading.

GOTHAM VERTICALS DELIVER THE CONTACTS

AN ANTENNA THAT SURVIVES THE COMPETITIVE STRUGGLE CONTINUES TO BE ADVERTISED.

PROVEN! PROVEN! BY THESE EXCERPTS FROM UNSOLICITED TESTIMONIALS:

CASE HISTORY #71
"I am very delighted with the first V80 and want another for a different location." A. C., California.

CASE HISTORY #159
"I ordered a Gotham V40 Vertical Antenna and found it so successful that several others are wanting them, too. Will you please send me four more." W. A., Alaska.

CASE HISTORY #248
"I just wanted to let you know how pleased I am with my Gotham V80 antenna. I have worked a W.A.S. of 46/43, a WAC of 3/3, and DXCC of 14/12 in about 12 months." G. W., Maryland.

CASE HISTORY #111
"The V160 did a beautiful job on a VE1 for me. Also, I forgot to take it down during the hurricane of last week. It is just as straight as it was when I bought it." D. S., New Jersey.

CASE HISTORY #613
"I have never been happier with any antenna than I have been with the V80. I have worked all bands with it and have had tremendous success — i.e., DL4s, ZS3, etc., all solid copy." R. D. S., Penna.

CASE HISTORY #483
"My V80 is working wonders. I am able to maintain a 1:1 SWR all across the 40 meter band. After many years on 10, 15, and 20, the XYL and I are getting great kicks out of some of the lower bands." J. A., New Mexico.

CASE HISTORY #146
"I have had very good luck with mine (my V80) feeding it with a Johnson Adventurer; works fine on all bands." B. I., Nebraska.

CASE HISTORY #555
"Being an owner of your V80 vertical I would like to let you know of the excellent results I am getting with it, both working the DX and the local stations on the lower bands. It certainly is an excellent antenna system." F. H. Jr., New York.

CASE HISTORY #84
"A few months ago I purchased your V40 vertical and have achieved outstanding results on the air." K. G. B., North Carolina.

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- Only a few square inches of space needed.
- Four metal mounting straps furnished.
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- Every vertical is complete, ready for use.
- Mount it at any convenient height.
- No relays, traps, or gadgets used.
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- Simple assembly, quick installation.
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- Will work with any receiver and xmitter.
- Overall height 23 feet.
- Uses one 52 ohm coax line.
- An effective modern antenna, with amazing performance. Your best bet for a lifetime antenna at an economical price.

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GOTHAM

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☐ V40 VERTICAL ANTENNA FOR 40, 20, 15, 10 AND 6 METER BANDS..... $14.95

THE V40 IS ALSO MADE FOR CITIZENS BAND OPERATION, WITH SPECIAL INSTRUCTIONS. DESIGNATE CB-11 ANTENNA. PRICE SAME AS THE V40

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

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

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

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WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: W7YWE. RM: K7IAY. PAMs and OBS: W7TZK and K7SLM. Nets: Pony Express, Sun. at 0830; YO, Mon., Wed., Fri. at 1830 on 3610; Jackalope, Mon. through Sat. at 1230 on 3920. W7YWE and I made a trip to Cheyenne in November to meet with the boys and talk AREC and were very pleased that they had representatives of the sheriff's office, fire dept., e.d., Red Cross and Highway Patrol. We got a lot accomplished. Result: More cooperation from them. Wyoming now has a ham newsletter put out monthly for a dollar ten a year. Order from KN7ZZP or K7OWT. K7ITH has a new Swan and K7DKZ has an HW-12 mobile. I am looking for nominations for the PICON award to be presented this summer. The nominee should be someone who has exceeded the normal amateur's activities for public service. Traffic: K7IAY 87, W7DXV 39, W7BHH 35, K7SLM 20, K7POX 14, K7VTM 8, K7WNF 6, W7YWW 3, W7AEC 1.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—SEC: W4NML. RM: WA4EXA. PAMs: K4NSU and K4WHW. I had a nice visit with the Russellville Club in Nov. and presented the ACK DX Phone Trophy to W4RLS. W4NML visited the Birmingham Club and presented the ACK DX C.W. Trophy to W4PRP. FARO officers for 1965 are K4NSU, pres.; Pete Hyde, vice-pres.; and WA4AQM, secy.-treas. WA4HKZ is the new AENP evening session NM. K4BSK has a TR-3, W4ATK has a 100V and a 75A-4, W4YNG is working on an electronic keyer, K4ANB got the G4ZU beam up and W4WGI has a new 40-meter vertical broadband "V." The Ala. & Ga. Amateur Radio Club now is affiliated with ARRL. Nov. net reports (times GMT):

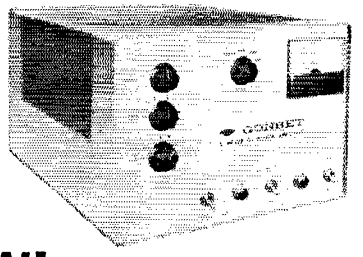
Net	*Freq.*	*Time*	*Days*	*Sess.*	*Avg. Tfc.*	*Avg. QNI*
AENB	3575	0100	Daily	30	3	7
AENM	3965	0030	Daily	30	4	42.8
AENO	50.55	0115	T/T/Sat.	13	.35	24.6
AENP	3955	1230	Mon.-Sat.	27	2	16
AENP	3955	2100	Daily	33	.75	16
AENR	50.55	0115	Wed./Fri.	8	.125	20.6
AENT	3970	2230	Daily	34	1.23	5.5

Congrats to K4WHW on being S.E. Division winner in the Sept. V.H.F. Party. The Huntsville Club won the cup for top Ala. FD score for the 2nd year in a row. Traffic: (Nov.) WA4EXA 182, WA4JWS 87, W4NML 73, K4NUW 40, K4NSU 35, K4BSK 29, K4DJU 28, WA4FJF 23, WA4GLX 21, K4KJD 21, K4WHW 20, K4ANB 17, W4YNG 17, K4GXS 14, WA4EXB 13, WA4HGN 11, K4AJF 8, K4BTO 6, WA4HFE 6, WA4MGI 6, W4DS 5, K4FZQ 4, K4RIL 4, W4WGI 4, W4DGH 2. (Oct.) K4ANB 52, W4YFN 30, K4TUT 22, K4VJL 20.

CANAL ZONE—SCM, Thomas B. DeMeis, KZ5TD—The FRACAP meeting held in Panama City was a huge success. Representatives from almost all the Central American countries and Mexico participated. KZ5EO represented the Canal Zone. The LPRA did a tremendous job in providing a complete program. KZ5EO also reported numerous 807s and 813s disappeared as festivities went chug-a-lugging along. W9IOP operated this Sweepstakes as KZ5OP, fully equipped including a 40-meter beam. KZ5s JT, KR, and LC are in the U.S. on leave or attending school. KZ5HJ is operating from Cardenas Village again, having transferred back from Coco Solo. KZ5TG has been hospitalized but is reported doing very well. KZ5RW is back from his Stateside vacation and on the air at home and mobile, too. Ex-KZ5BZ is operating from Augusta, Ga., as WA9-JSC/4. KZ5GQ is on the air with a homebrew transmitter. Many thanks to KZ5OC, the new SEC, for handling this office while I was away.

EASTERN FLORIDA—Acting SCM, Albert L. Hamel, K4SJH—SEC: W4JYT. Asst. SEC: K4KRG. RM C.W: W4LUV. RM RTTY: W4RWM. PAM S.S.B.: W4OGX PAM 40: W4SDR. PAM V.H.F.: WA4BMC. Congrats to W4LUV on his appointment as RM C.W. and making ORS at the same time. Good luck to WA4-CIQ on being selected as net mgr. for FPTN. At the same time we wish to thank K4LCF for the excellent job he did while managing this net for a long, long time. His job has curtailed his activities. W4BKC injected a sad note in his traffic report when he announced that W4YJM became a Silent Key Nov. 29. Ivan will be sorely missed by his many friends. Kudos to this months BPLers, WA4BMC, WA4JYB and WA1-AFP/4. You would be doing yourself and the gang a favor by using the Form 1 activity report card, particularly if you have something newsy or unusual to pass around through this column in *QST*. Just remember to keep it brief—space is limited—and that it will appear a couple of months after submission, so watch

POWERFUL BIG NEWS

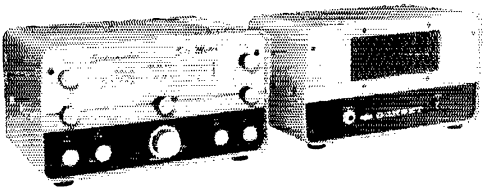


NEW!...2 METER–6 METER RF POWER AMPLIFIERS

More power in the VHF band!... and there is *plenty* of it in the new Gonset 2 and 6 Meter RF Power Amplifiers. Model 903A (2 meter) and Model 913A (6 meter) has a power input of 500 watt in all modes of operation. A 4X150A is used in the final, and the equipment is rated for CCAS* service. Only 5 watts is required to drive the 903A and 913A to full rated output. Output impedance is 50 ohms nominal with an input impedance of 50 to 75 ohms. The all solid state power supply is self-contained within the amplifier chassis. All stages are metered and all controls are on the front panel for ease of operation. The new linear amplifiers may be used with any of the famous Gonset Communicator series, as well as being ideally compatible for the new Gonset Sidewinder series.

Amateur Net Price $299.00

**Continuous Commercial and Amateur Service.*



NEW!...GONSET SIDEWINDER 6 METER SSB-AM-CW TRANSCEIVER

The new Gonset Model 910A *Sidewinder* offers coverage of the entire 6 meter band in 1 mc segments. Like its mate—the Model 900A 2 meter *Sidewinder*—this ultra-compact transceiver features all-transistor receiver and power supply and partially transistorized transmitter (except mixer, driver, and final stages). Designed for mobile or fixed communications, the unit operates with separate AC (shown above) or DC power supplies.

...COMES IN POWERFUL LITTLE PACKAGES from GONSET

SIDEWINDER SPECIFICATIONS:

TRANSMITTER:	
Power Input:	20 watts PEP (SSB) 6 watts AM 20 Watts CW
Spurious Mixer Product Suppression:	—50 db
Carrier Suppression:	—50 db on SSB
Unwanted Sideband Suppression: VFO or Crystal Control	—40 db
RECEIVER:	
Frequency Stability:	Highly stable incremental tuning utilizes same VFO as transmitter
Sensitivity:	½ μv or better for 10 db $\frac{S+N}{N}$
Selectivity:	Lattice crystal filter for both receiver and transmitter
Spurious Rejection:	—50 db or better
Image Rejection:	—50 db (both receiver and transmitter utilize double conversion)
AMATEUR NET:	$399.50
AC Power Supply	$ 67.75
DC Power Supply	$ 79.50

ANOTHER NEWSWORTHY NOTE: *the Gonset GSB-201 Linear Amplifier was recently increased from 1500 to 2000 watts PEP (SSB). For those who operate on 10 to 80 meters—the GSB-201 is a natural companion for any of today's exciters.*

WOULD YOU LIKE TO BE PLACED ON OUR NEW PRODUCT MAILING LIST?

We'll send you complete information on the products above and keep you informed of new Gonset developments from time to time. Merely write Dept. QST-2.

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your dated items. Let's bring back old times and start the ball rolling on those traffic reports. It really feels good to be leading the pack. Traffic: (Nov.) WA4-BMC 750, WA4JYR 701, W4TUB 462, W4DFU 346, W4-URX 315, K4KDN 276, W1AFP/4 195, WA4NEV 182, K4EY 176, WA4BAW 161, WA4LBM 134, K4SJH 129, WA4IWO 122, W4AKB 121, WA4FGH 121, WA4CIQ 116, K4QAY 93, W4LUV 89, K4COO 76, WA4IJH 75, WA4-NBE 71, WA4PWF 56, WA4RXG 54, W4KIS 48, W4IE 42, WA4COR 41, WA4RSQ 36, W4EHW 35, W4AYD 25, W4BKC 24, K4ILB 23, K4BNE 21, W4FP 19, WA4LRW 18, W4WPD 16, K4MZR/4 12, K4OAP 9, K4MTP 6, W4SVB, 2. (Oct.) W4TUB 417, W4WHK 141. (Sept.) W4TUB 182.

GEORGIA—SCM, Howard L. Schonher, W4RZL—SEC: K4MDC. RM: W4DDY. PAMs: K4PKK, WA4-EHT, WA4HSN, K8PWE/4 takes over from K4EIK as operator at K4MCL and lists a fine traffic total. K4DKJ is looking for a Ranger. WA4JXL is looking for Georgia contacts on 146.94 Mc. K4YZE and K4KHH are active in ARPSC work. WA4CJN continues DXing with a parallel dipole. WN4SRH is an active MARS member and 2-meter fan. WA4VMV has the 2-meter beam up 60 feet. W4HOS reports the DX Contest filled his schedule. WA4VVF soon will be on 6 meters. WA4MPD plans to tape bulletins. The Lanierland Club publishes an outstanding bulletin and has several worthwhile projects under way. My thanks to the clubs who send copies of their bulletins. They are interesting and informative. The Hostess City Award is well worth working for. Ask any Savannah ham about it. Net activity seems to have hit an all-time low because of propagation conditions. This would be a fine time to work on that v.h.f. project you have been planning. We could cover the section on 2 and 6 with a few more intermediate stations. Information needed on BC-1147. Contact W4RZL. Traffic: K4MCL 116, WA4VWV 68, K4DKJ 37, WA4HSN 28, WA4LLI 28, WA4JSU 18, WA4JXL 15, WA4BVD 14, K4FRM 6, K4YZE 5, WA4CJN 4, W4RZL 4, K4KHH 1.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE. PAM: K4NMZ. RM: W4BVE Tallahassee: WA4EAO, WA4EOQ and K4YPI are conducting a code and theory class for Novices, Panama City: New officers of the PCARC are: WA4JIM, pres.; WA4NVG, vice-pres.; WA4IMC, secy.; WN4VIY, treas.; WA4NLD, sgt. at arms. K4VFY is on s.s.b. now. WA4-JIM is conducting theory classes. WA4RME works maritime mobile from the oceanographic research platform 15 miles southwest of Panama City. He runs 1500 watts p.e.p. using an HW-22, linear and ¼-wave vertical. WA4FIJ sends his regards to WFPN members from Viet Nam; WA4FJF keeps up the family activity from Marion. Crestview: The county c.d. office is now equipped with a 500-watt all-band transmitter, donated by W4AOK. K4JFL and K4ADM will be operators. Although limited by long working hours, W4TFL still found time to issue 17 OO noticees in November. Milton: K4SMZ received Fla. *Skip* award for weather traffic activity. Pensacola: W4OFU, K4QOJ/K4BDF and K4RUG are joining the 2-meter activity. K4SOI is on 6 meters with a Utica 650. WA4QFK's station was hit by lightning. New officers of the V.H.F. Club are W4UL, pres.; K4PIN, vice-pres.; W9CIN/4, secy.; WA4RAU, treas. Fort Walton Beach: W4BVE reports that SP3DG, Poland, checked into the net one night and gave all signal reports. Traffic: (Nov.) K4VFY 309, W4BVE 160, K4NMZ 92, K4VWE 32, WA4JIM 11, WA4-EOQ 10, WA4NRP 6, K4SOI 4, WA4NVG 4. (Oct.) K4VFY 343, W4TFL 72.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colvar, W7FKK—SEC: K7NIY. PAM: W7CAF. RM: K7TNW. New officers of The Scottsdale Amateur Radio Club are W7DDC, pres.; K7YAM, vice-pres.; K7ZQI, secy.; K7JKG, treas. K5FPO/7, Duncan, Ariz., has just returned after spending two years in Chile, So. Amer. Congratulations to K7SXQ and his XYL on the new jr. operator. K7CUY is attending school in Flagstaff. W7LID has an 813 final. K7RVX is working the bugs out of his v.f.o. and plans to add a buffer stage to his transmitter. K7SFE is now stationed in Texas and is scheduling his friends evenings on 3995 kc. Our best wishes to K7UTX, the Glendale High School Amateur Radio Club, now officially an ARRL affiliated club. K7AIE has been on TDY at Ft. Monmouth, N.J. K7NHL is carrying a heavy sked for TWN and PAN. K7QCA has been in New Mexico and Colorado on business. K7RUR reports that the Arizona QCWA Dinner was a huge success with 33 in attendance. W7AYY reports that activity on 6 and 2 meters is quite good here in the Valley. Have you checked your operating habits lately? Are you setting a good example for the newcomers to our hobby? Traffic: K7NHL 164, K7UXB 29, K7UTF 27, K7RUR 9, W7FKK 8.

Real Power on Six and Two!

If you've been planning on increasing your power on six and two meters, here's the tube to use -- the Penta PL-177A beam pentode!

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Plate voltages as high as 2000 volts can be used, yet the PL-177A will operate with nearly equal efficiency at only 600 volts. And this rugged tube can withstand prolonged periods of overload operation.

Send today for your free PL-177A data sheet, with which we'll include a reprint of the December 1963 QST article, "A Medium-Power Band-Switching VHF Transmitter," which describes and illustrates a six and two-meter transmitter using the PL-177A. *The Penta Laboratories, Inc., 312 N. Nopal Street, Santa Barbara, California. 93102.*

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LOS ANGELES—SCM, John A. McKowen, W6FNE—Asst. SCM: John A. Vandean, WB6JGA. SEC: K6YCX. PAM: W6ORS. RMs: W6BHG, W6QAE, WB6BBO. As noted above a new member has been added to the staff of the Los Angeles section, WB6JGA as Asst. SCM. Lots of luck, John, and welcome to the group. WA6WAR reports his gear is for sale as he is joining the Flying Corps in February. WA6WTX has moved and his gear has been reinstalled. The AREC is going v.h.f. and a new command frequency is reported to be on 2-meter f.m. with this equipment very reasonable price-wise surplus. WB6FPQ is active with the Ft. McArthur gang. W6LVQ reports good activity on the RATTS Net on 3625 kc. Tue., Fri. and Sat. Some of the top traffic men in the state are in this net. K6EA is back on the beach for a short stay. W6BHG is out of the hospital after minor surgery. K6SIX is s.s.b. on 6. More people are realizing the capabilities of this mode on v.h.f. Distance and conflicting schedules have necessitated the resignation of WA6DJB as Asst. SCM. Thanks again, Dick, for your many hours of tireless effort. Support the AREC and your section net. AREC membership can be obtained by writing SEC K6YCX, 2041 South Benson, Ontario, Calif. The Southern Calif. Net meets daily at 0300Z on 3600 kc. Traffic: (Nov.) WB6BBO 886, W6GYH 623, K6MIDJ 540, W6QAE 152, WA6WAR 87, WA6TWS 80, WA6WTX 74, K6YCX 65, WB6FPQ 58, WB6BBH 57, W6USY 36, WA6YUW 26, W6LVQ 25, K6EA 12, W6PCP 8, WA6CXB 5, WB6GXI 5, K2PHF/6 4, W6BHG 3, K6SIX 2, WN6MPB 1. (Oct.) K6YCX 79, WB6FPQ 42, WA6CXB 8, K2PHF/6 2, W6FB 2.

SAN DIEGO—SCM, Don Stansifer, W6LRU—On Mar. 1, 1965, Orange County will join with Riverside, San Bernardino and Inyo Counties to form the new Orange section. To the many individual amateurs and club groups in Orange County that have been so cordial and a pleasure to work with the past 12 years as SCM, a sincere thanks. K6UUT is a new member of the San Diego V.H.F. Club. Recent Silent Keys include W6BAS and W6PTN. The San Diego ARPSC group, spearheaded by W6BKZ, had a booth at the recent Electrical Show in Balboa Park. Three complete stations operated and 2120 messages were originated from there. Asst. SCM W6EWU was a recent San Francisco visitor. An unscheduled drill called by the San Diego Medical group produced a combined C.D.-ARPSC-Hospital Net that handled 21 messages. EC W6MHY reports that it was successful. The newest ARRL affiliated club is the GD/Astro Club in San Diego. Orange County RACES officers for 1965 are Asst. Radio Officer, W6QAT; Operations, WA6KRU; Technical, W6DEY; and Public Relations, WB6ENL. WA6RGP won the Mladinich Trophy, given at the Anaheim Club Annual Dinner; 98 guests were present. Your SCM will visit both the Orange County and Newport Clubs in late February. New officers of the Orange County Club: K6KTX, pres.; WA6YWN, vice-pres.; WA6TSU, secy.; WA6MQL, treas.; WB6LXN, TVI; WA6KAN, activities; WB6FYW, pub. rel. W6CCE has a new 75S-3B receiver. NCS W6DNA, Orange County Net, meets nightly on 145.62 Mc. at 0230Z for traffic, which is routed to SCN W6YDK 2827, W6BKZ6 1640, W6JUH 621, W6EOTV at 0300Z. Traffic: (Nov.) K6BPI 4686, W6IAB 3232, 507, W6VNQ 480, WA6BRG 260, WB6KNN 66, K6IME 59, WA6ROF 45, WA6UUO 24, WA6ZWR 10, WN6JLC 8, WN6MAI 8, WA6TAD 7, W6WRJ 7, W6LRU 2. (Oct.) WA6BRG 140.

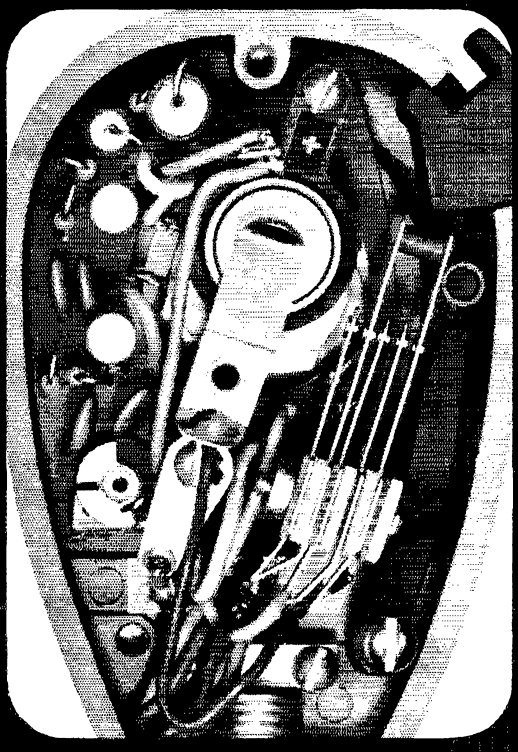
SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—RM: W7WST/6. WA6KVS, a very active v.h.f. man, is now Acting EC for the Thousand Oaks area. Jim was a sparkplug in the Paramount C.D. activities and we welcome him to the section. K6BUD expects to move to Vandenberg soon and is selling his house and antenna farm. K6AAK is putting up a tower and stacking beams for 2, 20 and 40 meters. W6KZO and the Santa Barbara v.h.f. gang are f.m. on 146.955 Mc. K6KCI and the YL group gather each week on 75-meter, s.s.b. for the Ironing Board Net. WA6OKN has a new TR3 which Santa brought. Your SCM is anxious to have the latest addresses of all radio clubs in San Luis Obispo and Santa Barbara Counties in order that I may keep you informed of matters of interest to all amateurs in this section. Traffic: (Nov.) W7WST/6 207, WB6DPV 9, WA6KVS 2, WA6OKN 2. (Oct.) W7WST/6 318, WB6DPV 9.

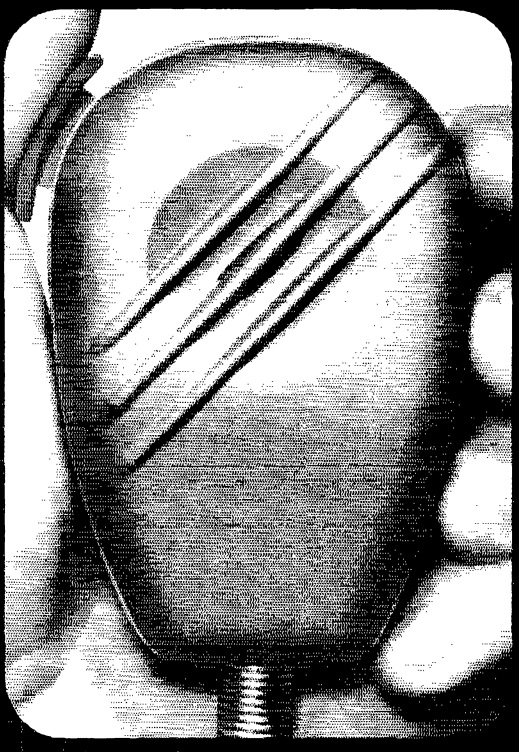
WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Thanks to K5EGB for the following news about NYLs. SCM comment: Just because they are married does not mean they are no longer YLs, so they think they should be called MYLs—Married Young Ladies.

This transistorized speech clipper doubles your talk power...

when you speak into the other side!





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Now! A two-transistor speech clipper, that can actually double your talk power, built right inside this high quality dynamic mobile microphone!

The battery-operated speech clipper in the D-501K can double average modulation levels — so important when you must break through heavy QRM. The D-501K clips vowel peaks (that contribute little to intelligibility) while raising the modulation level of consonants. And the frequency response of the tough dynamic element is carefully shaped to further increase intelligibility.

No need to rewire your transmitter when you add the American D-501K. The speech clipper is completely self-contained. An internal potentiometer permits exact output level adjustment (up to —35 db) for maximum modulation without splatter. Standard battery lasts for months.

Add life to your transmitter. Plug in the new American D-501K Speech Clipping Dynamic Microphone. See it at your American Microphone distributor's, or write for complete specifications today.

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What do you think? Several MYLs from Ft. Worth attended the TYLRUN Annual Birthday Party in Houston. K5BNH has a new s.s.b. rig. K5NJW is now a DX station; she was formerly DX membership chairman for the YLRL. K5DLI has moved to Odessa and is taking nurses training. W5RYX is taking a course in gardening and landscaping and in her spare time is helping the OM, W5LBM, to build an airplane. You guessed it. They are building the plane in the house. Both are pilots so I guess they have taken into consideration the size of the openings in the house. K5EGB and W5WKH announce the arrival of a new son on Sept. 13. W5KIK has a new granddaughter. W5AIW has a new crank-up tower, a tri-band beam and a Drake TR3. Congratulations to the Amateur Communications Club of North Texas on becoming an ARRL affiliated club. W5JIG lost his rig, tower, shack and home in a recent fire. K5SWU has a new Swan 350 mobile. W5VOH saved his rig and some furniture when his home was damaged by fire. Hams in Midland assisted O'Kelly in moving undamaged furniture to his new home. Traffic: K5FLD 314, W5VFM 108, K5DOC 90, K5DBJ 67, W5CVB 43, K5DBU 34, WA5EVS 34, K5UOR 32, W5LR 12, K2GKK/5 8.

OKLAHOMA—SCM, Bill F. Lund, K5KTW—Asst. SCM: Cecil P. Andrews, W5MFX. SEC: K5DLP. PAM: K5MTC. RM: W5QMJ. W5DRZ has resigned as PAM because of his new job as State MARS Director and K5MTC has been appointed in his place. W5JXM threw in the towel as RM and W5QMJ has been appointed in his place. Our Asst. SCM has been in the Okla. Osteopathic Hospital for lung surgery and is now home doing fine. W5HIM is home recovering from a recent heart attack. Two of our old-timers became Silent Keys: W5GZW, of Okla. City, passed away Nov. 26 and W5LIR, of El Reno, passed away Nov. 8. K5BBA is back with his *Green Ink* with news from Bartlesville advising that WN5KYH is a new Novice, KØRRG has been issued the call WA5KMP, K5AUX has moved to his new QTH in Bartlesville and K5TEY has moved to her new QTH in Copan. K5JJE enlisted in the Army Special Services and W5KZP and K5TCG are new hams in Bartlesville. K5WVS has been transferred to New York. I want to thank W5JXM and W5DRZ for their past services and for a job well done. Yours truly was called in for a special school held at Okla. University to see if we can find some way to up-date our Highway Patrol and cut down on the "slaughter" on the highways. It was a very good school and I want to take this means to ask all who operate mobiles to please watch your driving and if necessary to reload, pull over to the side of the roadway and stop. Let's not become a Silent Key because of carelessness. Traffic: K5TEY 256, K5KTW 40, WA5BNG 38, K5LZF 32, W5DRZ 31, W5UYQ 30, K5DLP 26, K5CAY 16, K5MTC 6, W4SKI/4 6, K5OCX 4.

SOUTHERN TEXAS—SCM, Roy K. Eggleston, W5QEM—Sure sorry to hear that W5EV has been in the hospital. He was doing some work on his rig and got across 2500 volts. Because of the quick thinking of his XYL, who jerked the chair from under him, he was able to get free of it. Bill, if you had still been in Corpus Christi this might not have happened. W5INN has a new Drake TR3. K5ANS has a new Valiant for c.w. Good going, Frank. As this will be my last column for *QST*, as SCM, I would like to thank all for their help during the last eight years, and I hope everyone will work with W5AIR to help make the Southern Texas section one of the best. I am leaving the office of SCM with lots of fond memories and with a host of new friends that I have made in traveling the section. To our former Director, W5ETA, who helped me so much when I first started, to our present Director, W5QKF, for his help as SEC and later as Director, to W5AIR, the SEC up until now, and to a host of others too numerous to mention, go my special thanks. Let's all continue to work for the betterment of amateur radio. To you, Jerry, congratulations on your election as SCM. Adios, hasta la vista, and will see all of you further down the log book.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK. PAM: VE6PV. ECs: VE6s SA, SS, ABS, AFJ, AJY, HB. RM: VE6AEN. OPSs: VE6s CA, PV, HM, SS, BA. OOs: VE6s HM, NX. OBSs: VE6s HM, AKV, ORS: VE6BR. OESs: VE6s DB, AKV, AJY, MC. VE6HM writes that he and the XYL enjoyed their trip to England very much and he hopes to be talking with you all this winter. VE6HN, an old-timer in the radio game who passed away in Calgary Nov. 25, was the first commercial radio operator in Lethbridge and founded radio station CJOC in 1926. He was owner, manager, salesman, operator and announcer. In fact, he

Low cost transistorized commercial SSB transceiver

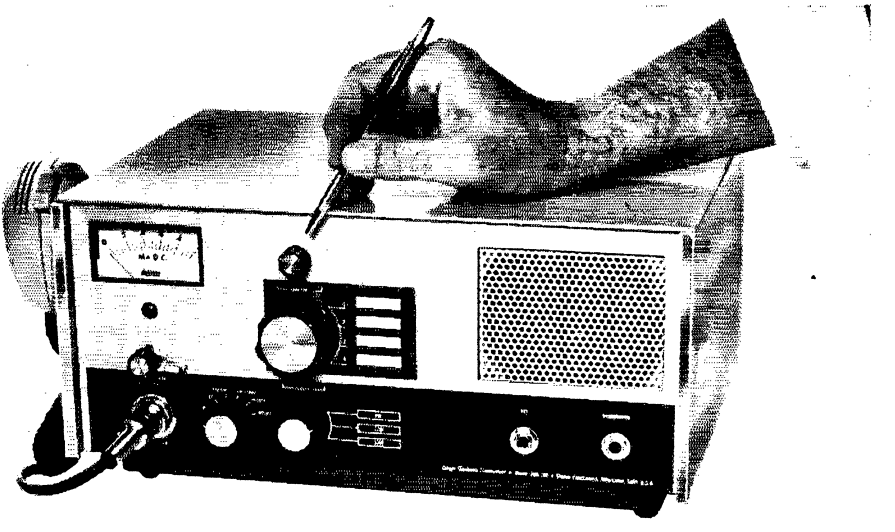
Designed for both mobile and base station operation, the SSB-100 transceiver gives you dependable long range communications with low battery drain. It is ideally suited for use where conventional power sources are not available.

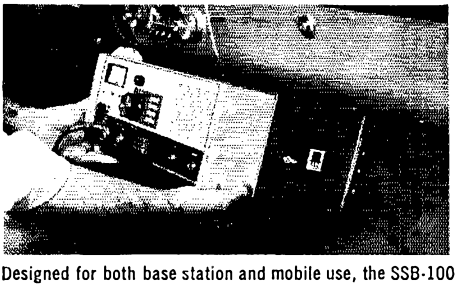
Transistorized construction reduces battery drain to less than 100 ma. during reception. Instant heating power amplifiers operate at the 100 watt P.E.P. level to provide immediate communications. Four crystal controlled channels can be selected throughout the 2-18 mc. range.

The unit is built to withstand severe environmental conditions encountered in military, construction and agricultural usage.

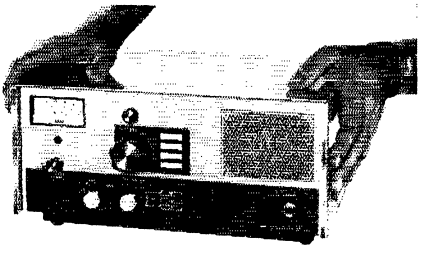
In addition to commercial applications, the SSB-100 has been approved for matching fund Civil Defense purchases, and may be used by non-amateur operators in RACES networks.

Prices start at $795.00; full line of accessories available.





Designed for both base station and mobile use, the SSB-100 can be removed from an office and quickly slipped into a foldaway mounting for mobile operation.



SSB-100R Four-channel crystal controlled receiver uses clarifier control to eliminate crystal ovens and further minimize battery drain.

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was a "one-man" radio station. He operated his first station in his own home in Lethbridge, later moving to the roof-top of the Marquis Hotel. He was instrumental in starting many amateurs in the early days. He also pioneered in the early days of aviation and was one of the first to attempt an Air Mail run from Lethbridge to Ottawa with a load capacity of 150 pounds. On his first run he was forced down in the U.S.A. and Uncle Sam had to complete the run by rail to its destination. He will be missed and mourned by many hams.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB —The British Columbia Amateur Radio Association's Cup award winner for 1964 is VE7ALE. VE7AKE is moving to Swindle Island for B.C. Tel. Thanks to the West Kootenay ARC for its monthly club letter. Officers of the club are VE7ABK, pres.; VE7BBK, vice-pres.; VE7VM, secy.-treas. The club has one old-timer, VE7CW, 50 years an amateur. VE7QQ, our RM, is asking questions. Would you support a slow c.w. traffic net to obtain your speed and operating habits to join the regular fast traffic nets? Possible 3700 kc. Vancouver ARC's Sunday Net on 3740 kc. is growing bigger each Sunday morning with more club members and others joining. Also the club's monthly transmitter hunt is making strides with more and more cars hunting. VE7BBQ, from Qualicum, has moved to New Westminster to work for Channel 8. VE7BMN is now mobile. VE7AKB is really showing what an English s.s.b transmitter can do on DX VE.7BHH is planning activity for B.C. QCWA members. Let's support his efforts by having a dinner for us B.C. QCWA members this coming year. We need more check-ins on 3650 kc. We need more in our Public Service Corps. We need more information for this column. We need more for all for 1965. Traffic: VE7BDJ 353, VE7BHH 60, VE7BEX 15, VE7AC 13.

MANITOBA—SCM, William H. Horner, VE4HW— New WARA officers are VE4CS, pres.; VE4DE, vice-pres.; VE4LK, secy.; VE4NS, treas.; VE4FB, bus. mgr. RM VE4JT reports that the new C.W. Manitoba Traffic Net (MTN) commenced Nov. 9 and activity for Nov. was: Sessions 17, QNI 82, QTC 17. TEN is being scheduled daily for traffic to and from NTS. VE4UM has a sked Tue. and Thurs. for overflow Winnipeg traffic. MTN meets daily at 0100 GMT on 3635 kc. and Net Mgr. VE4JT invites new members. There is much activity at university station VE4UM—keeping skeds, working on amateur TV project, developing RTTY operation and handling traffic. Sorry to record the passing of VE6IIN of High River. Jock's prewar call was VE4NC. Air Canada has promoted VE4RU to Vancouver. VE4KM is operating a.m. on 75 with 6 watts. VE4KR is back on 75 from Transcona after overhauling the equipment. The supplementary 75-meter phone net on 3760 kc. at 1845 GMT daily keeps traffic moving when conditions are poor on the regular net at 0100 GMT. New licensees are VE4BX, VE4MD, VE4RI, VE4WJ VE4WY and VE4VO. QSL Manager VE4OX attended the S.S.B. Dinner in Toronto. VE4QX has his Advanced Class ticket and is traffic-minded. VE4-HW has resigned chairmanship of the License Plate Committee. Since authorized in June, 1963, call-letter plates have been issued to 282 applicants. Traffic: VE4JT 51, VE4UM 15, VE4HW 11, VE4JY 10, VE4DL 9, VE4KN 8, VE4QD 8, VE4QJ 8, VE4UX 8, VE4JA 7, VE4AN 6, VE4QX 5, VE4EG 4, VE4NE 4, VE4XQ 3, VE4XN 2, VE4TM 1.

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCM: A. E. W. Street, VE1EK. Congratulations to VE1AHQ, VE1KI, VO1ET, VO2GA and their XYLs on the new arrivals. VO1CQ reports that his call sometimes causes a bit of confusion! Newly-elected club officers: (Halifax) VE1GC, pres.; VE1DR and VE1-AHD, vice-pres.; VE1AFN, secy.; VE1AIH, treas. (Sydney) VE1CI, pres.; VE1NV and VE1JD, vice-pres.; VE1QD, secy.; VE1ABM, treas. Mobile communication for the Santa Claus parade at Fredericton was provided by Vels ABK, AKT, AJT, TU and XZ SONRA Club meetings are being held on 3770 kc. Sun. at 1400 NST with VO1CU as NCS. The Goose Bay QSO Party (April 1-15) provides *you* with an opportunity to earn your WAG (Worked All Goose) certificate. Highlight of the recently held SONRA Fall Dance was the presentation of the Premier Smallwood Field Day Trophy to the Harmon Club. VOs EI, FX and GI are now operating s.s.b. VE1MM is transferring to the VE3 district. Active on 6 meters from Cape Breton are VEIs AAK, AJ, AKC, CI, ET, JD, NV, QD, ZE and ZO. VE1AEW is now located at Shelburne. VE3-CRA (ex-VE1QZ) was a recent visitor to Halifax. Traffic: VE1AEB 107, VE1DB 6.

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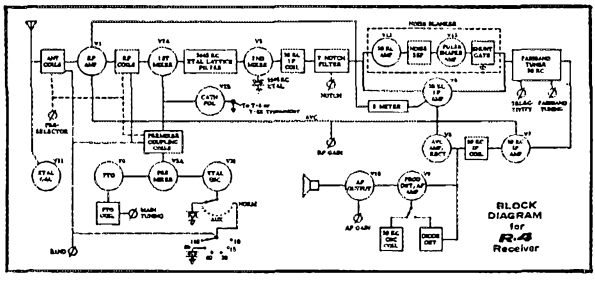
Model R-4 **$379.95** AMATEUR NET

Model MS-4 Matching Speaker **$19.95**

FEATURES

- **Linear permeability tuned VFO** with 1 KC dial divisions.
- **Covers ham bands** 80, 40, 20, 15 meters completely and 28.5 to 29.0 Mc of 10 meters with crystals furnished.
- **Also covers 160 meters,** Mars, Citizens Band, WWV, Marine, and short wave broadcasts. (With accessory crystals.)
- **Or will give 5 Mc of continuous coverage** (with accessory crystals) for use with VHF converters.
- **Or tunes any ten 500 KC ranges** between 1.5 Mc and 30 Mc with accessory crystals; 5.0 to 6.0 Mc not recommended).
- **Four bandwidths** of selectivity (equivalent to 4 filters) are furnished: 0.4 KC, 1.2 KC, 2.4 KC and 4.8 KC.
- **Passband tuning**
- **Noise blanker** that works on CW, SSB, and AM; **Notch filter;** and **100 KC crystal calibrator** are built in.
- **Crystal lattice filter 1st IF**
- **Premixed injection**—Crystal oscillator and low frequency VFO outputs premixed.
- **AVC with fast attack and slow release** for SSB or fast release for high speed break-in CW. Also AVC may be switched off.
- **Receives SSB, AM, CW, and RTTY** with full RF gain, complete AVC action and accurate S-meter indication.
- **Product detector** for SSB/CW—diode detector for AM.
- **Excellent overload and cross modulation characteristics;** insensitive to operation of nearby transmitters.
- **Compact size; rugged construction.**
- **Transceive capability;** May be used to transceive with the T-4 "Reciter" or T-4X Transmitter.
- **13 tubes and 7 diodes.**



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SPECIFICATIONS — Model R-4

FREQUENCY COVERAGE: 3.5-4.0 Mc, 7.0-7.5 Mc, 14.0-14.5, 21.0-21.5, and 28.5-29.0 Mc with crystals supplied. Ten accessory crystal sockets are provided for coverage of any 10 additional 500 KC ranges between 1.5 and 30 Mc with the exception of 5.0-6.0 Mc.

SELECTIVITY: Drake tunable passband filter provides:
.4 KC at 6 DB down and 2.6 KC at 60 DB down
1.2 KC at 6 DB down and 4.8 KC at 60 DB down
2.4 KC at 6 DB down and 8.2 KC at 60 DB down
4.8 KC at 6 DB down and 25 KC at 60 DB down
Selectivity switching is independent of detector and AVC switching.

I.F. FREQUENCIES: First I.F.—5645 KC crystal lattice filter; second I.F.—50 KC tunable L/C filter.

STABILITY: Less than 100 cycles after warm up. Less than 100 cycles for 10% line voltage change.

SENSITIVITY: Less than ½ uv for 10 DB signal plus noise to noise on all amateur bands.

MODES OF OPERATION: SSB, CW, AM, RTTY.

DIAL CALIBRATION: Main dial calibrated 0 to 500 KC and 500 to 1000 KC in 5 KC divisions. Vernier dial calibrated 0 to 25 KC in 1 KC divisions.

CALIBRATION ACCURACY: Better than 1 KC when calibrated at nearest 100 KC point.

AVC: Amplified delayed AVC having slow (.75 sec.) or fast (.025 sec.) discharge; less than 100 microsecond charge. AVC can also be switched off. 3 DB change in AF output with 60 DB change in RF input.

AUDIO OUTPUT: 1.4 watts max. and .5 watts at AVC threshold.

AUDIO OUTPUT IMPEDANCE: 4 Ohms and hi impedance for anti-vox.

ANTENNA INPUT: Nominal 52 Ohms.

SPURIOUS RESPONSES: Image rejection more than 60 DB. I.F. rejection more than 60 DB on ham ranges. Internal spurious responses in ham ranges less than the equivalent 1 uv signal on the antenna.

FRONT PANEL CONTROLS: Main tuning, AF gain, RF gain, AM-SSB/CW with slow AVC, fast AVC, or AVC off, function switch, band switch, xtal switch, passband tuning and selectivity, preselector, notch, and headphone jack.

REAR CHASSIS JACKS AND CONTROLS: S-meter zero, notch adjust, antenna jack, speaker jack, mute jack, anti-vox jack, accessory power socket, and fuse post.

POWER CONSUMPTION: 50 watts, 120/240 VAC, 50/60 cycles.

DIMENSIONS: 5½" high, 10¾" wide, cabinet depth 11⅝", overall length 12¼", weight 16 lbs.

AVAILABLE ACCESSORY: Model MS-4 matching speaker cabinet with high efficiency 5 x 7 speaker. Cabinet also houses the power supply for the T-4 or T-4X matching transmitters.

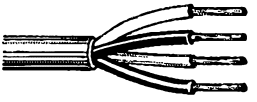
ONTARIO—SCM, Richard W. Roberts, VE3NG—Many thanks from the XYL and myself to those of you who sent us Christmas cards. From Windsor and Niagara we hear that a knock on your door by a little man in red is *not* Santa, but one of our RCMP, checking on your 807s. VE3QW is on s.s.b. with the rig he got at the ARRL Ontario Convention in London. VE3CZE also is on s.s.b. VE3DJK, of Cornwall, was a welcome visitor to the S.S.B. Dinner held in Toronto recently. The Hamilton Club had a bang-up Ladies Night at the Yacht Club recently. Congrats to Dr. John and Jean Card on a wonderful evening. Ontario lost one of its best known ham operators in November. VE3NZ passed away suddenly in Barrie Hospital. Jack, with his Three Nancy Zero from Stroud, will be missed by many and especially your SCM. From the Lakehead area we learn that VE3FSE, late of Metro ARC, is looking for DX; also VE3ZCD is heard well all over Ontario. New executives of the Westside ARC of Toronto are as follows: VE3CWN, pres.; VE3CUY, vice-pres.; VE3GAE, secy.; VE3FGW, treas. The Skywide ARC of Toronto is to be congratulated. It gave the owner of the Field Day site a gift of a fishing rod and he managed to catch a few. As a result the club was invited back next year. That's ham spirit! Copied from Skyhook 1956: VU2AA, from India was a visitor to the club. The Nortown ARC of Toronto was entertained with a special showing of slides and movies of the recent trip of the Schooner *Bluenose* to South America by Mr. Ian McBean, who is a Treasure hunter. Happy New Year to all. Traffic: VE3CYR 190, VE3NG 142, VE3CYR 103, VE3DRF 75, VE3BUR 47, VE3EHL 46, VE3DWN 37, VE3DMU 22, VE3RCS 22, VE3BLZ 21, VE3BTV 19, VE3CF1 17, VE3WW 12, VE3DVE 10, VE3AUU 9, VE3AWE 8, VE3VD 8, VE3EGG 7, VE3AKQ 5, VE3TT 2.

QUEBEC—SCM, C. W. Skarstedt, VE2DR—Asst. SCM: Michel St. Hilaire, VE2BEZ. The Canadian Easter Island Expedition contacts the outside world by amateur radio. The operator, VE3DGX will sign CEØ-EG while on the island until Feb. 15 on 14.120-kc. s.s.b. VE2WA is liaison station. On Feb. 4 the Sir George William College will stage a car rally with some 150 cars taking part. Arrangements have been made to supply communication by AREC members. The annual oyster party sponsored by the St. Maurice Valley group held at Trois-Rivieres was a great success. On Feb. 27 the South Shore gang will hold its Annual Dinner-Dance. Nice to welcome back VE2UK, who once signed VE2SM. Congratulations to the Sherbrooke Club which is now ARRL affiliated. A new group of the MARC, the technical group, will meet the 2nd Wed. of each month starting Feb. 10. For more details contact VE2-AUU. Le 5 Sept. VE2AHW fonda l'association E.S.O.C., afin d'aider tous les écouteurs sur ondes courtes, d'expression Française. L'association compte déjà plusieurs membres. VE2ABT et VE2AIH très absorbés par les études. Notre SEC, VE3AUU, tient un réseau de pratique d'urgence très intéressant sur 80 mètres. VE2-BJV et VE2BRT ont repris leurs cours de radioamateur. Il semble que Cupidon ait frappé VE2PY et VE2BEZ. VE2AGR d'obtenir son nouveau HW-12. Pour les intéressés, ne manquez pas OQN, réseau de trafic c.w. à basse vitesse. Enfin, un dernier mot, nous apprécierions plus des rapports des nombreuses régions de Québec. A tous, une bonne, prospère et heureuse nouvelle année. Traffic: VE2DR 113, VE2BEZ 51, VE2TA 50, VE2BRD 30, VE2EC 29, VE2OJ 20, VE2AUU 15, VE2HV 12, VE2ANY 11, VE2BCB 8, VE2BG 8, VE2-BEJ 4, VE2BOC 4, VE2AGD 3, VE2BNS 3?, VE2BRT 3, VE2KQ 3.

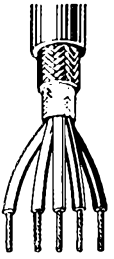
SASKATCHEWAN—SCM, Mel W. Mills, VE5QC—Moose Jaw Club's officers are VE5KZ, pres.; VE5IL, vice-pres.; VE5DF, secy.-treas.; VE5MR and VE5AQ exec. SEC VE5CU and I spent a most pleasant evening with the members of the Prince Albert Club at one of its supper meetings. Pres. VE5VT and all the members made us most welcome. Later we visited the home of EC VE5BO. A province-wide AREC exercise was held Dec. 5 under the control of EC VE5BO. Other ECs and their membership who took part were VE5FC Saskatoon, VE5VD Regina, VE5WM Moose Jaw and VE5NX South West. In Saskatoon a local net on 40 meters proved the usefulness of this band to relieve the congestion on 80. The exercise went off well with many problems being brought to light and solved. Congratulations and thanks to all. Also special thanks to VE5-CU for, in less than a year, he has built the basis of a first-class communications system. The Saskatchewan ARRL Hamfest will be held the July 1st week end in Saskatoon under the sponsorship of the Saskatoon Amateur Radio Club. Plan to attend now with *all* the family and get those tickets sold *now*. As VE5LM says "Come alive in '65 at the Saskatoon Hamfest."

Belden Wire and Cable for every ham application

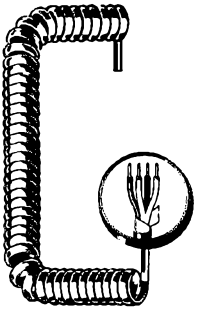
service rated—quality controlled easy-to-use packaged lengths



Antenna Rotor Cables. Sturdy, flexible, plastic insulated cable for all Ham antenna rotor applications. Color coded for easier hook-up. Chrome, vinyl plastic jacket resists sun and aging.

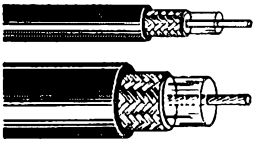


Power Supply Cables. Provide dependable service as power supply cords, interconnecting cables on electronic equipment, remote control circuits, special press-to-talk microphone circuits, and other ham applications. Designed for long service life with excellent mechanical and electrical characteristics, and uniform quality. Special jacket offers maximum resistance to abrasion and ozone.

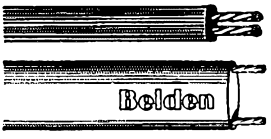


Coiled Microphone Cable. Provides low impedance for mobile microphone applications. Black neoprene jacket remains flexible at low temperatures. Available with or without shielded conductors.

Shielded Hook-up and Grid Wire. Provide most effective TVI suppression. Vinyl insulated with tinned copper braid shield. Available in wide range of capacities from 24 AWG to 12 AWG.



Ham Transmission Lines—75 Ohm Foam Core RG/U Type. Designed for lowest losses, longer service life, and maximum dependability. Cables are essentially flat with no peaks in attenuation to reduce signal on either high or low frequencies.



Ham Transmission Lines—Parallel Type. Made with brown virgin polyethylene for best weather resistance and lowest losses. Uniform quality control prevents standing waves and mismatches.

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WIREMAKER FOR INDUSTRY
SINCE 1902 — CHICAGO

Magnet Wire · Lead Wire · Power Supply Cords · Cord Sets and Portable Cord · Aircraft Wires · Electrical Household Cords · Electronic Wires · Welding Cable · Automotive Wire and Cable

8-2-3

One last thought, use your AREC procedure in your everyday operating and see how much more pleasant operating becomes and how the results improve. Please, fellows, get those reports to VE5CU and myself. Traffic: VE5HP 92, VE5LM 42, VE5OB 28, VE5HQ 4, VE5QC 4, VE5IL 2, VE5JJ 2, VE5PD 2, VE5IA 1.

SASKATCHEWAN QSO PARTY

February 21, 1965

All radio amateurs are invited to participate in the first Saskatchewan QSO Party, sponsored by the Regina Amateur Radio Association.

Time: 0001 GMT February 21 to 0001 GMT February 22, 1965.

Call: CQ VE5 or CQ Saskatchewan.

Exchange: VE5 stations will send QSO number, report and QTH. Outside stations will send QSO number, report and ARRL section.

Scoring: VE5 stations count one point per outside contact and multiply by the number of ARRL sections worked. Outside stations count 3 points per VE5 contact and multiply by the number of different VE5 QTHs. Phone (SSB or AM) counts as a separate contest. Only one contact with the same station is permitted per band. There are no power restrictions.

Awards: Certificates will be awarded to the top scoring station from each section. The top five VE5 contestants will also receive certificates.

Frequencies: 3550 3850 7050 7250 14,050 14,250 21,050 21,300 28,050 28,550.

Entries: Send to RARA Secretary, 2328 Grant Road, Regina, Sask., Canada. Closing date is March 15, 1965.

What The ARRL Means To Me

(Continued from page 28)

"I'm for RACES and AREC, spend all my time at it. But that junk in *QST* about amateur television. . . "

"Me? I'm in a very specialized amateur field, television. Go ask one of those nuts who sleep in a pup tent on Field Day."

"Yeah, Field Day. That's amateur radio at its best. The foulups come from too much attention to those phony expeditions to rare foreign countries."

"What do you know about it? Antennas, that's what's taking too much space. Front-to-back, angle of radiation. . ."

"Wait a minute! Propagation information is the. . ."

"Surplus equipment, that's the glut on the. . ."

"Radio club news, if you ask me. . ."

"Hams in space, Project Oscar. . ."

"Code practice stations. . ."

"Oscilloscopes and test. . ."

"Civil Defense. . ."

"Lower power. . ."

"Keyers. . ."

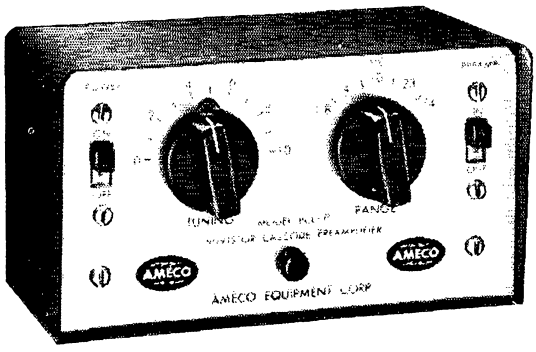
"FM. . ."

"Hold it, gentlemen! Hold it! Thanks very much for all your answers, but I think now I've found the answer myself. What does the ARRL mean to me? And to you? *Something for everyone!* Good night." QST

AMECO *Leader in Compact, Quality Ham Gear*

Improve your receiving Capability with the

NEW ALL BAND NUVISTOR PREAMPLIFIER



Model PCL-P (shown above) with built-in power supply—wired and tested $32.95

Model PCL is identical in all respects to model PCL-P except that it does not contain a power supply. (Power can be taken from receiver or from the Ameco PS-1 Supply) wired and tested $24.95

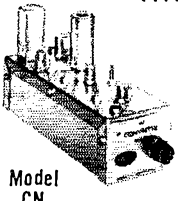
- **6 thru 160 meters**
- **With built-in power supply**

Two nuvistors in cascode give noise figures of 1.5 to 3.4 db. depending upon the band. The weak signal performance of ALL receivers as well as image and spurious rejection are greatly improved. The PCL's overall gain is in excess of 20 db.

Panel contains bandswitch, tuning capacitor, an "on-off" power switch and a switch that transfers the antenna directly to the receiver or through the Preamplifier.

The addition of the preamplifier to the ham station will enable the ham operator to hear signals that he was not able to hear before. The improved noise figure will allow reception of signals that were previously lost in the noise.

NUVISTOR CONVERTERS FOR 50, 144 AND 220 MC. HIGH GAIN, LOW NOISE

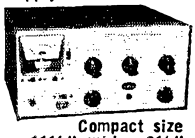


Model CN

Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain — 45 db. Noise figure — 2.5 db. at 50 Mc., 3.0 db. at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150V. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply. Model CN-50W, CN-144W or CN-220W wired, (specify IF.) **$49.95.** Model CN-50K, CN-144K or CN-220K in kit form. (specify IF.) **$34.95**

NEW 2 & 6 METER TRANSMITTER

With built in modulator & solid state power supply



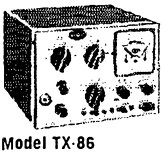
Compact size — 11½" wide, 9½" deep, 6" high.

The new Model TX-62 is easy to tune because all circuits up to the final are broadbanded. There is no other transmitter on the market like it.

SPECIFICATIONS AND FEATURES: Power input to final: 75W. CW, 75W. peak on phone. Tube lineup: 6GK6 —osc., tripler, 6GK6 doubler, 7868 tripler (on 2 meters) 7984-Final. 12AX7 and 6GK6 modulator. Crystal-controlled or external VFO. Crystals used are inexpensive 8 Mc type.

Model TX-62 wired and tested $149.95

COMPACT 6 THRU 80 METER TRANSMITTER



Model TX-86

Handles 90 watts phone and CW on 6 thru 80 meters. Final 6146 operates straight thru on all bands. Size — only 5" x 7" 7 7" — ideal mobile or fixed. Can take crystal or VFO. **Model TX-86 Kit $89.95 — Wired Model TX-86W $119.95. Model PS-3 Wired $44.95. Model W612A Mobile Supply wired $54.95.**

CB-6

CB-6K — 6 meter kit, 6ES8-rf Amp., 6U8-mix./osc. $19.95
CB 6W — wired & tested ... $27.50
CB-2K — 2 meter kit, 6ES8 1st rf amp., 6U8 — 2nd rf amp/mix, 6J6 osc. $23.95
CB-2W — wired and tested, ... $33.95
Model PS-1 — Matching Power Supply — plugs directly into CB-6, CE-2 and CN units. PS-1K — Kit ... $10 50
PS-1W — Wired $11.50

EASY TO UNDERSTAND AMECO BOOKS

Amateur Radio Theory Course	$3.95
Amateur License Guide	.50
Radio Operators' Lic. Guide, EL 1-2	.75
EL 3 ..... 1.75 EL 4	1.25
Amateur Log Book	.50
Radio Electronics Made Simple	1.95

CODE PRACTICE MATERIAL

Ameco has the most complete line of code records, code practice oscillators and keys. Code courses range from start to 18 W.P.M. and are on 33, 45, or 78 r.p.m. records. Model CPS oscillator has a 4" speaker and can be converted to a CW monitor.

Write for details on code courses and other ham gear.

Ameco equipment at all leading ham distributors.

Dept. QST-2

AMECO EQUIPMENT CORP.
178 HERRICKS RD., MINEOLA, L. I., N. Y.
Affiliated with American Electronics Co. and Ameco Publishing Corp.

Silent Keys

IT is with deep regret that we record the passing of these Amateurs:

W1CMT, Frederick Tedford, Pocasset, Mass.
K1JED, Joseph T. Blondin, Warwick, R. I.
W1UG, Oakes A. Spalding, Woods Hole, Mass.
W1VBG, Carl T. Morris, Westfield, Mass.
WB2AGD, Harold D. Niver, Claverack, N. Y.
W2CVT, Albert H. Emery, Poughkeepsie, N. Y.
W2EJP, George C. Rochow, Garwood, N. J.
W3FUY, Stuart A. Wilson, Lahaska, Penn.
W3LDZ, Addison Davidson, Jr., Fountainville, Penn.
W3SDN, Robert Harmon, Seneca, Penn.
Ex KN3YXV, D. P. Glick, Frederick, Md.
K4AWK, H. A. Stewart, Jr., Chesapeake, Va.
K4KWJ, John Webb, Newport, Ky.
W4YJM, Ivan D. Horton, Orlando, Fla.
K4YPY, William Bradley, Nashville, Tenn.
K5DMA, William C. Schneider, Baton Rouge, La.
K5DNF, Duncan B. Ross, Texas City, Texas
W5JFL, Earl V. Evans, McKinney, Texas
W6CNF, Wallace C. Wood, Bodega Bay, Calif.
WA6GOL, James Parks, South Gate, Calif.
W6HQR, Herbert E. Black, Downey, Calif.
W7NYT, Michael Blackwell, Tucson, Arizona
K8ANX, A. C. Meyers, Columbus, Ohio
W8BFP, Richard L. Smith, Tremont City, Ohio
W8HE, Clair B. Andrews, Grand Rapids, Mich.
K8JEN, Virgil R. Crandall, Sr., Kalamazoo, Mich.
K8JUZ, Albert Horvat, Vienna, Ohio
W8LWD, Thomas A. Margraff, Bucyrus, Ohio
W8NX, John L. Jacobs, Port Huron, Mich.
W8PXR, Samuel M. Bell, Ann Arbor, Mich.
W8QVV, Richard D. Boeneman, Ferndale, Mich.
K8TTW, Lawrence E. Snyder, Springfield, Ohio
W8TW, John M. Barnhart, Wintersville, Ohio
K9JSI, Herbert G. Asmus, Laporte, Ind.
WN9KNO, The Rev. Sol Altschuller, Long Island, N. Y.
K9PYW, Clarence Johnson, Muncie, Ind.
K9TMQ, Laurence Luff, Milwaukee, Wisc.
W9WWP, Faye M. Blount, Deerfield, Ill.
KØKZR, Charles Robert Anderson, III, Denver, Colo.
PAØPWS, Peter W. M. Simons, Soest, Netherlands
VE2KH, John E. Pavey, Montreal, Quebec, Canada
VE6HN, Jock Palmer, High River, Alberta, Canada
VE7AKY, Norman H. Doughty, Victoria, B. C., Canada

1964 SET

(Continued from page 67)

12. SANTA CLARA VALLEY (6 reports)		1104 (14)
Burlingame[1, 2, 3]	W6VZE	83
Half Moon Bay Area[1, 3]	W6PLS	103
Monterey Co.[1, 3]	K6TEH	99
Redwood City, Atherton, Menlow Park[1, 2, 3]	W6DEF	631
San Jose[1, 2, 3]	WA6FCH	170
San Mateo[1, 2, 22]	K6PJW	18
13. OKLAHOMA (7 reports)		878 (19)
Comanche Co.[1, 3]	WA5ETA	318
Garfield Co.[1, 2, 3]	W5MFX	109
Oklahoma Co.[4]	K5MIB	....
Okmulgee[3]	W5WAF	....
Ottawa Co.[1]	WA5FLV	56
Stephens Co.[1, 3]	K5SWL	63
14. VIRGINIA (6 reports)		719 (30)
Accomack, Northampton Cos.[1, 3]	W4OID	62
Alexandria[3]	.....	....
Area 4[1, 3]	W4RHC	301
Bristol, Area 9[1, 3]	W4THM	80
Montgomery, Giles Cos.[1, 3]	K4GRZ	116
Norfolk, Area 1[1, 3]	K4ASU	160

15. NORTH CAROLINA (7 reports) 470 (9)

Alamance Co.[1, 2]	WA4FEW	69
Durham Co.[1, 2, 3]	W4LEN	116
Forsyth Co.[1]	W4IRE	153
Gaston Co.[3]	WA4ANII	....
Guilford Co.[1]	W4AJT	102
Orange Co.[1, 2]	W4BZL	30
Wayne Co.[3]	WA4PDS	....

16. WESTERN NEW YORK (6 reports) 755 (25)

Chemung Co.[1, 3]	K2DNN	177
Chautauqua Co.[1]	W2SB	175
Delaware Co.[1, 2]	W2TFL	117
Genesee Co.[1]	K2MDS	133
Orange Co.[3]	WA2JGL	....
Steuben Co.[1, 2, 3]	W2YIY	213

17. KANSAS (8 reports) 956 (27)

Sedgwick Co.[1, 2]	WØBMW	419
Zone 2[1]	WØFRC	203
Zone 5[2]	WØZGK	....
Zone 6[1]	KØGOZ	....
Zone 11[1]	KØJDD	184
Zone 13[1]	KØLPE	....
Zone 14[1]	WØIIJ	....
Zone 15[1, 3]	WØZUX	150

18. NEBRASKA (5 reports) 433 (55)

Dodge Co.[1, 3]	KØJFN	127
Lincoln, Lancaster Cos.[1, 3]	WAØEUM	112
Sarpy Co.[1, 3]	KØIAL	83
Scottsbluff Co.[1]	WØVGR	60
Seward Co.[1, 2, 3]	WØZWG	51

19. EASTERN NEW YORK (4 reports) 882 (23)

Dutchess Co.[1, 3, 16]	W2HZZ	141
Schenectady[1, 2, 3]	K2IOW	541
Ulster, Orange Cos.[1, 14]	WA2GAL	38
Westchester Co.[1, 2, 3, 14]	K2SJN	162

20. RHODE ISLAND (6 reports) 282 (13)

East Providence[3]	W1VWR	....
Johnson[1, 2]	W1POP	44
Narrabay[1]	K1FHS	68
Narragansett[1]	K1JGF	37
Newport[1]	W1JFF	46
Univ. of R. I.[1, 2]	W1QLT	87

21. ARKANSAS (5 reports) 395 (20)

Bexar, Marion Cos.[1, 2, 3, 15]	WA5CAG	20
Jefferson Co.[1]	W5CAM	65
Pulaski Co.[1, 2, 3]	W5DTR	126
Sebastian Co.[1]	W5HPL	137
Washington Co.[1]	K5TCK	47

22. ONTARIO (5 reports) 462 (17)

Hamilton[1, 3, 12]	VE3EUM	146
Metro Toronto[1, 34]	VE3LI	127
Midland Area[1, 23]	VE3AG	73
Peterborough[4]	VE3BUW	....
Whitby[1, 2, 3, 23]	VE3ATI	116

23. MISSOURI (4 reports) 507 (32)

Cass, Johnson Cos.[1, 3]	KØFPC	50
Jackson, Clay, Platte Cos.[1]	KØTCB	176
Macon, Adair Cos.[1, 3]	KØEQY	140
Northwest Mo.[1]	WØOGC	141

24. MARYLAND-D. C. (4 reports) 435 (28)

Baltimore Area[1]	K3SGD	197
Calvert Co.[1, 2]	W3ZNW	48
Washington Co.[1, 3]	W3OYX	190
Washington, D. C.[3]	W3CJT	....

25. SOUTHERN TEXAS (4 reports) 601 (11)

Bexar, San Antonio Cos.[1, 10]	K5UZR	206
Nueces Co.[1]	W5AQK	253
San Particio Co.[1, 2]	W5BRA	32
South Jefferson Co.[1, 3, 21]	K5RV	110

26. MAINE (3 reports) 190 (40)

Somerset Co.[1, 3]	K1QIG	108
S. Aroostook Co.[1, 3]	K1CLF	44
Waldo Co.[1, 3]	K1TZH	38

27. WESTERN PENNSYLVANIA (3 reports) 294 (45)

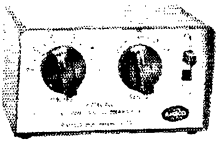
Allegheny Co.[3]	K3ZMH	....
Beaver Co.[1, 3]	K3OTS	99
Blair Co.[1]	K3IML	195

28. WASHINGTON (3 reports) 218 (39)

Benton Co.[1]	W7YFO	125
Whatcom Co.[1, 3]	W7FCH	93
Yakima Co.[3]	K7MGA	....

29. WISCONSIN (3 reports) 299 (24)

Eau Claire Co.[1]	W9BEW	52
Racine[1]	W9SZL	82
Winnebago Co.[1, 3]	WA9EUA	165



AMECO PCL, 6-160 METERS ALL BAND NUVISTOR PRE-AMP

Improves performnce of all weak signal receivers. 2 Nuvistors in cascode give an overall gain of 20 db and noise figures of 1.5 to 3.4 db depending upon the band. Controls: bandswitch, tuning capacitor, and off/stand-by/on switch for inserting or removing pre-amp. Power requirements of 120V @ 7 ma., and 6.3V @ .27A. can be obtained from your receiver or from AMECO PS-1 supply. Size. 3" x 5" x 3"

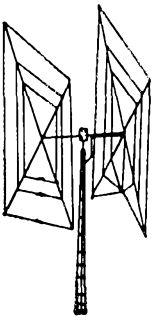
Wired & Tested **$24.95**

PCLP—(PCL with built-in power supply) **$32.95**

W2AU SUPER 2 ELEMENT QUAD FOR OUTSTANDING PERFORMANCE ON 10-15-20 METERS

pre-tuned •• rated 2KW PEP • low Q • low angle radiation • high gain • broad band • low wind load • simplified assembly • rugged construction • single line or 3 line feed • ship. wt.-40 lbs.

$44.95



PRECISION PLANETARY-VERNIER for exceptionally fine tuning

Superb craftsmanship by Jackson Bros. of England. Ball bearing drive. ¼" dia. Shaft 1⅛" long: 6:1 ratio. Vy FB for fine tuning. Easily adaptable to any shaft. Comparable value $5.95 Model 4511 DAF.

$1.50 ea. **10 for $13.50**

Shown approximately actual size

PRECISION BALL DRIVE DIAL

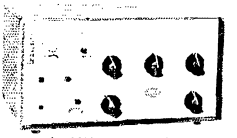
Another superb product of Jackson Bros. of England. 4" dia. dial with 6:1 ball drive ratio. Fits standard ¼" shaft. For that velvet touch . . .

Amateur net **$3.95**

SUPEREX HAM HEADPHONES

Full comfort even after many enjoyable hours of continuous use. Superb comfort even for eyeglass wearers. Crisp, distortionless reproduction and high sensitivity allows you to single out that weak signal and hard to reach station. 600 ohms impedance, completely adjustable head harness.

$24.95



AMECO 2 & 6 METER CW/PHONE XMTR

Model TX-62 complete 75 W. phone and CW transmitter has built-in power supply and modulator. Tunes easily.

50-54 Mc. and 144-148 Mc, Xtal (8 Mc) controlled or can take VFO, Meter reads final grid or cathode current or RF out. Size: 11½x9½—6" high, shipping weight approx. 20 lbs.

Tx-62, wired and tested **$149.95**

VERSATILE MINIATURE TRANSFORMER

Same as used in W2EWL SSB Rig—March, 1956 QST. Three sets of CT windings for a combination of impedances: 600 ohms, 5200 ohms, 22000 ohms. (By using center-taps the impedances are quartered). The ideal transformer for a SSB transmitter. Other uses: interstage, transistor, high impedance choke, line to grid or plate, etc. Size only 2" h. x ¾" w. x ¾" d. New and fully shielded.

Amateur net **$1.39**

3 for $3.49

10 for $10.75

DIRECT/5:1 REVERSE VERNIER DRIVE

The newest in the line of fine tuning aids from Jackson Bros. Direct/Slow Reverse (5:1 ratio) Vernier Drive. Easy fixing — requires only one ⅜" hole. High torque, low back lash, smooth and permanent movement, coaxial spindles, ¼" shaft dia.

Model 4111/RV **$1.95**

actual size

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30. LOS ANGELES (5 reports)			216 (15)
Baldwin Hills[4]	.....	....	
Centmela Valley Area[4]	W6OI	121	
San Fernando Valley[4]	.....	....	
West Covina[4]	.....	....	
Whittier[1, 3, 14]	W6LVQ	95	
31. MINNESOTA (3 reports)			161 (43)
Freeborn Co.[1, 2]	WØFIT	55	
Ramsey Co.[1, 3]	WAØFUR	106	
Steel Co.[3]	WAØDGW	....	
31. COLORADO (3 reports)			216 (26)
Denver Metro Area[1]	WØFA	29	
El Paso Co.[1]	WØGCH	156	
Weld Co.[1, 3]	KØUYF	31	
33. MONTANA (3 reports)			213 (29)
Bozeman[5]	W7NPV	....	
Laurel[1, 2, 26]	W7LBK	82	
Missoula[1, 3]	.....	131	
34. WESTERN FLORIDA (3 reports)			120 (40)
Bay Co.[1, 3, 20]	WA4NRP	85	
Lauderdale, Colbert[3]	WA4HFE	....	
Walton Co.[1]	K4VWE	35	
35. SASKATCHEWAN (4 reports)			309 (58)
Prince Albert, Northern Area[1, 22]	VE5BO	225	
Regina[1]	VE5VD	84	
Moose Jaw[4]	.....	....	
Saskatoon[4]	.....	....	
36. SOUTHERN NEW JERSEY (2 reports)			238 (49)
Atlantic Co.[1, 3]	WB2PHV	107	
Gloucester Co.[1, 2]	K2JKA	131	
37. ALBERTA (2 reports)			268 (33)
Calgary[1, 3]	VE6SA	268	
Edmonton[3]	VE6AJY	....	
38. KENTUCKY (2 reports)			457 (46)
Daviess, Ohio, Handcock, McClean, Muhlenberg Cos.[1]	W4PFQ	216	
Jefferson Co.[1, 14]	W4NOA	241	
38. CONNECTICUT (2 reports)			166 (15)
Bloomfield[1, 2, 3]	W1PRT	84	
West Hartford[1, 7]	K1SJG	82	
40. BRITISH COLUMBIA (2 reports)			150 (34)
Richmond[1, 3]	VE7AKE	92	
Trail Dist.[1, 30]	VE7BOZ	58	
41. ILLINOIS (3 reports)			62 (31)
Bloomington[5]	W9SXL	....	
Monroe Co.[6]	W9ICF	....	
Whiteside Co.[1, 3, 28]	W9IAD	....	
41. DELAWARE (2 reports)			133
Kent Co.[1, 3]	K3OCE	133	
New Castle[3]	K3AZH	....	
43. GEORGIA (6 reports)			39 (37)
Coweta, Fayette[1]	K4IKV	39	
Franklin Co.[4]	.....	....	
Fulton Co.[4]	.....	....	
Hall Co.[3]	K4FLR	....	
Macon[4]	.....	....	
Whitefield Co.[4]	.....	....	
44. ALASKA (1 report)			341 (58)
Anchorage[1, 4]	KL7CUK	341	
45. NEW MEXICO (2 reports)			50 (47)
Los Alamos Co.[1, 3]	K5HTT	50	
North Eddy Co.[3]	WA5HOH	....	
46. SOUTH DAKOTA (3 reports)			133 (22)
Deuel Co.[1, 2, 30]	KØTXW	55	
Lawrence[4]	.....	....	
Yankton Co.[1]	KØYJF	78	
47. WEST VIRGINIA (1 report)			189 (35)
Kanawha Co.[1, 2, 3]	W8IRN	189	
48. SACRAMENTO VALLEY (2 reports)			61 (53)
El Dorado Co.[1, 23]	W6LSW	61	
Sacramento[3]	K6QIF	....	
49. OREGON (1 report)			107 (39)
Josephine Co.[1, 2, 3]	W7DEM	107	
50. SAN JOAQUIN VALLEY (1 report)			91 (58)
Tulare Co.[1]	W6ARE	91	
51. WESTERN MASSACHUSETTS (1 report)			113 (21)
Gardner and Vic.[1]	K1LNC	113	
52. UTAH (1 report)			104 (52)
Utah Co.[1]	K7SAI	104	
53. EAST BAY (1 report)			99 (36)
Metro Contra Costa[1, 24]	W6RTF	99	
54. WYOMING (1 report)			86 (58)
Cheyenne, Laramie Cos.[1]	K7POX	86	

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Low cost — self-supporting 10 - 80 meter antenna. Tunes 3.5 — 30 Mc with manual tap adjustment. Feed with 52 ohm coax. Quick installation. Amazing efficiency for DX or local contacts. Used as portable antenna also.

$15.95
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Overall ht. — 18'. Tubing diameter — 1 1/4" to 7/16". Max. unguyed wind survival — 50 mph. — Mtg. bracket for 1⅝" mast. Wt. 5 lbs.

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Maximum power: 1000 watts AM or CW — 2 KW PEP. Omnidirectional. Vertical polarized.

TECH-CEIVER 6A

Low cost, compact, 6 meter transceiver

Stable superhet receiver. 5 watt transmitter, featuring PTT, using std. (Ft 243) 8 Mc range xtals, non-critical coils, plate modulation, power and modulation indicators, 10 tube performance. Step-by-step manual included. Wt. 9 lbs. 115 VAC Power supply (kit) — 15.95.

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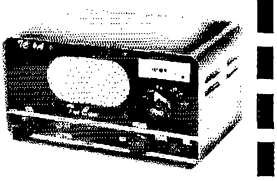

- 5 Watt input
- Sensitivity — better than 1 UV
- Selective — 20KC @ 6DB points
- 49-54 Mc coverage

PSA-63 POWER SUPPLY

Universal Power Supply: Powers most AM rigs up to 100 watts, SSB units — up to 200 watts, PEP. Silicon rectifiers provide both 300 VDC & 600 VDC @ 300 Ma., ICAS (210 watts total), plus 6 VAC @ 10A or 12 VAC @ 5A, plus 95 VAC @ 10 Ma. Size 11¼" x 4¾" x 6". Wt. 15 lbs. Kit — 24.95, Wired — 39.95. Opt'l cabinet — 4.95.

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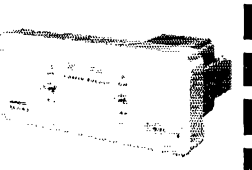

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NEW 80-40 meter diapole using proven parallel diapole principle to resonate on both bands. Requires only one 52 ohm feed line (coax not supplied). Kit includes wire, insulators, center connector & full instructions. Complete formula supplied & quick graph chart for easy adjustment. May be used on 15 meters also. SWR: Better than 2:1 at resonance — 80/40. Max. length — 123 ft.; 140 ft. for lowest CW range. Easy to install. Wt. 4½ lbs. Shipped Parcel Post.

80-40 Meter Diapole
One Feed line

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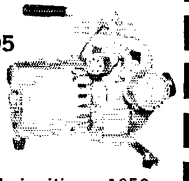

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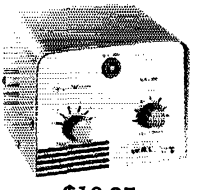
SS-3 "Q" MULTIPLIER

- Notch and peak
- Self Powered
- One simple receiver connection

Int'l 115 VAC P.S. Plugs into Collins 75S-1, KWM-2 & others. Use with receivers having 455KC-IF: AC or DC powered. Adj. selectivity: 300 cy. to 10 KC. Sharp rejection (50DB) null for hetrodynes. 6¼" x 4¼" x 4¾".

$15.95
kit

ANTENNA TUNER MM-100



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kit

Specifically designed to match end-fed long wire which is ½ wave, or multiples thereof, to 50 ohm transmitters. Panel lamp indicator. For inputs up to 150 watts SSB, 100 watts CW, 75 watts AM. 4 x 5 x 4 steel case. Reduces TVI.

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WRL NUVISTOR PREAMP PRINTED CIRCUITS

PA50-2 Stage preamplifier for 6 meters. Use 2 RCA 6CW4 nuvistors. Highest grade glass epoxy board. Assembled and pre-aligned for 50 ohm input-output. Requires 60-120 VDC @ 10 MA. & 6.3 VAC
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55. NEW HAMPSHIRE (1 report)		85 (50)
Section[1, 2, 19]	W1ALE/ W1TNO	85
56. NEVADA (1 report)		64 (42)
Reno, Sparks, Washoe Cos.[1, 2, 28]	W7PC	64
57. IDAHO (1 report)		00 (54)
Nez Perce Co.[3]	W7GMC	....
58. LOUISIANA (1 report)		00 (48)
Algeres, Northwest New Orleans[4]	.....	....
58. NORTHERN TEXAS (1 report)		00 (58)
Terry Co.[4]	.....	....
60. All others		zilch

[1] Mail report received. [2] Bettered last year's score. [3] Radio report received. [4] Hearsay report. [5] Mail report received, no point summary. [6] Mail report received, no test held. [7] October 30, 31. [8] November 1. [9] October 12. [10] October 5. [11] Included in report from W2FI. [12] Includes reports from *W2s* AZA EKL HSB JU KRP ZAI. [13] October 3–5. [14] October 2. [15] October 2, 3. [16] October 11. [17] October 10, 11. [18] October 5. [19] September 8–12. [20] September 9–12, October 3–5. [21] September 30, October 12. [22] October 7. [23] October 18. [24] October 6. [25] October 31. [26] October 17. [27] September 26. [28] October 10. [29] October 22. [30] October 25. [31] October 18. [32] September 29. [33] October 24. [34] October 20.

Miscellany and Comments

As is usually the case, we are in receipt of numerous and voluminous reports of preparations and post-mortems on the SET. We wish we could cover them all in as much detail as they deserve. All such reports will remain on file for one year (until they are shoved out by a new crop of reports next year) and will make good source material for the ARPSC column and ARPSC bulletins.

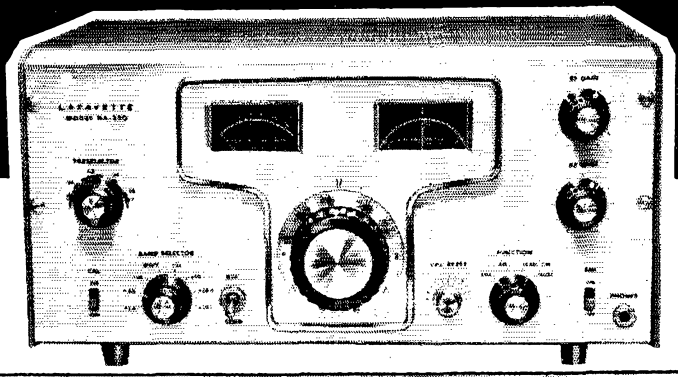
Once again, in 1964, in connection with the SET, we originated twelve "test emergency" messages. This time we tried to make it a *real* test by having the messages originated by a civilian (*i.e.*, non-amateur) official of an agency and addressed to another non-amateur official far away; unfortunately, however, we couldn't get anyone to buy this idea (the only one who nibbled on it "chickened out"), so we had to do the next-best thing — have local ECs originate the messages. We selected one from each call area, plus two from Canada and one from Puerto Rico. A more difficult test than that of a year ago, the messages made better time and we think were less garbled, so the performance generally showed great improvement. Two of the thirteen messages were not received, and perhaps not originated — we still do not know. We hope to have a further rundown of the results of this test in the ARPSC column or a special field bulletin later on.

Those who were active during the SET are well aware of the fact that down in the Mississippi Delta there was nothing "simulated" about the operation. The boys in Louisiana and area were embroiled in the real thing as Hurricane Hilda was cutting up. Both east and west, AREC groups and NTS nets were activated for this emergency. This will explain the extra hours of operation put in by RN5 over and above the amount recommended. ECs were welcome and urged to submit reports of their real operation on the SET report form to have it count for their drill, but not many did so. We forgive you, fellows, and thanks for the swell job during Hilda — more valuable than a test any day.

We want to compliment ECs and NTS managers generally on the amount of preparation put into this test. Some of the bulletins and notices and schedules of operation put out were almost unbelievable because of their completeness of detail. As we write, we have before us bulletins from Los Angeles SEC K6YCX, TCC Director W4ZJY, 4RN Manager W4SHJ, PAN Manager WB6JUH, RN5 Manager K5IBZ, Virginia SCM W4QDY and SEC W4SHJ, Monroe County (Mich.) EC W8NDM, Westchester County (N. Y.) EC K2SJN, CAN Manager W9DYG, N.J.J. SCM W2CVW and SEC K2ZFI, and of course the usual meticulous joint Florida bulletin put out by SECs W4IYT and W4MLE. There are many more in the file. Emergencies are usually not planned, but the procedures set forth in these bulletins are standard, ready to be put into effect at *any* time; for SET purposes, they merely serve as reminders of what should be done.

One of these days we may pull a *surprise* SET, with absolutely no pre-announcement!

NEW! LAFAYETTE



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Lafayette's newest! A dual conversion superheterodyne communications receiver covering the 10 through 80 meter amateur bands and offering a high order of electrical and mechanical stability for superior AM, CW and SSB operation. Check some of the exceptional features!

- Sensitivity 1 μv or Better
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NEW! LAFAYETTE Professional-Quality 8-TUBE AMATEUR RECEIVER Model HA-230

Model HA-230
89.50
Wired
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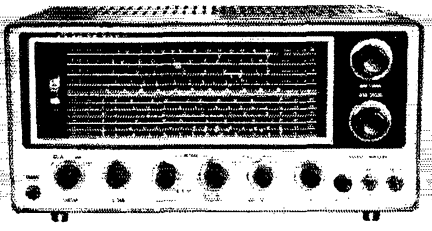

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"Results in a nut-shell: Progress, better than last year; not as good as next year." — *W1YNE, SEC R. I.* "Sorry, no newspaper coverage, editor did not see fit to cover; cancelled my subscription." — *K1QIG, EC Somerset County, Me.* "At the time of the SET I had a total enrollment of 50 members; 8 took part." — *WB2PHV, EC Atlantic County, N. J.* "What we lack in numbers we are trying to make up in quality and hope for a much better showing next year." — *K8EVL, Asst. EC Adams County, Pa.* "Continuous session is better than every two hours — this is how it would be in a real emergency." — *K4GRZ, EC Montgomery-Giles Counties, Va.* "Next year let's get Mama Nature to hold up real disasters until the SET is over!" — *W4LEN, EC Durham County, N. C.* "Since our county was on tornado alert, our score was lower than it would have been." — *K4NUW, EC St. Clair County, Ala.* "There is a desperate need for some active missionary work in this field." — *W4FP, EC Polk County, Fla.* "Hurricane 'Dora' was enough for one year." — *W4WHK, EC Clay County, Fla.* "It was an excellent SET with lots of interest and enthusiasm. It was a test of endurance also for some of us." — *W6DEF, EC Redwood City, Atherton & Menlo Park, Calif.* "Let's hope there are no real emergencies until we get better organized." — *K6LRN, SCM East Bay.* "Was first day of elk hunting season in this area." — *W7COH, EC Missoula area, Mont.* "The advent of transceivers greatly reduces mobile capabilities on ten meters. This is a serious handicap to local AREC and RACES." — *W8IRN, EC Kanawha County, W. Va.* "C.B. provides local communications and manpower, with ham radio providing the long haul liaison, which is as it should be." — *W9ICF, EC Monroe County, Ill.* "I had some difficulty because of the inconsistency between ARPSC and RACES." — *WA9EUA, EC Winnebago County, Wis.* "It might help if publicity was a little earlier coming in *QST*." — *WA9FSW, EC Hancock County, Iowa.* "Our first SET, will work to improve our score next year." — *KØEQY, EC Macon-Adair County, Mo.* "NTS really was not very frantic." — *KØFPC, EC Cass-Johnson Counties, Mo.* "Excellent test and excellent cooperation! May I suggest a manual on ARPSC, even if merely reprints of the excellent articles in *QST*?" — *WØGCH, EC El Paso County, Colo.* "By far the most participation ever reported from this section." — *WØBUL, SEC Mo.* "Took me two weeks of telephone calls to organize our SET. What happens if I only have a couple of hours notice?" — *VE3EUM, EC Hamilton, Ont.* "We plan to have another one before Christmas." — *VE7AKE, EC Richmond, B. C.* "There should be more importance attached to the SET, even more than Field Day. Perhaps it should be a contest to provide greater interest." — *VE6SA, EC Calgary, Alta.*

QST

Beer-Can Baluns

(Continued from page 50)

to the proper length, and be sure that the end is square and free of burrs. Place the brass plate on a piece of transite or other insulating material that will stand the heat of soldering, and insert the copper pipe in the ⅝-inch hole. Make sure that the plate and pipe are perpendicular, and solder them together with a torch. Now line up the brass plate on the end of the beer can, and solder them together with a large iron.

Prepare the N connector or the inside of the pipe end as before. Mark the hole centers and drill and tap the brass bottom for 4–40 thread. Assemble with screws. This assembly method

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SX100	209
SX111	159
SX140	69
S38D	34
S85	69
S108	79
S118	69
S120	47
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III 2 METER	179
G66B	69
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RME VHF126	169
KE93 6AC	109
CLEGG 2BUS	425
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99ER	114
THOR6 6AC	295
THOR6 DC	109
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DX40	44
DX60	57
DX11	39
VHF1 SENECA	159
RX1	179
HW32	119
HW12	119
SB300	259
HP13	57
HP23	39
MP1	57
MT1 XMTR	47
UTICA 650	89
UTICA 650 VFO	22
LAFAYETTE HE10	49
CENT B SLICER	39
KNIGHT T60	37
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ORDER BLANK TO: (1) send for free price list, (2) trade ur present gear, (3) order equipment, (4) sell ur gear for cash.

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(A small deposit will hold the unit of your choice on Lay-Away)

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results in a stiffer balun, with the matching section readily removable for changing the center conductor for different transformer impedances.

Using the Baluns

Performance of the 432-Mc. balun is just great. We've made 12 of them, and all act the same. Careful measurements with good laboratory equipment show the following characteristics:

In matching 50 ohms to 200 ohms an s.w.r. of 1.07:1 at 432 Mc.

Balance 4 degrees off at 432 Mc., 0 degrees at 436 Mc.

Bandwidth plus or minus 10 Mc. for 1.15 s.w.r.

Here are some pointers for proper use of the baluns. If you build according to the dimensions of Table I you will get the impedance and matching qualities you design for. So, if you find an s.w.r. on your transmission between the transmitter and the balun, change the antenna, not the balun. If this is not convenient, or (as is likely) you do not know what the antenna impedance really is, use some form of adjustable matching device between the balun and the antenna. The best method we've found is the "corrective stub." It was described in detail by Tilton[5] and it is in the *Handbook*.

If you design your balun for the impedance of the line to be used to connect it to the antenna (as for example the commonly-used 300-ohm balanced line) you need not know what the antenna impedance actually is in order to use this matching system effectively with coax feeding the output of your transmitter to the balun, when the corrective or universal stub is used.

The balun should be mounted so that the open end is at least one inch away from any object. Ours are mounted by means of angle brackets at the closed end. These can be soldered in place, or held by means of the screws that hold the connector to the can bottom plate.

We hope that you have as noticeable an improvement in your system performance with these baluns as we have had. We wish to thank Chuck Givens, WA6IIP, for making the pictures, and Bob Melvin, W6VSV, Chuck Smallhouse, WA6MGZ, and Hank Olson, W6GXN for their helpful comments. QST

[5] "V.h.f. Antenna Facts and Fallacies," Part III, *QST*, March, 1964, p. 29.

A 64-page cumulateve index to *QST* is available for 25¢ postpaid, covering the years 1950-1964. Request your copy from ARRL Hq., 225 Main St., Newington, Conn.

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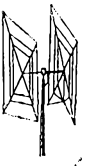

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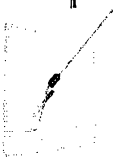

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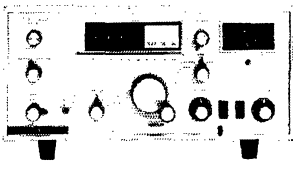

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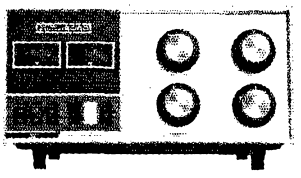

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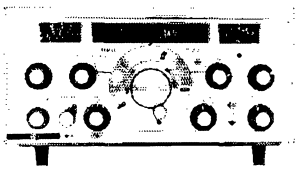

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A.C. For Your Car

(Continued from page 16)

autotransformer of the type that is used in a.c. power supplies was discovered. Such transformers are produced under various trade names such as Variac and Powerstat. This one happened to be a type 10B Powerstat. It had a broken wiper arm, but the winding was in good shape. A little coaxing with a screwdriver removed the bakelite form, leaving a toroid with a 115-volt a.c. winding.

The original winding was first covered with a layer of Scotch No. 27 glass tape. Then the base winding was added. The winding was made in bifilar fashion by paralleling two strands of No. 16 enameled wire and winding on 10 turns of the double conductor, spreading the turns out over the entire circumference of the core. The base-winding center tap was formed by connecting the starting end of one strand to the finishing end of the other strand. The two remaining ends go to the transistor bases as indicated in Fig. 1. The base winding was then covered with a layer of glass tape.

The collector winding was made in the same manner as the base winding, except that 30 turns were made with double strands of No. 14 enameled wire. Some care had to be exercised here because the winding space in the center of the toroid had become limited. The correct phasing was determined by haywiring the transformer into the circuit. If the circuit does not oscillate, reverse end connections to either the base winding or the collector winding (not both). If necessary, the output voltage can be adjusted by increasing or decreasing the number of turns on the collector windings. As a final operation, the whole transformer was covered with a layer of Scotch No. 33 plastic tape.

Results

The output was viewed on a scope and found to be 230 volts peak-to-peak at 60 cycles with a symmetrical rectangular waveshape. This corresponds to an r.m.s. voltage of 115. The voltage and frequency stability proved to be good from no load to a full load of 85 watts. The unit was bench-tested for a period of 10 hours with a load of 60 watts without mishap. At 85 watts, the transformer runs warm after 4 hours. The no-load drain on the car battery is 900 ma. The efficiency runs between 75 and 80 per cent. The output can be easily rectified and filtered and used as a B supply.

The fact that the unit is mounted in the engine compartment has not been detrimental. The perforated cover allows free circulation of air. QST

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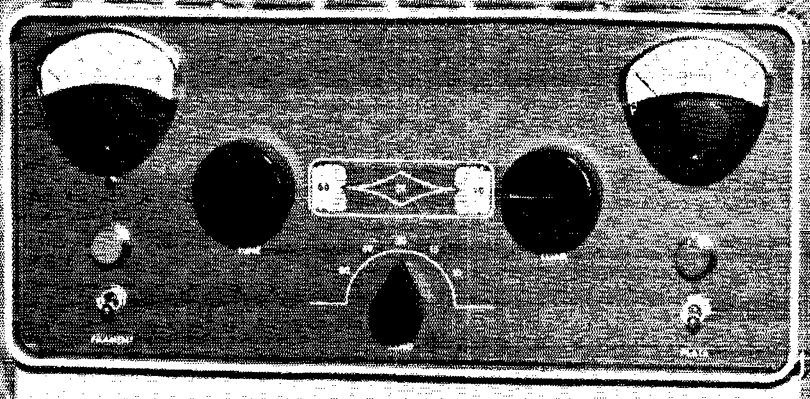

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RTTY SS

(Continued from page 60)

SOAPBOX

"I was all thumbs, but had a lot of fun." — *W1GKJ.* . . . "Loads of DX and had a ball. Keep it the way it is." — *W8KDW.* . . . "Conditions this year were the best yet." — *GM3ENJ/GM3IQL.* . . . "The QRM on 20 was a masterpiece." — *K8MYF.* . . . "Here's to bigger and better RTTY contests." — *W3NMP.* . . . "It was a grand weekend." — *G2HIO.* . . . "Conditions were quite strange. I only worked one statesider." — *ZL1WB.* . . . "Heard lots from Europe on 20 but couldn't seem to get across the pond." — *VE4BJ.* . . . "Haven't had so much fun on the air for a long time!" — *K1PLP.* . . . "Being my first crack at the contest I quite enjoyed it." — *VK2EG.* . . . "The international RTTY activity seems to have picked up considerably since last October." — *W4GJY.* . . . "I will try and get a beam for the next contest." — *PA0FB.* . . . "Heard lots of DX stations, sorry I couldn't reach 'em." — *W7PHG.* . . . "For each and every contact a QSL card was filled out and sent to the respective bureau." — *KP4AXM.* . . . "Didn't have a very high score but sure had lots of fun." — *W5JUM.* . . . "This was my first RTTY contest but not my last." — *SM6CSC.* . . . "The QRM on this side of the ocean was much heavier than last year." — *OZ8US.* . . . "Managed to make 50 QSOs in spite of the QRM." — *XE1YJ.* . . . "The bands were all open at the usual times to all parts of the world." — *UA1IF.* . . . "It was barely an afternoon tea party in this part of the world." — *VK3KF.* . . . "Swell contest, the only one I enter." — *W0DOP.* QST

Correspondence From Members

(Continued from page 84)

operator without instruction in the matter. It sounds ridiculous to hear a s.s.b. operator make the statement that he is going to ". . . put on the linear" with the implication that previously he has been operating in some other manner!

So let's call an amplifier an amplifier, men! If you are on s.s.b., we know already that you think it's linear.

Or should we go back to calling a variable frequency oscillator an e. c. o.? — *K1AEC*

World Above 50 Mc.

(Continued from page 78)

lasting for nearly 60 seconds." Thanks fellas, your publication is a very interesting one and you do a beautiful job on it. W6YKS tells of October openings on six meters: on October 20 John worked Utah, Arizona, Nevada and San Diego; on the 22nd he heard Arizona and California; on the 23rd it was a fair opening to southern California with a number of those boys worked.

In addition to the 50-Mc. s.s.b. net, operated for several years now, each Sunday morning at 11, the East Coast V.h.f. Sideband Association is running two 2-meter net sessions. K3CZI is NCS for a period beginning at 9 a.m. each Sunday, operating on 145.1 Mc. K3KEO, Magnolia, Del., runs another at 10 a.m. on 144.1. All sidebanders are welcome to check into either session. The 50-Mc. session at 11, still in the capable hands of W2CVF, Brooklyn, N.Y., is running as high as 55 check-ins of late. QST

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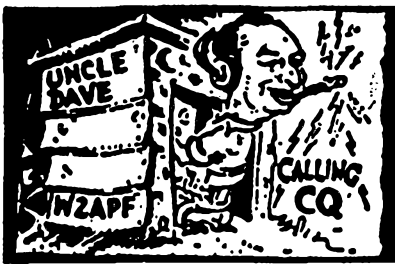

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SIMPLE-TO-INSTALL, HI-PERFORMANCE ANTENNA SYSTEMS:

1 KW P.E.P. Mono-Band Kit . . . 1KMB1V/81K . . . $19.95*
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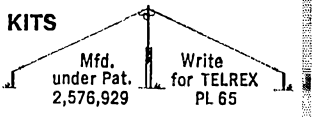

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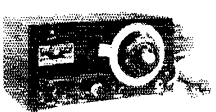
ASBURY PARK, NEW JERSEY

LAMPKIN METERS + 2nd Commercial License = YOUR OWN PROFITABLE BUSINESS!

YOU ALREADY HAVE EARNED ONE FCC LICENSE . . . YOUR HAM TICKET. IT HAS GIVEN YOU LOTS OF FUN. WITH A LITTLE EXTRA STUDY YOU CAN EARN ANOTHER — A 2ND-CLASS RADIO TELEPHONE. THIS TICKET CAN LEAD TO LOTS OF MONEY — IN A BUSINESS THAT'S A NATURAL FOR A HAM!

THERE IS AN URGENT NEED FOR TECHNICIANS WITH 2ND-CLASS COMMERCIAL LICENSE, TO MAINTAIN TWO-WAY COMMERCIAL RADIO. CLOSE TO 3,000,000 NON-HAM MOBILE RIGS MUST BE KEPT OPERATING. CITIZENS BAND RADIO IS EXPLODING. FREQUENCY ADJUSTMENTS ON ALL THESE OUTFITS CAN ONLY BE MADE BY PROPERLY LICENSED AND EQUIPPED TECHNICIANS. TO LEARN MORE . . .



LAMPKIN 105-B FREQUENCY METER
RANGE 0.1 TO 175 MC AND UP.
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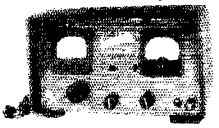

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At no obligation to me, please send me free booklet "HOW TO MAKE MONEY IN MOBILE-RADIO MAINTENANCE"—and data on Lampkin meters.

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HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.
(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all 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. Ham-ads signed only with a box number without identifying signature cannot be accepted.
(3) The Ham-Ad rate is 35¢ 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 10¢ 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 10¢ rate. Address and signatures are charged for. **An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ 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 copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.
(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 except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

HAMVENTION Notice! The Dayton Amateur Radio Association invites you to the 14th Annual Dayton Hamvention Saturday, April 10, 1965, Wampler's Ballarena, Dayton, Ohio. Banquet Speaker, Bill Leonard of CBS. Technical Sessions: DX, SSB, Antennas, RTTY, and Army MARS; Hidden Transmitter Hunt, Exhibits, women's activities. FCC Exam, general class only. Make examination application in advance to Engineer in Charge at your local F.C.C. office. F.C.C. will issue examination papers Friday evening, April 9. Exhibits: Saturday Registration 07:00—17:00; Exhibits 07:30—18:00, Forums 09:00—17:00; Banquet 19:00. For information, write Dayton Hamvention. Dept. A, Box 44, Dayton, Ohio, 45401.

MIDLAND (Texas) Amateur Radio Club Annual St. Patrick's Day Swapfest, March 21st. Inquiries invited. 510 Midland Savings Building, Midland, Texas 79704.

AUCTIONFEST. Ft. Lauderdale, Fla., Saturday, Mar. 6, Armory. SW 4th Ave. at SW 24th St (Rte. 84). Opens 8 A.M. Schmidt, W4NYF, Chm., Broward Amateur Radio Club.

WANTED: Early wireless gear, books, magazines, catalogs before 1922. Send description and prices. W6GH, 1010 Monte Dr., Santa Barbara, Calif.

MOTOROLA used FM communications equipment bought and sold. W5BCQ, Raph Hicks, Box 6097, Tulsa, Okla.

WANTED: military or industrial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y.

WANT Callbooks, Catalogs, magazines, pre-1920 for historical library. W4AA, Wayne Nelson, Concord, No. Carolina.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP. Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan. Tel. NOrmandy 8-8262.

WANTED: All types of aircraft on ground ratios. 17L 618F or S 388, 390, GRC, PRC, 51J, RVX. Collins linear amplifier, Type 204; Especially any item made by Collins Radio, ham or commercial. Also large type tubes and test equipment in general. For fast cash action contact Ted Dames, W2KUW, 308 Hickory, Arlington, N.J.

SELL swap or buy ancient radio set and parts, magazines. Laverty, 118 N. Wycombe, Lansdowne, Penna.

We Buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., P.O. Box 516, 199 Front, Hempstead, N.Y.

WANTED For personal collection: Benwood Bakelite Rotary Gap; antique gear dating back to 1915 or earlier. Spot cash! WØZAB, 4 Williamsburg, St. Louis 41, Mo.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Clinton, Chicago 6, Ill.

CASH For Callbooks. For private collection. U.S. Government Callbooks before 1927. Radio Amateur Callbook Magazine 1942 wanted. W8EF, 801 Lake Shore Road, Grosse Pointe 36, Mich.

COLLINS 32S-1 xmtr, $300.00. J. F. Young, W5HXW, 1234 Glen Cove, Richardson, Texas. Tel: 14-235-6927.

304TL tubes wanted. Also other xmtrs and special purpose tubes. We will buy military or commercial transmitters and receivers with designations ARC, GRC, URR, 51 and MN. Air Ground Electronics Co., 64 Grand Pl., Kearny, N.J.

TUBES, Diodes, transistors wanted. High cash prices paid. Astral Electronics, Box 636, Elizabeth, N.J. Tel: 354-3141.

QSLS?? WPES?? Personalized made-to-order one-day service! Largest variety samples 25¢ DeLuxe, 35¢ (refunded). Sakkers, W8DED, Box 218, Holland, Mich. (Christian Ham Callbook, $1). Religious QSL samples. 25¢.

C. FRITZ QSL's. Sorry, fellows, due to pedestrian (me) auto accident, I am on my back for 3 months. All damage to legs—first reports are encouraging. See you later!

QSLS. Twenty exclusive designs in 3 colors. Rush $3.00 for 100 or $5.00 for 200 and get surprise of your life, 48-hour service. Satisfaction guaranteed. Constantine Press, Blandensburg, Md.

QSLS. Samples 20¢. QSL Press, Box 281, Oak Park, Illinois. 60303.

QSLS "Brownie" W3CII, 3111 Lehigh, Allentown, Penna. Catalog with samples, 25¢.

QSLS-SMS. Samples 10¢. Malgo Press, Box 375 M.O., Toledo 1, Ohio 43601.

QSLS "Frier" Harvard St. Schenectady, N.Y. 12304. Large "Clip and Design" Catalog with samples, 25¢.

DELUXE QSLS. Petty, W2HAZ, Petty Printing Co., Inc., 1702 5th. Trenton, N.J. 08638. Samples. 10¢.

QSLS Stamp and Call bring samples. Eddie Scott, W3CSX, Fairplay, Md.

QSLS. See our new "Eye-Binder" cards. Extra high visibility. Samples 25¢. Dick, W8VXK, 1994 N. M.-18, Gladwin, Mich.

QSLS, SWLs, XYL-OMs (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing; eye-catching, comic, sedate, fatabulous, DX-attracting, prototypal, snazy, unparagoned cards (Wow!), Rogers, KØAAB, 961 Arcade St., St. Paul 6, Minn.

QSLS-SWLS 3-colors, 100 $2.00. Samples dime. Bob Garra, 414 Mahoning St., Lehighton, Penn.

QSLS, 100 for $3.00. 28 new drawings. Samples 10¢. Brigham, Colson St., North Billerica, Mass.

QSLS. Samples 10¢. Wildcat Press (W6CMN, Bill), 6707 Beck Ave., North Hollywood, Calif. 91606.

QSL, SWL, cards that are different. Quality card stock, Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio.

QSLS Distinctive samples dime. Volpress, Box 133, Farmingdale, N.Y.

DON'T Buy QSLS until you see my free samples. Bolles, W5OWC, Box 9363, Austin, Texas.

QSL, SWLS, WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

QSLS: Economy, 2 color, 125 for $3.75. Samples Free. R. A. Larson Press, Box 45, Fairport, N.Y.

QSLS. Samples Free. Blantons, Box 7064, Akron, Ohio 44306.

QSLS, SWLS. Gorgeous Rainbows, etc. Top quality, fast service! Low prices. Samples 10¢ (refundable). Joe Harms, WA4FJE, (ex/W1GET, W2JME), 905 Fernald, Edgewater, Fla. 32032.

ZIP Code Rubber Stamp. Call, name, address, with ink pad. $1.00. K4ISA, Perry, Box 8080, Allandale, Fla.

QSL Specialists. Distinctive Samples. 15¢. DRJ Studios, 2114 N. Lavergne Ave., Chicago, Illinois. 60639.

PICTURE QSL Cards of your shack, etc. Made from your photograph. 1000, $14.50. Also unusual son-picture designs. Samples 20¢. Raum's. 4154 Fifth St., Philadelphia, Penna. 19140.

QSLS New cartons. Top quality, fast service. Samples 20¢. Ed's Press. 3232 LeMoyne, Chicago, Ill. 60651.

QSLS. Free samples. Attractive designs. Quick service. W7IIZ Press. Box 183, Springfield, Oregon.

SUPERIOR QSLs, samples 10¢. Ham Specialities. Box 73, Hobbs, New Mexico (formerly Bellaire, Texas).

QSLS. Samples 25¢. Rubber stamps: name, call and address $1.55. Harry Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

QSLS 300 for $4.35. Samples 10¢. W9SKR, "George" Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS 3-color glossy, 100, $4.50. Rutgers Vari-Typing Service. Free samples Thomas St., Riegel Ridge, Milford, N.J.

QSLS Kromekote 2 & 3 colors, attractive, distinctive, different. Free ball point pen with order. Samples 15¢. Agent for Call-D-Cal decals. K2VOB Press, 31 Argyle Terrace, Irvington, N.J.

QSLS $2.50 per 100. Free samples and catalog. Garth, Box 51Q, Jutland, N.J.

½" Call QSLS $2.40/100, $2.90 (2 sides). Samples. Gariepy, 2624 Kromer, Ft. Wayne, Ind.

GREET Ham Friends with 3-D Personalized Christmas cards. Newest holiday idea. Brilliant, sparkling designs. Samples 10¢. 3-D QSL Co., Monson 2, Mass.

3-D QSL Cards have that prestige look, with glittering colors and metallics in raised space-age designs fused to brilliant plastic finishes. Cost so little more than mere mediocrity! Samples 25¢ (refundable). 3-D QSL Co., Monson 2, Mass.

QSLS. Modern designs. Call stamped in gold. Free samples. American Roll Leaf Mfg. Co., 1629 Northern Blvd., Roslyn, L.I., N.Y.

QSLS-100 3-color glossy $3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64114.

AT Last! Something new in QSL cards! All original designs. Send 25¢ for samples to Yarsco, Box 307, Yorktown Heights 1, N.Y.

CUSTOMIZED QSLS with your autographed photo. Dime brings sample. Pic-Ur-QSLs, Rice Lane, Baltimore, Maryland 21207.

RUBBER Stamps, 3-line. $1.00. Andrew Travis, 2002 West 8th, Austin, Texas. 78703.

RUBBER STAMPS $1.00. Call and address. Clint's Radio W2UDO, 32 Cumberland Ave., Verona, N.J.

PICTURE OF yourself, home equipment, etc. on QSL cards made from your photograph. 250—$7.50 or 1000 $14.99 ppd. Samples free. Write to Picnic Cards, 129 Copeland Ave., La Crosse, Wis. 54603.

ATTRACTIVE QSLS: Guaranteed largest variety of individual samples (25¢ deductible). Paul Levin, K2MTT, 1460 Carroll St., Brooklyn, N.Y. 11213.

QSLS. Free samples. WA6QAY Press, 3363 Wicopee Place, San Diego, Calif. 92117.

QSLs. Finest. Filmcrafters, Box 304. Martins Ferry, Ohio.

SELECTED QSL samples 10¢. Tom, W6OHE, P.O. Box 2411, San Bernardino, Calif.

QSLS. Samples, dime. Printer, Corwith, Iowa.

QSLS, YLRL Specials, OM's, reasonable. Samples 10¢. W2DJH Press, Warrensburg, N.Y.

QSLS: 100, $3.00; 200, $5.00; 500, $10. K5MHZ Press, Box 10183, Alameda, New Mexico, 87114.

PLASTIC Holder frames and displays 20 QSL cards, 3 for $1.00 or 10 for $3.00. Prepaid. Tepabco, Box 198, Gallatin, Tenn.

ENVELOPES For ham station, printed with QTH; 100 6¼". $1.50. 100 9½" $1.85. pp. Ham Enterprises, Box 4133, Dallas, Texas

CANADIANS: Want Johnson Courier, preferably f/w, for cash. Please state price and condition. E. Crump, 64 Barrie, Galt, Ont. P., Canada.

CANADIANS! Selling: National 270 receiver, Gonset G-76 transistor DC power supply model 3350; Heathkit preamplifier WAP-2. Wanted: Gonset G66-B. VE2OU, P.O. Box 355, Riviere du Loup, Quebec P., Canada.

CANADIANS: Ranger I for sale or trade. Need SSB xcvr. D. Driedger, VE3DKE, 1336 University W., Windsor, Ont., Canada.

TUBES Wanted. All types, highest prices paid. Write or phone Lou-Tronics, Inc. 74 Willoughby St., Brooklyn 1, N.Y. 11201. Tel. UL-5-2615.

ACT Now!! Barry pays cash for tubes (unused) and equipment. Barry Electronics, 512 Broadway, NYC 12. Call 212-WAlker-5-7000.

COLLINS Amateur equipment bought, sold and serviced. Paul A. Reveal, W2DC, 129 Midland Ave., Glen Ridge, N.J.

TUBES, Diodes, transistors wanted. High cash prices paid. Astral Electronics. Box 636, Elizabeth, N.J. Tel: 354-3141.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J. Tel. GArfield Area code 201-471-2020.

CASH For Your Gear. We buy, sell and trade. Send for free bargain list. H & H Electronic Supply, 506 Kishwaukee St., Rockford, Ill.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts; 617-598-2530 for the gear u want at the price u want to pay.

WANTED: Collins Parts, BC-610, GRC-27. Autodyne, Bethpage, L.I., N.Y.

TRADE: SBE-33 transceiver, 1 yr. old, recently factory overhauled. Like new condx, together with new SB1 VOX, PTT mike, transistor mobile p/s mobile mount and manuals, plus $400 cash. For trade on KWM 2 and A/C P/S or will consider Collins 30S-1 linear. Give or take. Call, write, or fone day or evenings: CH 9-0923, A. J. Bertolisi, 382 Fulton St., Farmingdale, L. I., N.H. 11735.

KWM-2 with 516 F ac., supply, $900; 30L-1, $400. Factory checked and aligned, cables and manuals. Condition excellent. Ted Brix, 5573 N. Van Ness Blvd, Fresno 5, Calif.

ELECTRONIC Tubes Top Brands Sold at substantial savings! (Minimum Order $15.00). Authorized GE, Amperex, Dumont & Eimac Distributor. Send for Free Buyers' Guide for all your Tube Requirements. Top Cash Paid for your excess inventory (New Only-Commercial Quantities). Metropolitan Supply Corp., 443 Park Avenue South, New York, N.Y. 10016, 212-MU 6-2834

FOR Sale: Back issues QST and CQ. Large S.A.E. for list. Will swap. W2TAM, 140 Summit Ave., West Trenton, N.J. 08628.

CRYSTAL Bargains. Free List. Nat Stinnette, W4AYV, Umatilla, Fla. 32784.

GOVERNMENT Surplus. Buy costly electronic and mechanical surplus from government agencies and from world-famous, nationally known Surplus Center. Purchase $4,100 electronic amplifiers, $13.91; $500 motor gyroscopes, $12.47; $110 automatic stepping switches, $12.91. Hundreds of other electronic surplus bargains. Send 50¢ (stamps) for list of "where and how to buy" from government sales depots plus our three large illustrated electronic, hydraulic, mechanical sales catalogs. Surplus Center, Box 713 QS-12, Lincoln, Nebraska.

CLEGG Venus with AC supply, never used, to be sold substantially below cost. K7EPD, 4250 East Palo Verde Dr., Phoenix, Arizona. Tel: 947-1518.

RTTY Gear for sale. Write for list. 88 or 44 mhy Toroids, Five for $1.75 ppd. Elliott Buchanan, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

100V Central Electronics. The transmitter with everything. Exclnt condx, $399. K2JZW, Nussbacher, 212-332-5870. 2750 Homecrest Ave., Brooklyn 35, N.Y.

WANTED: Model 28 teletype machines and cabinets. Cash or trade for new amateur equipment. Alltronics-Howard, P.O. Box 19, Boston 1, Mass. 02101. Tel: 617-742-0048.

LOOKING? Shopping? Trading? Trying to save money? Write Bob Graham for special deals on new and reconditioned used gear. Cash or Budget. Graham Radio, Dept. A, Reading, Mass. 01867. Tel: 944-4000.

WILL Buy pre-1925 QSTs, etc., etc. State condition and price. W6ISQ, 45 Laurel Ave., Atherton, Calif. 94025.

COLLINS Owners. AM adapter, $5.00! State model. KWM-2 Kc independent receive adapter, $15. No circuit changes! S-Idering! Holes! Easy installation! Kit Kraft, 104 Mound, Harlan, Ky.

MOBILE Rig complete: Ameco TX86 factory-wired, Honeywell mobile supply, push-to-talk mike. Gonset Super 12 converter, Ameco noise limiter. All for $198.00. Leo Israel, W2MNE, Tel: 516-OR6-7046. 35 Henry Dr., Glen Cove, LI., N.Y.

HAM Discount House. Latest amateur equipment. Factory sealed cartons. Send self-addressed stamped envelope for lowest quotation on your needs. PL-172 and socket, $95; CDR TR-44, $50; SR-160, $290; Hy-Gain TH-4, $85. Used less than 5 hours, HW-12 with HP-23 and HP-13, $195. F.o.b. HDH Sales Co., 170 Lockwood Ave., Stamford, Conn.

FOR Sale: 75A-4 like new, #5430 3.1 kc filter and mathagica speaker, vernier dial only $475. W8NRE, 1598 Van Gesien Rd., Caro, Mich. 48723.

HEATHKIT Marauder, brand new, professionally wired, $295.00; Mohawk receiver, used, but in exclnt condx, $150.00; Warrior linear, used, also in exclnt condx, $175, or sell the works for $550. Will be willing to ship. Richard A. Hoppe, 208 E. Monroe St., Valparaiso, Ind.

FOR Sale: Plate transformers 3600-0-3600 VAC @ 1000 ma. CCS, with 120/240 VAC primary, one year unconditional guarantee, $35. 4-1000A filament transformers 7.5 V.C.T. @ 21 amps, $15. 872A bridge filament transformers 3 secondaries 5.0 VAC @ 20 amps. 20KV ins. $25. Peter W. Dahl Co., 5331 Oaklawn Ave., Minneapolis, Minn. 55424. Tel: 922-7618

GLOBE Hibander 6-2 with VFO, Johnson converter 6-2, D104C, Tapetone 6M with p/s. WA2DEW 372 Essex Ave., Bloomfield, N.J.

SALE: HT-32 xmtr. Exclnt condx, almost new. Must sell. Make offer to Goldenson, Sunny Ridge Road, Harrison, N.Y.

WANTED: Two inch wide recording tape for RD142A/UN Recorder. WIGPY.

WANTED: Ancient de Forest spherical audion with screw base, "H" tube. Carbon filament switchboard lamps. 916-A radio frequency bridge. W9EWK, 610 Monroe Ave., River Forest, Ill. 60305.

COLLINS S/Line in top condx 75S-1, 32S-1 and AC supply. Ship in original boxes. All for $800. D. Anderson, KØBLO, Box 437, Hiawatha, Iowa.

HEATH Pawnee, $135.00; BC-221, $80; BC-212, $60; G-E 'scope, $75; RDZ, $45, ART-13, $35. Lewis, Va Tel. Lexington, Va.

SELL: 75S-3B w/500 cycle mech. filter 32S-3, 516F-2, all as new condx, less than 6 months old, works, $1200. Will deliver within 500 miles or I pay shipping in continental U.S. G. Schoofs, WØIVY, P.O. Box 32, Silver Bay, Minn. Phone (218) 226-4133.

HUNTER Bandit 1000A sealed carton, half-price; Bandit 2000A, mint, $319; 136A-1 blanker for 75S-1, new, $49.00; VFO for KWM-1, 70K-1, new, $29. VFO for KWS-1, 70E-23, new, $39; Collins 51S-1 in warranty, $1150. Richard E. Mann, 7205 Center Dr., Des Moines, Iowa.

MUST Sell: Package deal $860. National NC-303 receiver with matching speaker and Johnson Viking "500" transmitter. In excellent condition, no scratches and used very little. Will ship. S. U. Berger, KØRTZ, P.O. Box 182, Schleswig, Iowa.

CLEGG 99er, "mike-phone", monitor, preamp. $95 Spanmaster 80-10 M rcvr $10 xtal calibrator $5. All ppd and in perf. working condx. WA9KAN, 1436 Bonniebrae, River Forest, Ill.

HW-12-22,-32 owners. Four hour conversion to self-contained Triband transceiver with SSB and cw coverage. Parts will cost less than $20. Complete instructions. $3.00 ppd. WA2SJZ. Robert Christie, 88-15 168th St., Jamaica 32, L.I., N.Y.

COMPLETE SBE-33 mobile rig. Coils, antenna, p/s, mike, mntg brackets. Used 4 months: $350. BC-221 with book and AC supply, $75. Teletype model 26 with converter and 'scope tuning, $100. E. Melmon, 180 San Aleso, S.F., Calif. K6DOF.

SELL: Factory-wired Ranger II, Hammarlund 180-A, D-104 mic w/ptt, Dow-Key in original cartons. Never used! No reasonable offer refused. You pay shppg. P. O'Brien, 63 Second St., New Rochelle, N.Y. 10801

HEATH HX-20. HP20. $150; Model 14 teletype. Steel Tex TT100 RTTY adaptor and magnet driver, $100. K2HJY, Box 292, RD, Medford, N.J. Tom Bethel.

POWER Supply: Combination transformer and silicon rectifier, 120/240 VAC input. Rectifier can be connected bridge or doubler. Bridge: 3000 VDC, 800 Ma. SSB. Doubler: 6000 VDC, 500 Ma. SSB. 4¼ x 5½ x 7½ 30 lbs. $49.50 F.o.b. Los Angeles. Other combinations available. Specialty Engineering Co., 9007 Avalon Blvd., Los Angeles, Calif. 90003.

GALLON Linear. Electronically regulated. Bias supply. Beautiful construction. Fully metered. All band KW antenna tuner. Parts for power supply. Enclosed in 3 ft. rack. $130 complete. Charles King, K1ETU, 36 Linsley Ave., Meriden, Conn.

SELL Or trade: Winco 3000 watt gas generator set (exclnt condx), 115V ac and 230V ac, 60 cycle, Briggs & Stratton engine, rope start; also DX-100, SX-28, Telrex 3-el, 15M full size beam (like new), and RCA Master Voltohmyst WV-95A; want Drake TR-3, RV-3, AC supply. DC supply. W2QFQ, Bernard Schreibman, 362 Meadowbrook Ave., Eatontown, N.J. 07724

DRAKE 2B, $195.00; Q-multip./spkr, $20; calibra., $10. All in like-new condx. Steve Greenbaum, WA2NEU, 49 Wadsworth Terrace, N.Y.C., 10040. Tel: 212-LO9-1005.

GARDINER Automatic code sender, 22 rolls, like new, $25.00. Andrew L. Freeman, 1805 North Third St., Grand Forks, North Dakota.

GETTING The new NCX-5. Would like to sell my mint condx NCX-3 for $265. Getting the new NCX-5. Would like to sell my mint condx NCX-3 for $265.00. WA2LIM, tel: 212-461-1779.

FOR Sale: SP-44 Panadaptor, $40; Prop pitch motor, $15.00; DX-100, $85.00; DSB100, $40; Precision series E-200-C signal generator, $20; Cardwell, dual 850 mmfd, variable, $10; B&W 75 ohm lo-pass KW filter, $10; Stanor P8044 plate xfrmr, dual secondary 1000 VCT, 400 VCT each at 150 ma., $15. UTC LMI 2500 lo-pass filters, $7.50 ea. 304TL, new, $15.00. W1OUG, 150 Brook Run, Stamford, Conn.

WANTED: HQ-145X or later model. Jim Taylor, 6701 Darby Rd., Hyattsville, Md. 20784.

WANTED: ATJ-ATK, less iconoscope. Write: Teller, 1521 E. Parkway, Brooklyn 33, N.Y.

VALIANT. $185.00; HQ-110C, $160; HT-40, $65.00; Vibroplex Original, $10.00; AT-1, $15.00; Johnson 122 VFO, $25.00. HB antenna coupler, $10.00; Ameco code osc., $10.00; NC-88, $50. Sell or trade for gud transcvr. Joseph Redman, 11613 Ashley Drive, Rockville, Maryland.

FOR Sale: Ranger II, factory-wired, used two hours, with coax relay and D-104 mike; $250.00. Also HA-1 keyer and matching Vibroplex key, $50. Ed Pearson, 2202 Hillcrest Dr., Duluth, Minn.

MECHANICAL Filter wanted, 800 cycles for 75A-1. W2DPP.

KWM-1, mobile mount; AC power supply, and head mike. All for $275.00 plus shipping chgs. W5FJR, 5475-G Kelley, Ft. Knox, Ky.

MODEL 26 RTTY printer and keyboard for sale, complete with stand. Write for further details to Mark E. Ballard, 721 West Seventh St., Marion, Ind. All inquiries answered.

HW-12 with Heath AC and DC supplies: xtal cal., 3 months old; $225.00. Ranger II, technician-wired, 5 months old; $250.00. HQ-110 w/Ameco 6-meter preamp, $130.00. Will ship collect. WA4RYN, 1320 Canary Dr., W. Columbia, S.C.

DRAKE 2-B, matching speaker, Q-multiplier, $200; HX-500 with factory recommended modifications, $400; TA-33 Sr., Ham-M, $100.00, bug, mike, cable, etc. Call 516-MA1-7125. R. Shaper, 2108 Univ. Halls, Cornell Univ., Ithaca, N.Y.

MECHANICAL Filters, RCA. Build a super Q5er, update your equipment. Schematic included. Either 1 Kc wide, cw type, at 100 Kc or fone type, 9 Kc wide at 300 kc. Only $5.95 each. Bob Wilson, W5NUW, 419 Davis, Nowata, Oklahoma.

SHACK Cleanout: Rcvrs, BC794 (Super Pro) w/p.s., BC-342; transmitting tubes, 4-1000As, 250THs, library of tech manuals on surplus gear. Parts and assemblies for R-390A, HP 400D AC VTVM. Send for list: Ken Van Houten, K1YNN, RFD Box 16, Reading, Vt.

WANTED: Rig with VFO and power supply to $100. Gred Goldblatt, K3MAY, 1523 Robbins St., Philly, Penna.

SELL: DX-100 (will work SSB with SB-10), $105. Mosley CM-1 speaker, Knight xtal calibrator, $110.00. Command BC-455-B receiver (6-9.1 Mc) spkr, p.s.; excint condx, $45. Precision 912 tube-tester, with instructions, recent tube chart, $25. Doug Steinmetz, A6SUZ, 121 Rheem Blvd., Orinda, Calif., Tel: 415-254-2370.

WANTED: D.C. supply and mobile mounting rack for SR-150. John G. Crosby, 728 Peachtree Circle, Marietta, Ga. 30060.

AUDIO Bandpass filter of February 1964 QST, p. 41 wanted. A. Goyette, 68 Kempster Ave., Ottawa 14, Ont., Canada.

HOMEBUILT Receiver, 80/40 meter, good shape. Built from Handbook. WNØKDA, Dave Gulick, RR No. 4, Mexico, Mo.

KWM-2, 516F-2 power supply with spkr. Recently returned from Collins with latest modifications and performance sheet. Original condx, no scratches. Cash deal only. Free delivery 100 miles; $777.00. Jack N. McVicar, 2127 Adel, Janesville, Wis. K9OBQ.

KWM-2 516F power supply 1½ years old. All new tubes. Linear 4-1000, Collins directional watt-meter. Ham-M rotor, TA33 Sr. Beam; Heath monitor scope, all housed in 2 relay racks 5 ft. 8 in. by 3 ft. 8 in. You just plug it in. $1300 takes it. Peter Williamson 132 Winthrop St., Augusta, Me. 04330. K1RES, Tel: (days) 622-6119.

FOR Sale: RME 4301 Sideband selector, never used. W8WGO, 14487 Washington Blvd., Cleveland, Ohio 44118.

SELL: WRL Meteor, matching supply; Eico 722 VFO, your best offer. WA2ZVJ, 2115 East 27th St., Brooklyn, N.Y.

FOR Sale cheap. QSTs or CQs, any quantity. Send your list for quotation. Cash for Callbooks before 1942. Want early radio gear and publications. Erv Rasmussen, Box 612, Redwood City, Calif.

SELL: Apache, Mohawk, Warrior A-1 firm $475. You ship. WA2UQP, Robert B. Cummings, R.D. No. 1, Rock Stream, N.Y.

SELL: Gonset G-66B mobile receiver with factory-built 12-volt matching power supply. Perfect condx, $100 or best offer. W9-EKL, 7 Imperial Court, Champaign, Ill. 61821.

SELL TR-3 and D.C. supply. W9BIU, Fred Gwyer, Box 236, La Grange, Ill.

SELL: Heath HX-10 Marauder, $260.00; Heath "Tener", $20; National NC-240D rcvr, $65. G. Jones, K1QDR, 15 Amy Road, Framingham, Mass.

WANTED: Commercial or Military, Airborne or Ground, equipment and testsets. Collins Bendix, others. We pay freight. Ritco, Box 156, Annandale, Va.

HALLICRAFTERS SR-150 and AC power supply, $450. National 183-D, $225. All as new, one owner. T. L. Piche, 177 Pearl St., Burlington, Vt.

WANTED: C.E. MM-2, receiving adaptors; HRO-60 E, AA, AB, coils, accessories; Japanese, Collins, RCA mechanical filters; FT-241 Channels 326-30; old electronics catalogs. LP-5, LM-10 manuals. WB2FIL, RD-1, Box 315, Old Bridge, N.J.

SSB $260 package: Swan 120, Adcom mobile power supply, microphone. Heath AC supply. $390 package: SBE-33, SBE mobile supply, Shure SR-9D microphone. Hustler antenna with mount and all coils. Sid Galitzer, K2KLL/3, 1900 Lyttonsville Rd., Silver Spring, Md. 20910

SELL Trade: 15 watt 6 meter transmitter, Ameco 6 and 2 meter converters. 2 plate modulators 40 and 125 watts. 220/110-10 amp. Variac. Electronic keyer. Plate transformers: 5800 VCT/300 Ma. 20,000 VCT/750 Ma. Silicon 200 watt linear supply. Need: Grid dipper, receiver, commercial and surplus 1-777 tube-tester. Or??? Stan, W8OKU, 2748 Meade, Detroit, Mich. 48212.

WANTED: Modification kit for converting a Collins 75S-1 receiver to a 75S-2. W4SHL.

WILL Pay $325 cash for Collins 32S-1 in operating condx. J. Klobuchar, W1BZT, 5 Longfellow Road, Sudbury, Mass. 01776.

SELL: Collins 516E-1 dc supply and 351D2 mobile mount for KWM2, excint condx, $200. Wm. Culpepper, 503 Boundary Rd., Pitman, N.J.

SB-400 HEATH transmitter, cleanest SSB available. Professionally assembled, barely used, absolutely perfect, save 60 hours. $315 FOB K6CTV/WA4NGO, 13315-108th Avenue North, Largo, Florida 33542. A/C 813-595-2591.

COLLINS Unused carrying case, $30; excint PM-2 supply, $65, heavy duty Johnson rotator with cable and indicator, $60 (pick-up deal only). Collins KWM-2, gud condx w/516F2 supply w/spkr, added, $750.00 f.o.b. Selling because have S/Line. Prices F.o.b. Bornemann, W5CQF, Rt. 1, Box 168-B, Lacombe, La.

NC98. Matching tilt-base and speaker, perfect, $50. Heathkit balun coils, $7.00. 6 M HE45A, matching VFO, halo antenna with mounts, perfect, $125. Ed Pims, 601 E. 80th St., Brooklyn, N.Y. RN 3-3975.

HALLICRAFTERS: BC-610 xmtr and BC-614 speech amplifier, perfect condx. Best offer or trade on SSB xmtr. WA8BIW, 838 W. Main, Ashland, Ohio.

WANTED: Collins F455J21 and F455J15 mechanical filters for 75A-4. WØUSL.

SURPLUS Electronics technical manuals. Stamp for list. S. Consalvo, 4905 Roanne Dr., Washington, D.C. 20021.

COLLINS 75A-4 with two filters 6 kc, 3 kc, also speaker, in excint condx, original carton, used vy little (reason: owner of two 75A-4s. First check for $500 will ship air freight prepaid. W3VE, C.M. Clark, Phones 412-261-3600 days and 412-WA1-2223 nights. Pittsburgh, Penna.

HELP Wanted: A young alert radio amateur who desires to combine his vocation with his avocation. Sales experience required. Advancement for the right man guaranteed. Apply Harvey Radio Co., Inc., 103 West 43rd St., New York, N.Y.

SAVE Money on new equipment. Still a few of our 1964 demonstrators left. Write for special low cash, no-trade prices. Ed Juge Electronics, 1514 Pennsylvania, Fort Worth, Texas.

FOR Sale: Package deal! TR-3, RV-3, AC-3, DC-3, MMK-3 plus EV664 mike and stand. All less than 6 months old, perf. condx; $670; new SB-200, wired, $190.00; E-Z Way foldover tower, 40 ft., with underground post, plus CDR-Ham-M rotor, TA-33 Sr. with 40 K plus 100 ft. RG-8/U and all other wiring $285.00. Seco Antenna Tester, SWR and power in watts 1 to 1000 new, $25.00. NC-60 special rcvr, 3 mos. old, $25.00; I will ship all the above except antenna system. WA2YNS, 424 Elmhurst Road, Utica, N.Y. Tel: 315-72-45374.

APACHE, excint condx, a sacrifice! $135.00. K6TVO, Tel: 213-785-8196.

DX-100 for sale, in excint condx, vy little use. $125.00. J. B. Shinal, 23 Shamrock Ave., Seneca Falls, N.Y. 13148.

TR3-AC supply, speaker, new, in original cartons with warranty cards. Certified check for $475. K3VTO, Tel: 215-FI2-2538.

SELL: Collins 32S-3, $590.00; Heathkit AM-2 SWR bridge, $12.00; Bud LF-601 low-pass filter, $10.00. Charles Berens, 2295 Sierra Drive, White Bear Lake, Minn.

COMPLETE Mobile, $110.00; AF-67, G66B with AC-DC supply, antenna relay, mount, coax, HQ-100C rcvr, $75; instruction books included. K6GIW, R. Fluegel, 5097 Glasgow Dr., San Diego, Calif. 92117.

SWAP Or sell: G-76 with AC supply, immaculate, 3 months old, for KWM-1 or other SSB transceiver of equal value. K2RDM, R. Pohorence, 113 Dale Ave., Ossining, N.Y.

COLLEGE Expenses forcing sale: Excellent HT-37, Deluxe 500 watt amp. and supply, Capehart Panamuse and Scott receivers. Write to Dick Crossett, WB2DST, ex K3PGJ, 94 Sunnyside, Pleasantville, N.Y. 10570.

FOR Sale: Seneca, $150; Ameco converter and Preamp, $40 B.C. 1031A Panadaptor, $60; Telrex 15-element 2-meter beam, $30.00; Triplett modulation Monitor, $25. All for $285.00. W2OSQ, Bill Alznauer, 11 Adair Drive, Bricktown, N.J.

WANTED: Constant voltage transformer rated 2000 watts or more, trade Mod. 15 teletype wid converter and R.A. 34 p/s. K8GKR, R.R. 1, Harrod, Ohio

3.3 Kw mobile alternator at 110 VAC wid regulator output is 2.2 kw. Complete for $140.00. Health "Q" meter, $35.00. Hugh Riggs, K1UDF, 106 Morris Dr., Laurel, Md.

SB-10 Heath Sideband, $85.00; Hallicrafters S-108 receiver, $80; Globe 680A Scout, 80 to 6 meters, 90 watts, $55.00; Gonset FM auto radio tuner, $35.00. Everything is in perf. condx, unscratched. K3IBQ, 1239 Wehatsheaf Lane, Abington, Penna.

GALAXY V, $400; Galaxy III, $299.00; ac power supply, $65.00; remote VFO, $50. All new, in unopened factory cartons. Bookstore, 5824 N.W. 58th St., Oklahoma City, Okla. 73122.

FREE! Blue Book List. WØGFO offers you discounts on hundreds of reconditioned equipment bargains! 30S-1 (6 weeks o'd, like new), $1199.00; SX-140, $71.96; AF-67, $49.96; SR-160, $260.10; Warrior, $196.00; NC-109, $89.10; HT-32, $254.40; RME-6900, $180.00; Cheyenne, $49.19; HRO-50, $125.48; HT-41, $254.20; HQ-140X, $125.10 and many, many more. Ask for our new 1965 Catalog. Write to Leo, Box 919, Council Bluffs, Iowa.

SR-160 transceiver with AC power supply. Guaranteed new condition and less than 20 hours total use. Will ship in the original boxes: $335.00 or your best offer. No trades, sry! Randy, K5-KNR, 2220 Avenue "O", Huntsville, Texas.

PRINTED Circuit Boards. Hams, Experimenters Catalog, 10¢. P/M Electronics, Box 6288, Seattle, Washington 98188.

FOR Sale: Globe LA-1 linear, 420 watts P.E.P., $60.00; C-E 20A exciter with Deluxe 458 VFO, $130.00; HRO-7 rcvr with four regular coil sets, $100; special 15-meter HRO coil set, $10.00; Central Electronics Q-Multiplier, $10.00, D-104 microphone, like new condx, $10. Truman Pennington, 1709 Lincoln Dr., Williamsport, Penna.

THUNDERBOLT, $260; GSB-100, $220; SX-115, $375; NCX-3, $260; NCX-A, $70; Johnson TR Switch, $18.00. All in mint condition. W1KYG, 48 Raleigh Dr., Nashua, N.H. Tel: 889-2244.

SB-10, SSB exciter. Repair or used parts. $40.00. David Powell, Box 306, Danville, Ky.

CLEANING House! Like-new Lampkin freq. meter 105B ser., No. 5145, $165.00; Triplett GM tube-checker model 3423, $75.00; Simpson 260 adapters, models 650 and 656, $30. Cipher V tape recorder, $40. Eddystone slow motion dial, $14. Bob Welch, K2BXN, Box 427, Branchville, N.J.

FOR Sale: HX-10, expert wiring, never any trouble, $275, prepaid anywhere in USA. W2QBC, 30 Edgar Ave., Buffalo, N.Y. 14207. Tel: 716-873-0447.

FOR Sale: Best offer, new Collins 351D-2 mobile mount and MP-1 12V DC power supply. Bernie Swartz, 717 Washington, Huntingdon, Penna.

INTERESTING Offers! Ham's trading paper, 12 issues, $1.00. Sample free. "Equipment Exchange Bulletin", Sycamore, Ill.

KITY-255-A polar relays, $2.75. Sockets for polar relays, $2.50. Both for $4.00. K5ZPY, Box 544, Hamilton, Texas 76531.

NC-300 and speaker for sale. In gud mechanical and electrical shape, $170.00. Jim Berger, W3MWC, 6615 Silverwood St., Phila., No. 28, Penna. IV 3-5547.

COLLINS 75A4 revr for sale. One owner. Ser. No. 3876. Complete with all three mechanical filters, spiner dial, manual. Top condx. First $425. Will pack carefully. Anthony L. Steckel, W3UMX, 1291 Old Harrisburg Pike, Lancaster, Penna. Area 717, 393-0448 daytime.

TRADE 304TL/THs. NYC area only for Eico model 460 or 427 scope. W2NSZ.

COLLINS KWM-1 expanded 40-20-15-10. See Dec. 1963 "73"; noise blanker, mobile mount, AC supp., $430; 75A4 3.1, 1.5 filters, spinner knob, $425; CE-100V, $425; Johnson Super Thunderbolt 3000v supp., $295; Eico #425 oscilloscope, $30; TD-60APA-10 scope and Panadapter 110V60 cy, $25. K6GHU, 762 Juanita, Santa Barbara, Calif.

FOR Sale: Hammarlund HK-18 keyer, new, $25; Eico signal tracer, model 147, factory wired new, $25; Model 28 teletype with three sheed gear box, 6-75-100 WPM, excint condx, $525. Fine homebrew teletype converter with scope in new style Collins cabinet with separate FSK, $100. Will box or crate and ship free within 500 miles. Drew C. De Vriendt, KØMJJ, 12 The Knolls, Lincoln, Nebr.

75A-4, with filters, 3.5 kc, 2.1 kc and .500 kc, mint condx; Thunderbolt linear, 2 kw. PEP, 20 hours, mint condx, $890 for both or best offer singly. George Sandford, K2PGH, Squires-Sanders, Inc. 201-647-3200.

SELL: Viking 500, $400; Gonset Communicator II with Gonset 2-meter VFO, $140; Gonset Commander xmtr, $50; 110v. remote control 6 position coaxial switch, $15; pr. held telephones, $20; CE SSB slicer, Model A, $20; Maguire aircraft transmitter, ART-1, $20; Johnson 100DD70 variable condensers, $4 each; assorted meters, $3 each. Want: Johnson SSB adapter, 'scope W2KQA, 127 Nesbit Terrace, Irvington, N.J. 07111.

CLEGG 99'er 6 meter transceiver, $100. Hi-Par halo and mount, $10. Knight R-100 revr and spkr, $50. K1VUX (Tel) 617-298-0196.

NCX-3, $250; NCX-D, $80; NCX-A, $75; Jennings UCS vac. variable 10-300 uuf, at 10,000 volts, $45; 75S1, 32S1, 516 F-2 power supply, $750. All in excint condx. Warren Groves, W8WYI, 3728 Creek Dr., Charleston, W. Va.

SELL: Hallicrafters HT-40 xmttr, $50; factory-wired SX-140 revr, $75. F.o.b. Jim Wilson, 615 Holiday Dr., Pocomoke City, Maryland 21851.

WANTED: High number 75A4. Fred Gallien, W6PZ, 9155 Skyline Blvd., Oakland 11, Calif.

SELL: SP-600-JX14. Excint condx. Factory overhauled, $425. W7ZXM, 1530 NE 98, Seattle, Wash. 98115. Tel: 206-525-7926.

INSULATORS wanted! Two to six pieces of a rectangular porcelain bar insulator measuring one by one and a half by eight inches with two three-eights inch holes. Probably war surplus. Gene Hubbell, W9ERU, Box 350, RR #4, Rockford, Ill.

RME 4350A receiver, perfect, $125.00. Ken Mudd, 2678 Broad, Galesburg, Ill.

SELLING: HT-37, Schickler, 16-18 163rd St., Whitestone, L.I., N.Y. 11357. Tel: 212 FL 7-7146.

GLOBE Chief 90, must sell $25.00. Terry Hart, WNØJBF, Ottumwa, Iowa.

NYC Area hams! Sell Hallicrafters SX-110 receiver w/ Lafayette spkr, $90; Eico 720 transmitter, $45.00; 730 modulator w/cover, $40; Heath HA-20 6-ceter linear, $75.00; Seneca VHF-1 transmitter, $110.00; Ameco CB-2 2-meter converter w/pwr supp, $20. All gear in xcint condx. Pick up deal only, sry, no shppg. WB2GWU in Brooklyn, N.Y. Tel: EV 8-1893 after 5 PM.

1964 CLEGG Venus 6M transceiver, matching a.c. power supply, manuals, mike. Used only 3 months. $500. Dave Curtis, 127 S. 40th St., Newark, Ohio 43056.

DRAKE 2-A and 2AQ plus xtal calibrator, $169; HT-37, $269; HT-33A, $309; Richard Lacy, KØAHO, 301 Rider Hall, SCI, Cedar Falls, Iowa, 50613. Tel: 266-9024.

INEXPENSIVE Sideband Pacemaker, $195, 100-Amp. alternator, $75. Free delivery Maine. Nelson Bigelow, Box 535, Camden, Me.

FOR Sale: Viking Ranger, factory-wired, HQ-129X with matching speaker, both in xcint condx in original cartons: $210, for both. Leo R. Schwartz, 51 Strawberry Lane, Roslyn Heights, N.Y.

FOR Sale: Complete station. Operative. SX-111, DX-60 many extras. Reasonable. Marty, WB2AHX, 2507 DeVoe Terr., NYC CY 8-5581.

SELL: Heath Cheyenne transmitter with mic, $50; homebrew AC supply, $15.00; Health AM-2 SWR bridge, $13.00. Perfect with all instructions. Mort Feldberg, 3541 W. Sunnyside, Chicago 25, Ill.

CENTRAL ELECTRONICS 200-V, like new, $495; new Drake 2-B with calibrator, $245.00. Elvin Miller, 3845 Kipling Ave., So., Minneapolis, Minn.

VACUUM Capacitors. Variable and fixed. Commercial grade. Unbelievably low prices. Send for list. Electronic Surplus Co., Box 1225, Boston, Mass. 02104.

FOR Sale: Health HX-20 SSB transmitter, Heath Comanche revr; Heath Cheyenne AM xmttr, Heath mobile mount. Holds receiver and either transmitter, Heath DC power supply operates receiver and either transmitter mobile. Homebrew AC power supply operates receiver and either transmitter fixed station. Mike, Master Mobile allband antenna, bumper mount. All gud equipment but surplus to my needs since purchasing gold-pated transceiver. First certified check for $250 takes all (ship USA). L. D. Turner, K5IED, RFD #1, Farmersville, Texas. Phone Merit, Texas 776-2250.

WANTED: 51J-4, GPR-90. In mint condx only. Pay cash. Write W2AEB.

SELL: 2 Heath A9-C, 20 watt audio amplifiers, Heath FM-3A and AM-1 tuners, $20 each or $75 for all including Knight stereo control, Heath 1A-1 ignition analyzer, $45, Jackson 1" oscilloscope, $15. All in mint condx with manuals. K3LZD, 413 Bliss, Pittsburgh 36, Penna.

GSB 101 KW linear, $150.00. New 18 HT Hy-Tower, $85; Harvey-Wells mobile transmitter, $25.00. Trade? Need: K.W. Matchbox. 160 M. gear. K9RGH, 9600 S.W. Hwy, Oaklawn, Ill.

VIKING Courier and NCX-3 for sale, $135.00 and $255 respectively. Both look new and perform perfectly. Write for more details. K4YYL, Art Balz, 229 Lake Fairfield Dr., Greenville, S.C. 29607.

SELL: KW SSB, GSB-100, $195.00; GSB-101, $145.00; both $320.00. SX-101, MK III, $175.00 HE-45 w/Halo, $70. HP400C VTVM, $35.00. Small tape recorder, $12.00. Carl King, 641 Topton, Blue Bell, Penna.

CLEGG Zeus $495 and Interceptor, $295. Mint condx. Serial No. 378549 and 340155. Both for $725. Special rubberized horse hair shipping containers if desired. Charles Schroeder, W2VGI, 21 High Acres Dr., RD #2, Poughkeepsie, N.Y.

GOING SSB! Selling extremely fine AM-CW rig which has reputation as one of the most potent, cleanest-modulated signals in Philadelphia: Eico 720, 730, Globe V-10 VFO. $150.00. K3QFF, 857 Meetinghouse Rd., Jenkintown, Penna.

APACHE, used 100 hours. In excint condx. Professionally wired. $175. Will deliver between Washington and Philadelphia, S. Jersey area. Will not ship. Braun, 1802 Metzerott, #48, Adelphi, Md.

SELL: HT-37, $260, late SX-111, $145; Heath Warrior, $165. All equipment in excint condx. Inquiries answered. Zack Wilkerson, KØDVY, 3431 Euclid, Wichita, Kansas.

WANTED: Perfect 62S-1. Sell or trade. Heath 6-meter Shawnee, $150. Precision radiation instruments model 111B deluxe scintillator and model 107C professional Geiger Counter (both excellent condition with leather cases and accessories). Ron Button, W1AIZ/2, RD 3, Box 2, Campbell Road, Schenectady, N.Y.

WANTED: Heathkit AM Tuner BC-1A. Hall, 114 Moran, Monterey, Calif.

CRYSTALS Airmailed: MARS, Nets, SSB. Novice, etc.—Custom finished FT-243 .01% any kilocycle, 3500 to 8600 $1.90, (five or more $1.70 ea). (Nets, ten or more same frequency $1.35.). 1700—3499 and 8601—20,000 Kilocycles, (overtones above 10,000 $2.50, .005% 50¢ each extra. P-6/u miniature above 2000 add 75¢ each. QST—Handbook kits, FT-243: "DCS-500", "IMP" $9.95/set. December QST X-VFO, 26 accurate crystals $29.90. G. E. Ham News kits, inquire. Spot frequency and matched, 375 to 525 Kc. available. Airmailing 10¢/crystal, surface 5¢. Write-specify exact need. Crystals since 1933. C-W Crystals, Box 2065-Q, El Monte, California.

SX-111 with R-47 speaker, manual, original carton. Few hours, new condition, $150. D-104 mike, $10. K5STO, 7418 Quail Run, San Antonio, Tex. 78209.

BARGAIN List, clearing out, meters, diodes, relays, transformers, components, 32V-1, manual, coax relay, mike, spare final, excellent, $140; HQ-110, SG-100 speaker, manual, mint, factory cartons, $120; 4D32 tubes, guaranteed, $8. Thordarson 3000v, 720 ma. CCS plate transformer matching choke, $45.00. 75A-4 receiver, matching speaker, manual, $160. WØLWZ, 1030 So. Dudley, Denver, Colorado. 80226.

FOR Sale: Heath "Warrior" HA-10 linear, Emica 4-1000A, Eimac SK-500 socket; Chicago fil. trans. Redmond blower. Jennings UCS-300 vacuum variable. Cardwell 1500 mmf. variable and all parts for 3000V DC 650 Ma. Power supply, send for list. A. Martinka, 3723 Magnolia Ave., Chicago, Ill. 60613.

ENVELOPES for ham station, printed with QTH: 100 6¾", $1.50, 100 9½", $1.85, pp. Ham Enterprises, Box 4133, Dallas, Texas.

FOR Sale: Collins S/Line, 75-S3, like new, $395; 32s-1 w/516-F2 power supply (latest fact. modifications), $445.00. Factory cartons. Package price with no shipping, $825.00. W3QKW.

WANTED: Power Supply RA-34 for BC-191 xmtr. George Barry, Jr., W5UQR, Rte. 1, Box 219-C, Lacombe, La.

WANTED: 100 v. Central Electronics, like-new condx, w/manual, for young blind ham, reasonably priced. WN5JDU, Robert Osborn, 2315 W. Kings Hwy., San Antonio, Texas, 78201.

HQ-170AC receiver with noise silencer and matching speaker. Excint condx. $350. K3RIY, P.O. Box 217, Lansdowne, Penna.

HEATHKIT HW-22, 40 meter SSB transceiver with HP-23 AC supply, $135.00. SX-28 receiver, $50. K6POU, 2712 Kinney Dr., Walnut Creek, Calif.

SELLING: HT-40, $45.00; S-85 w/S-meter, $65; V-44, $10. All three, regular $240 for $110. WA9LOM, 9727 Springfield, Evergreen Park, Ill.

VIKING II, Viking VFO, $95.00, Hallicrafters SX-111, A-1 condition, $155, Globe Chief 90A, $25.00. WB2KDB, 351 Howe Ave., Passaic, N.J.

KNIGHT R-55A receiver, $40, Paul Bede, WA8HBL, 126 Butler, Clio, Michigan 48420.

GLOBE King 500-A, perfect condx, unmodified, spare 4-250, diagrams, will ship, $200. Larry McCreary, K4KHE, RFD #6, Franklin, Ky. 42134. Tel: 586-4977.

PAIR Gud 4-400A's, $45.00. K6SGQ, 1870 Petaluma, Long Beach, 90815.

MUST Sell: Heath Apache, $180; SB-10, $70; both, $225.00. Drake 2A, $175.00. All excellent. K2KHR, 1024 Lancaster Ave., Syracuse, N.Y. 13210.

WANTED: RF signal generator General Radio 605, Measurements Model 80, Ferris Microvolter or similar. W6IV, Box 773, Los Altos, Calif.

VALIANT: Priced to sell. $165.00. Sorry, no shipping! WA2-OQE, Wallace Austin, Barryville, N.Y. 12719, Phone: 914-956-2665.

SELL: Best Offer, MM-2 'scope by Central Electronics with 50 Kc. adapter. W4BLX.

WANTED: Non-working Ranger that can be repaired. State condition and price. Mel Schaefer, 125 South St. Ext., Dryden, N.Y.

SELL: Heath HR-10 receiver, $50; Heath HX-11 transmitter with three crystals, $30. Both excellent. F.o.b. WA5FRL/6, 998 Benito Ct., Pacific Grove, Calif.

SELL: McLaughlin MLC-4 signal splitter, $60; Kuhn 351B 12VDC SWL converter, $20. Shoultz, 801 Humewick Way, Sunnyvale, Calif.

KWM-2, 516F-2, 312-B4 for sale or trade on small car. W5KQU/4, 1606 Clubview Dr., Huntsville, Ala.

75S3C for sale, like new, $550. Wanted: 62S1 Fred Moore, K2BRH, 337 Glen Rd., Rome, N.Y.

APACHE and SB-10, exclnt condx, $225. WA4SPW, 1915 Beall Dr., Hampton, Va. 723-6418.

RANGER II, like new, asking $220. Make an offer. K8UPC, 20515 Denby, Detroit, Mich. 48240.

SELL: Hallicrafters SX-28A w/manual and R-42 spkr, $100; Central Electronics Model B (w/Q multiplier) Signal Slicer w/manual and AP-1 adapter, $40; National S-O-J audio filter, $6.00. All in xclnt condx. R. Gostkiewicz, 2613 W. Berwyn, Chicago, Ill. 60625.

COLLINS: KWM-2, 516F2; 75S1, 32S1, 516F2; one more than I need and they're immaculate. Twist my arm a little if you need one. Almost forgot—Galaxy III AC supply, never opened. Cash or trade maybe. WØBNF, P.O. Box 105, Kearney, Nebraska.

COLLINS 75S-1; 32S1, 516F-2 AC power supply, $750. Robert Cox, K5KMK, 1028 Hardin, Blytheville, Arkansas.

HE-45B, like new condx, little used, plus VFO, plus Saturn Six halo, $100. Local sale. Culicover, 2775 Kingsbridge, Terrace, Bronx, N.Y. 10463.

SELL Johnson Valiant with 51SB SSB all wired and ready to go, $300. WA2HWG, 1555 Dudley Ave., Utica, N.Y.

VIKING I with TVI kit, $75; Globe King 500C, $300; HRO-60 with coils, AC, A.B.C.D, xtal calibr $250; Heath Twoer, $35; Johnson Lo-Pass 250 watt filter, $10; Dow electronic changeover relay TRM-1 $10; Unused surplus 4E27, $4.00; New 4D32, $8. All items in first class shape. W8WC, 359 Bonham Rd., F.o.b. Cincinnati, Cincinnati, Ohio, 45215.

TETRONIX Model 575 transistor curve-tracer, General Radio 605-B lab. sig. gen., Ballantine 314 VTVM, RCA lab. sign. gen. LG-22; RCA UHF lab sig. gen. LG22, L&N Wheatstone bridge mod. 4735 and 4232B, Dekatron DT 72A decade trans, Weston DC lab meters and others. Send for list and specs. D. Mills, 10 Cottonwood Dr., Huntington, N.Y. Tel: 516-HA7-8791.

BOOST Reception, 3.5-30 megacycle SK-20 Preselector kit, $18.98. Boost modulation, AAA-1 Clipper-Filter kit, $10.99. Reduce noise, NC-7 noisejector, IF, wired, $4.49. Postpaid! Literature free. Holstrom Associates, Box 8640-T, Sacramento, Calif. 95822.

LAMPKIN Freq. Mtr. 105B and Mod. Mtr. 205A Quad scale. Best offer over $350. H. Kent, K1AOX, 175 Harvard St., Hartford, Conn.

CREI Math course, $49; Clare mercury-wetted contact relays HG-1004, $8; German Wehrmacht tubes; Heath IG-102, $25; IP-12, $40; IT-10, $5; 3E29, $6; RK-65, $20; 849, $49; TS-13, $5; standard aluminum 31½" rack panel, $8; 3GP1, $5; 3 BP1, $5; 6v or 12v dynamotor ea., $6; MIT book Waveforms, $8; Sigma 4F relay, $5; Petersen 8 mc. xtals, $2. W2RUK, 7 Charles St., Auburn, N.Y.

"HOSS-TRADER" Ed Moory, needs folding money to buy hay for his ponies, on a Cash, No Trade deal! Factory Warranty demonstrator equipment: SB-34, $299; TR-3, $429; Galaxy III, $269; Swan 350, $319; NCL-2000, $439; 75S-3, $449; New TA-33 Mosley beam and demo Ham-M rotor, $159; SR-160, $249; Galaxy V, $349. New equipment: SB-33, $259; Utica 650, six meter transceiver, $129; SB-1 linear, $189. Reconditioned gear: KWS-1 and 75A-4, $1055; 2—V, $449; 100-V, $399; HT-37, $289; 75A-4 ser. no. above 5000, $439; 2-B, $195; SX-111, $149; GSB-101, $225; GSB-100, $159; Viking Valiant, $175; Ranger, $95; NCX-3, $239. Terms: Cash. Ed Moory Wholesale Radio, Box 506, DeWitt, Arkansas. Phone WHitney 6-2820.

SACRIFICE! Must sell! Off to college! Heathkit Apache xmtr, NC-270 rcvr, DX-20, Heathkit IM-10 VTVM, Hy-Gain vertical. All in perf. condx. WA2QYZ, Dreyfack, WA2QYZ, 0-57 Pine Ave., Fair Lawn, N.J. 07411.

FOR Sale: Or trade! B&W 5100B and 51SB-B. Guaranteed in A-1 condx. Used vy little. Best offer cash or coin collection. R. G. Wells, Jr., W4NSZ, c/o Star-Lite Bowling Center, Pikeville, Ky. So. Mayo Trail, P.O. Box 2178, Tel: 437-6259.

WANTED: Set 160-meter plug-ins for 100V. Also 600L to match grey 100V mint condx only. Milt Mead, W2OP, Clovedale, N.Y. Tel. NL 6-9765.

HEATH Tunnel Dipper, $30; new 12V dynamotor 400V at 180 Ma., $4. 25 in. desk rack, $4. W6EHZ, 14945 Dickens St., Sherman Oaks, Calif.

WANTED: 500 cycle filter and 6KC filter for the 75A-4. Advise condx and price. W2BOT, 107-24, 114 St., Richmond Hill, N.Y. 11419.

MOBILE SSB Rcvr, HR-20, in exclnt condx, $80. W5MPX, Box 1433, Shreveport, La.

MINT LaFayette HE45-B, $79. K1IIK.

VIKING Valiant, $175; SX-111, perf. condx, $140; ART-13 w. plugs, LF osc., new 813, $45; LV. supply, silicon rect., 24V at 12A, 400V at 300 Ma., with above, $15. Lyall Sherred, K9VHA, 819 W. Lincoln, Freeport, Ill.

HOWARD Radio Specials: SR150 W/d.c. and mount, $425; SW240, late mod., $245; Invader 200, $325; Demo SBE33, $289; HT32, $295; HT37, $295, new, $395; LSA3 W/d.c., $250; Demo SR160, $299; KWM-1 W/a.c., $399; SX-101 ILL, $299; DX100, $89. Free list. Box 1269, Abilene, Texas 79604.

COMPLETE Two meter station. 'Twoer', modified. Xtal socket, phone jack, R.F. meter on panel. Really puts out. 11 element Telrex, CDR AR22 rotor and box, 50 ft. low-loss coax, Tokyo Rose and original mike, 3 xtals, $100. DX-20 50-watt c.w. new transformer and final; English key and 3 Novice xtals. Exclnt. $25. R-100 receiver, speaker, S meter with 6 meter Int'l. converter, 2 meter Nuvistor converter and preamp and Ameco p/s, $85. Wahle, WN9IFR, 17W042 Indian Hill, Bensenville, Ill.

SELL: B&W 5100-B; Astatic D-104 mike; Hammarlund SP 600-JX; Central Electronics SB Slicer; 10-meter 3-el. Telrex with 40 ft. crank-up tower and CDR rotor. Best offer. Mrs. William Staudacher, Walnut Town Rd., RD #3, Fleetwood, Penna. Tel: 215-944-8593.

LIKE New 4X250B, $15 pr.; xclnt 4X150A, $5 pr., guaranteed; 2000V silicon rectifier stacks, $8.95, guaranteed. Sell complete lapidary outfit, diamond saw, polishing tumber, grinder, stones, etc. Want astronomical telescope. "Cy" Pruett, Star Rte C, Flamingo Bay, N., Ft. Meyers, Fla.

FREE! Giant Bargain Catalog on transistors, diodes, rectifiers, components, Poly Paks. P.O. Box 942Q, Lynnfield, Mass.

TELETYPE Model 19, complete with power supply. $125.00. You pick up. W1ORG, Plainville, Conn.

COLLINS VFO's new for 75A4, $49; 75A3, $39; 75A2, $39; KWS-1, $39; KWM-1, $29; 32V, $19; R390A, $39; Collins 51S-1 receiver in warranty, $1150; Hunter Bandit 2000B; DX Adaptor for KWM-1, $19; Novice adaptor, $14. Richard E. Mann, 7205 Center Dr., Des Moines, Iowa.

ALL Excellent: HT-32, $300; HT-33A, $300, both for $550. RME-6900 with spkr, $200. All three for $725.00 W5VKC, 10939 Aladdin Dr., Dallas, Texas.

SELL: Hallicratters SX-62A, $240; in exclnt condx, guaranteed. Will pay $40 for short wave receiver. Rev. Byron Johnson, Box 68, Richmond, Minn.

FOR Sale: Valiant, exclnt condx, in use now. Perf. CW and tone rig. Money order for $165. Ship collect. Inquiries answered. Richard J. Hahn, 740 E. Sycamore, Willows, Calif.

SX-101, Mark I rec. with speaker; Collins 32V-2, FB. Complete station for $375.00. Howard C. Bean, W1HUR, 26 Gilmore, St., Concord, N.H.

KEYER-Monitor keys your transmitter safely, for months on two, internal flashlight cells. Monitors your keying with crisp speaker-tone. Sealed relay contacts for long life. Keys beyond 100 WPM. Attractive cabinet has front key-jack, tone-off control, and rear keying terminals. $18.95. PP USA. Electro-Signal Lab, 782 Broad St., Weymouth, Mass. 02189.

FOR Sale: 75A-4 rcvr, Ser. No. 4908, with matching speaker, in perf. condx. Johnson Ranger with PTT and matching Astatic mike; Hy-Gain Tribander beam; new Signal Sentry. Best offer takes any or all. Charlie Nash, KØYXZ, Atwood, Kansas. Phone MAin 6-3155.

SELLING Complete station: Including Johnson Invader 2000; Hammariund HQ-180; Hallicrafters T.O. keyer; Communicator IV, 2 meters; Eico 720 xmttr, tower, HT-4 beam, Ham-M rotor. All in mint condx. Will arrange terms for local ham with gud credit. WA4CAL, Claudius Dockery, III, P.O. Box 278, Greensboro, N.C.

SALE: Gonset G66-B and G77A mobile twins, 12 VDC, 117 VAC, complete with cables and Johnson loading coil. Gud condx, $300 or best offer. Need money for college. K4NUZ, Box 2058, Williamsburg, Va.

FOR Sale: Johnson Viking Valiant (new tubes and in great condx), $225. RME-6900 receiver, $250. Both logged less than 150 hours. To: WA2FIT, 89-81 215 Place, Queens Village, L.I., N.Y. 11427.

DRAKE 2B, $200; HX-50, $225. 2 KW 40-meter linear with 3 VF572As and solid state supply, $110. Harold Tatar, M.D., 13855 Superior, Cleveland 44118, or CEdar 1-2266. Sry, no shipping!

SELL: Apache, 'scope aligned SB-10, $210; SX-101A, $200. Both are in superb condx. K2YMO, Ludutsky, 38 Mead Lane, Westbury, N.Y. Tel: 516 ED 4-5816.

TV Cameras for sale or will trade for RTTY equipment. Two RCA TVeye cameras complete with lens, grade "B" Vidicon and instruction book. $150 each. K7KRP, 603K, La Grande, Oregon.

COLLINS Mechanical Filters, 455 Kc either 16KCBW, $12.00 or 8KCBW, $14.00 or pair 8 and 16, $23.00. Check with order. Steve Ritter, 1422 Valleycrest Blvd., Annandale, Virginia.

WANTED Quick: DX Station needs 160-meter B&W HDVL coil for DX tests this 1QSY winter/spring. Advise condx-your price-airmail W1BB.

SALE: Factory sales repr. sales samples, Triplett, VOM's Models 800, $50; 666R, $20; Model 630NA, $50, Model 100 plus clamp-on ammeter, J. Heimann, 1653 Pinehurst, St. Paul, Minn.

SELL: HX-2, HR-20, HP-20, HP-10. Would like $295. Make offer. R. J. Tonneson, KØQVF, S.S.S. Box 1201, Wahpeton, N.D. 58075.

KW Mobile and/or home station, 3 months old. Mint SB33 with DC supp, LA-1 with KW, DC transistor supply. Accessories: mike, KW ants., power lines, etc. $750 or ur offer. V. Chinn, Box 521, Notre Dame, Ind.

ANTENNA Must come down: Brand new HW-12 75M, SSB xcvr w/HP-23 supply, $150; Swan 120 w/supply, $170. Write or phone Jay Klein, WA2PKD, 1020 Grand Concourse, N.Y. 51, N.Y. Tel: JE-6-3741.

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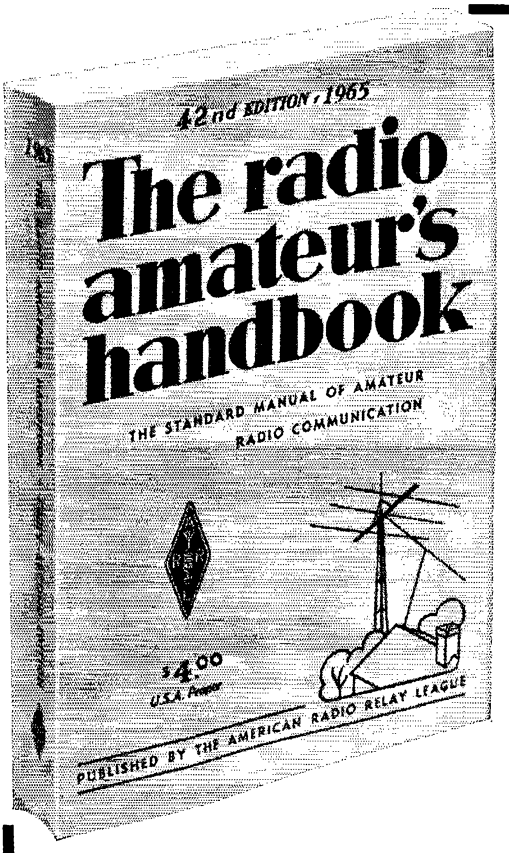

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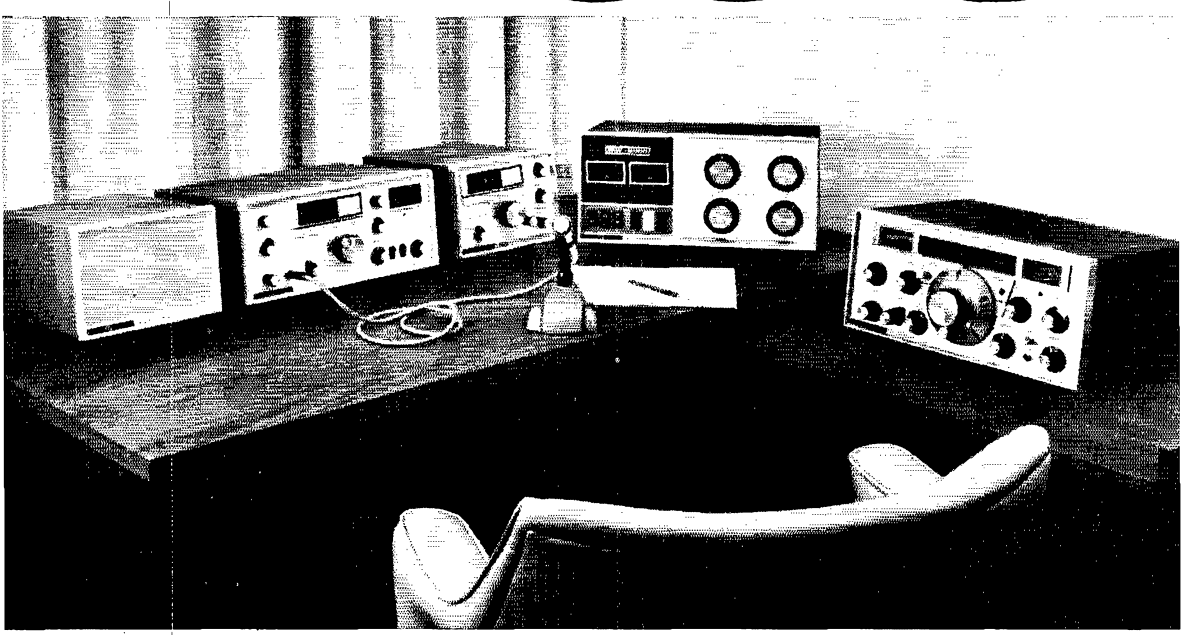

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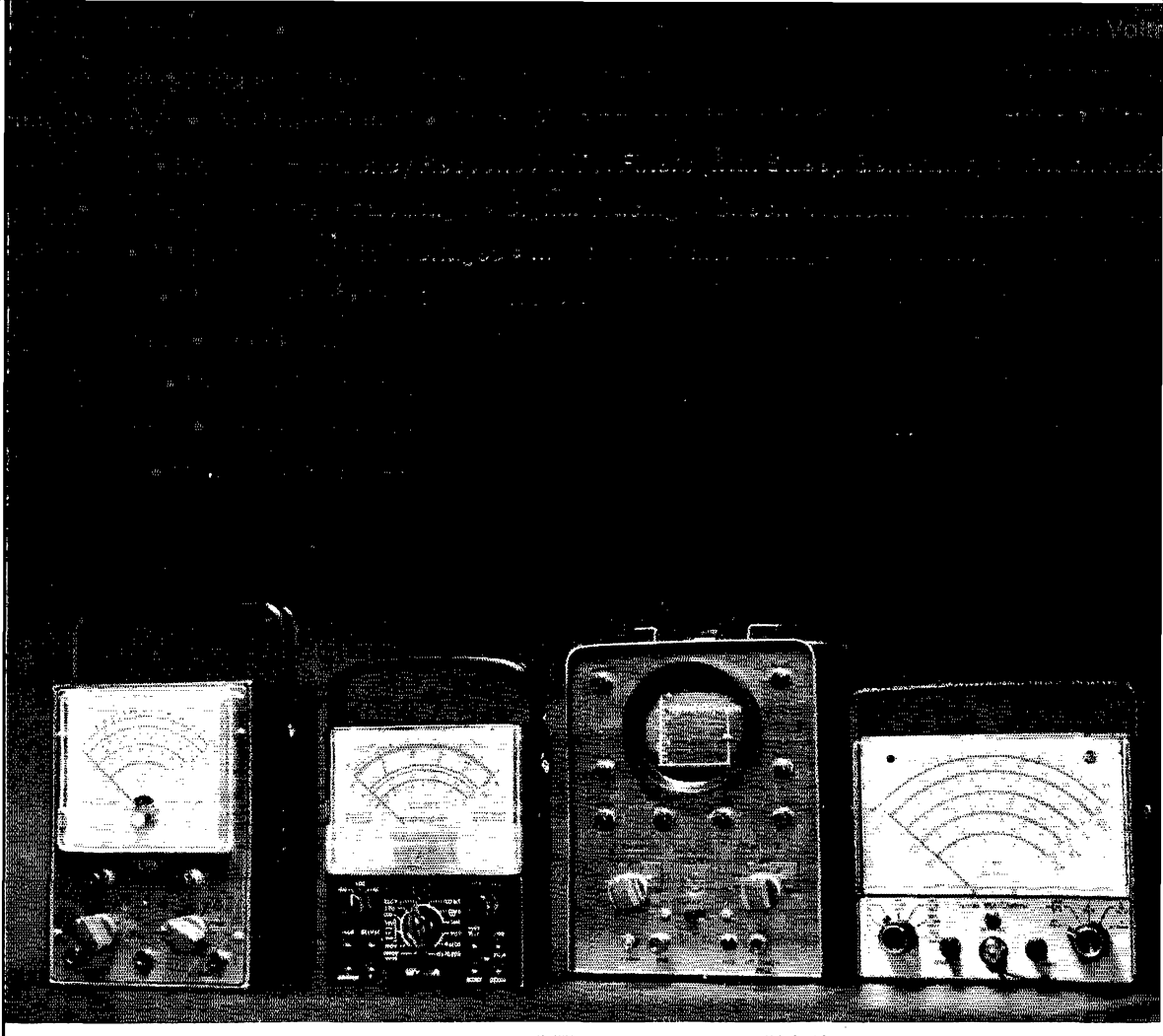

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