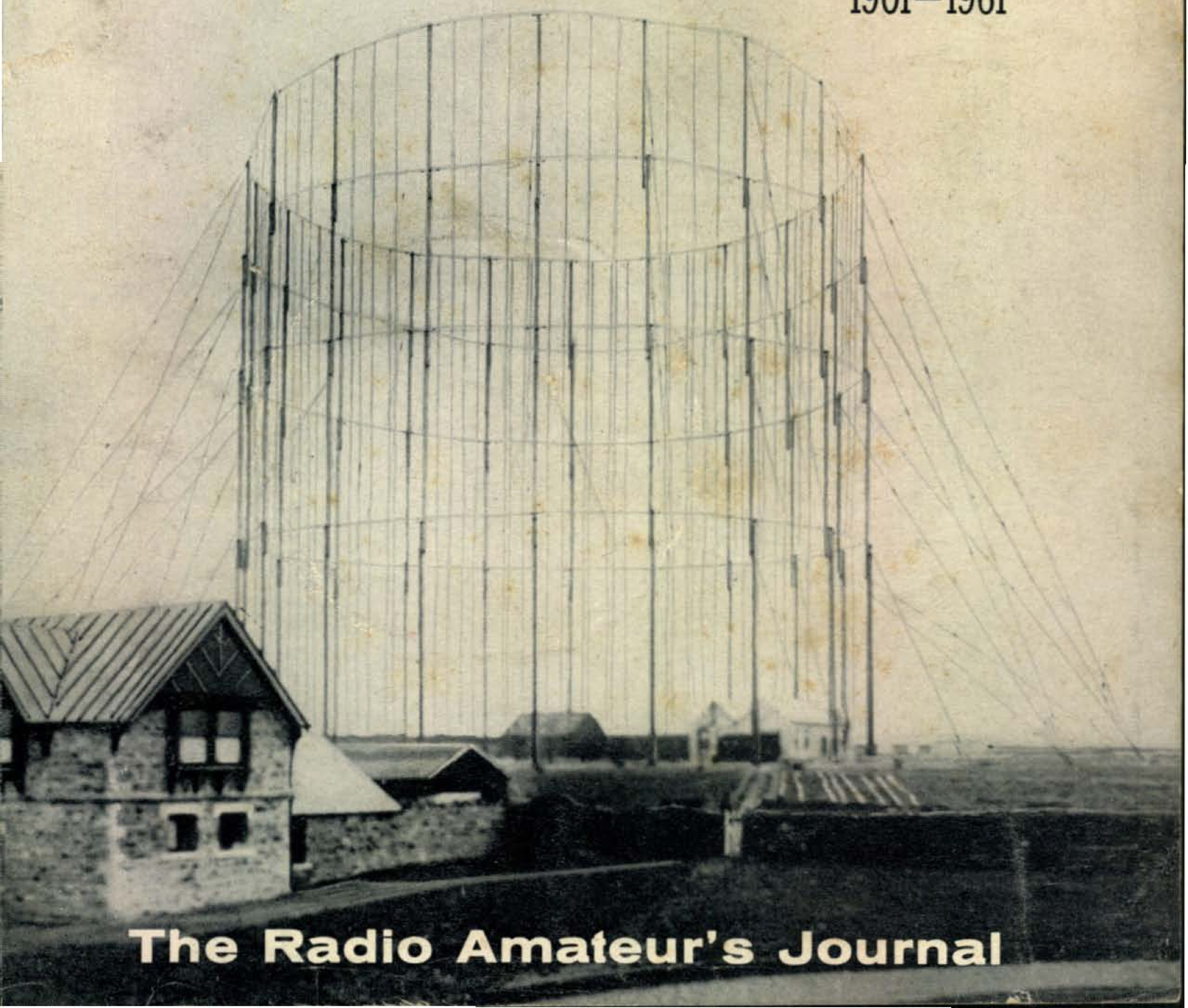
CQ

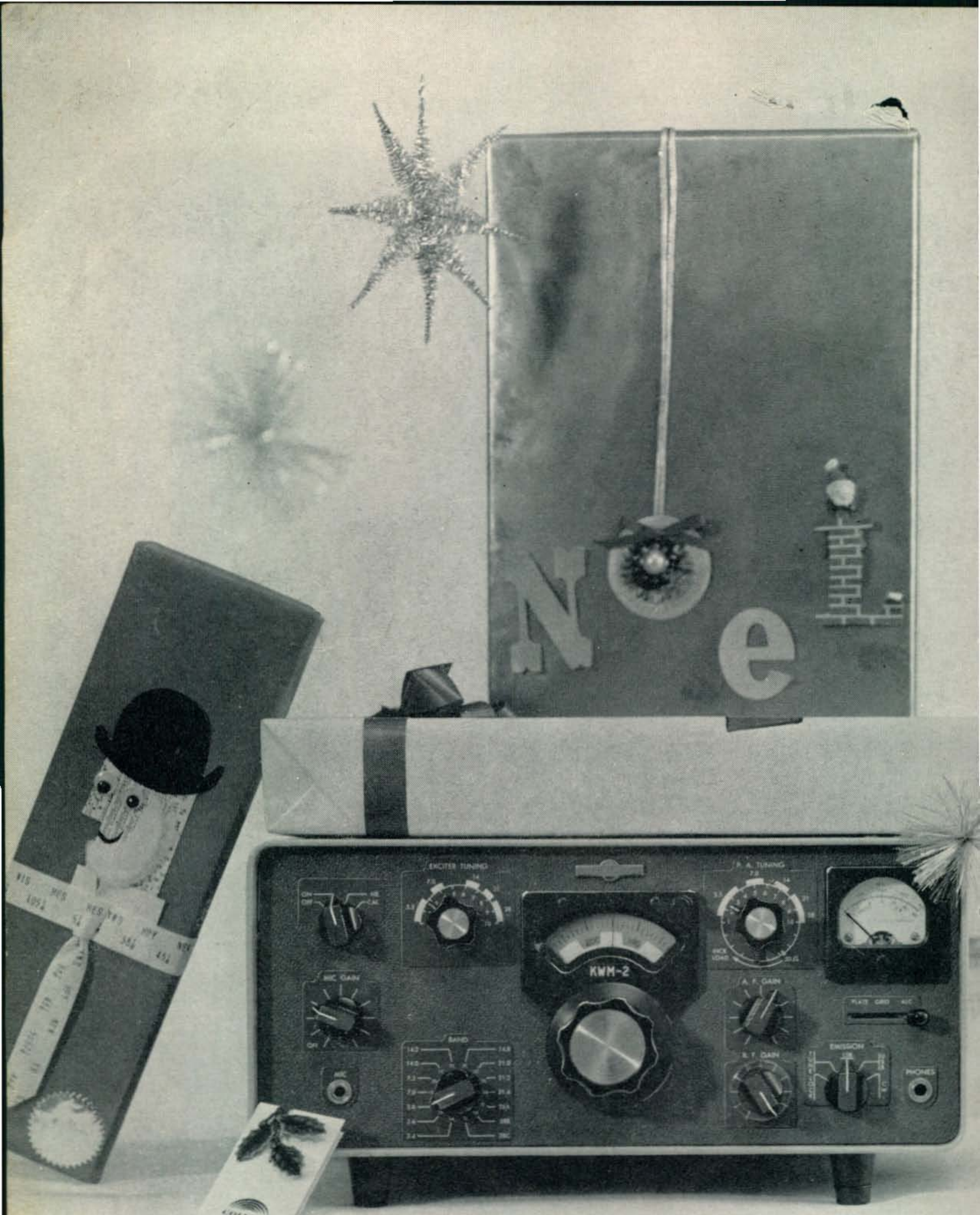
December 1961

50¢

60th Anniversary
Marconi's
Transatlantic
Communications
1901–1961



The Radio Amateur's Journal



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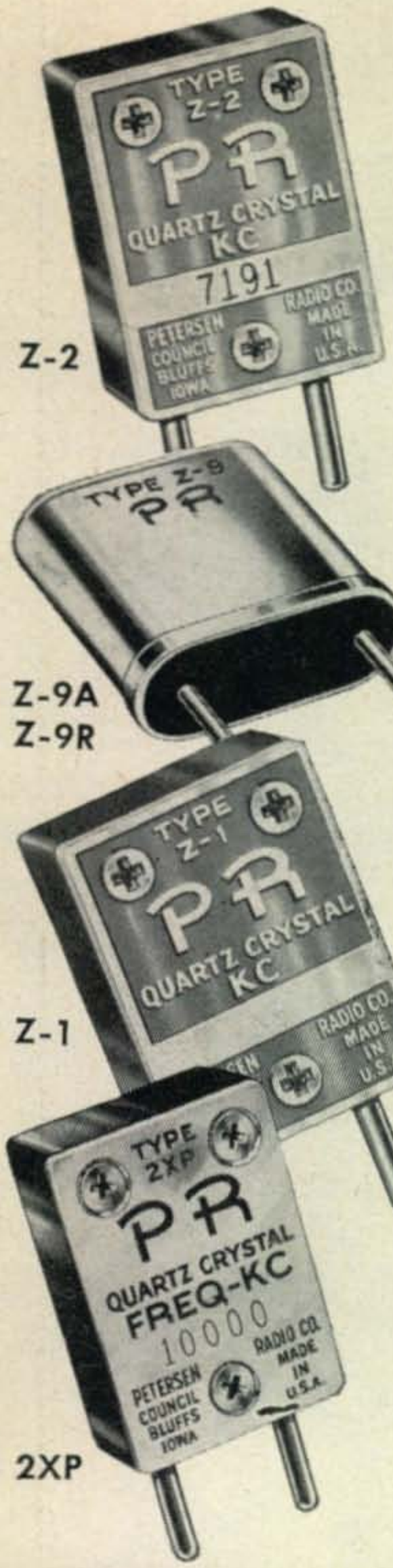

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Z-9A
Z-9R

Z-1

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For further information, check number 3, on page 120

Man's desire to communicate still offers our greatest opportunity to achieve peace on earth and good will toward all mankind

Merry Christmas and

Happy New Year

hallicrafters company

. . . and 73 from

W J. Hallgren W9AC Bud Hallgren Jr.

CQ The Radio Amateur's Journal

VOL. 17, NO. 12 DECEMBER 1961

OFFICES

300 West 43rd Street
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CQ—(Title registered U.S. Post Office) is published monthly by Cowan Publishing Corp. Second class postage paid at New York, N. Y. and at Garden City, New York. Subscription Rates: U.S.A. and Possessions, APO, FPO, Canada and Mexico: one year $5.00; two years $9.00; three years $13.00. Pan-American and foreign, one year $6.00; two years $11.00; three years $16.00. Printed in the U.S.A.

Postmaster: send Form 3579 to *CQ*, 300W. 43rd St., N. Y. 36, N. Y.

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for a

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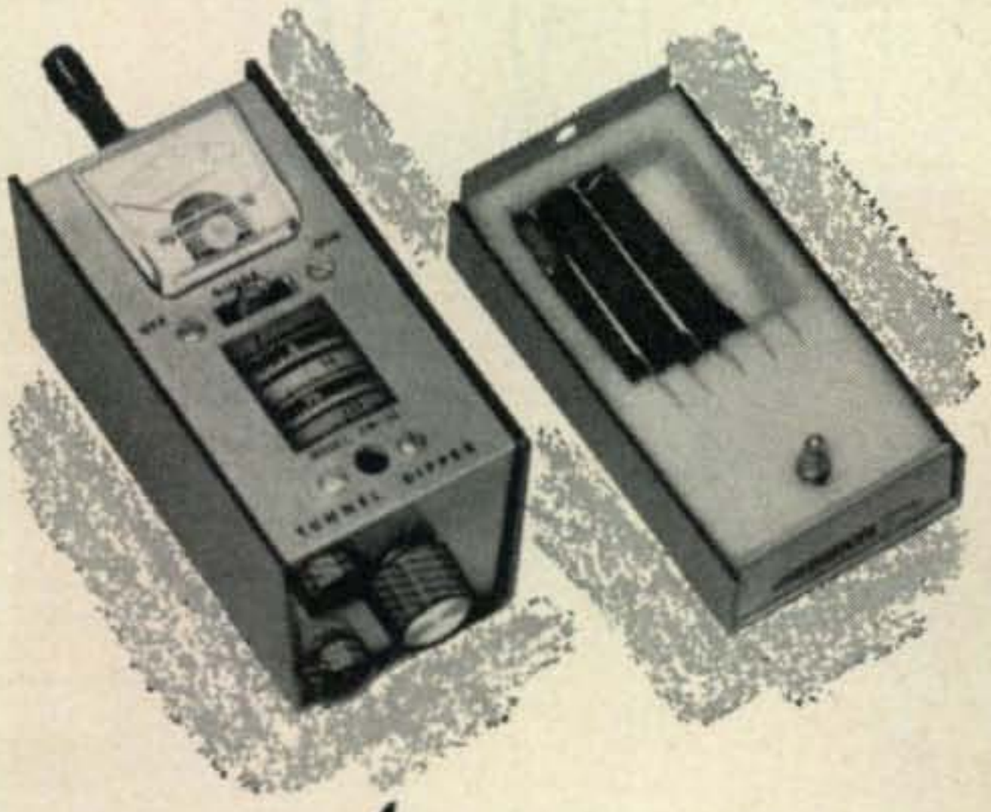

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Merry Christmas

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ZERO BIAS

CHRISTMAS, 1901, must have been a wonderful time of year for Marconi and his friends, for it was only two weeks earlier that he and his crew of technicians established a DX record which was to go down in the annals of history as one of the greatest scientific achievements of our times.

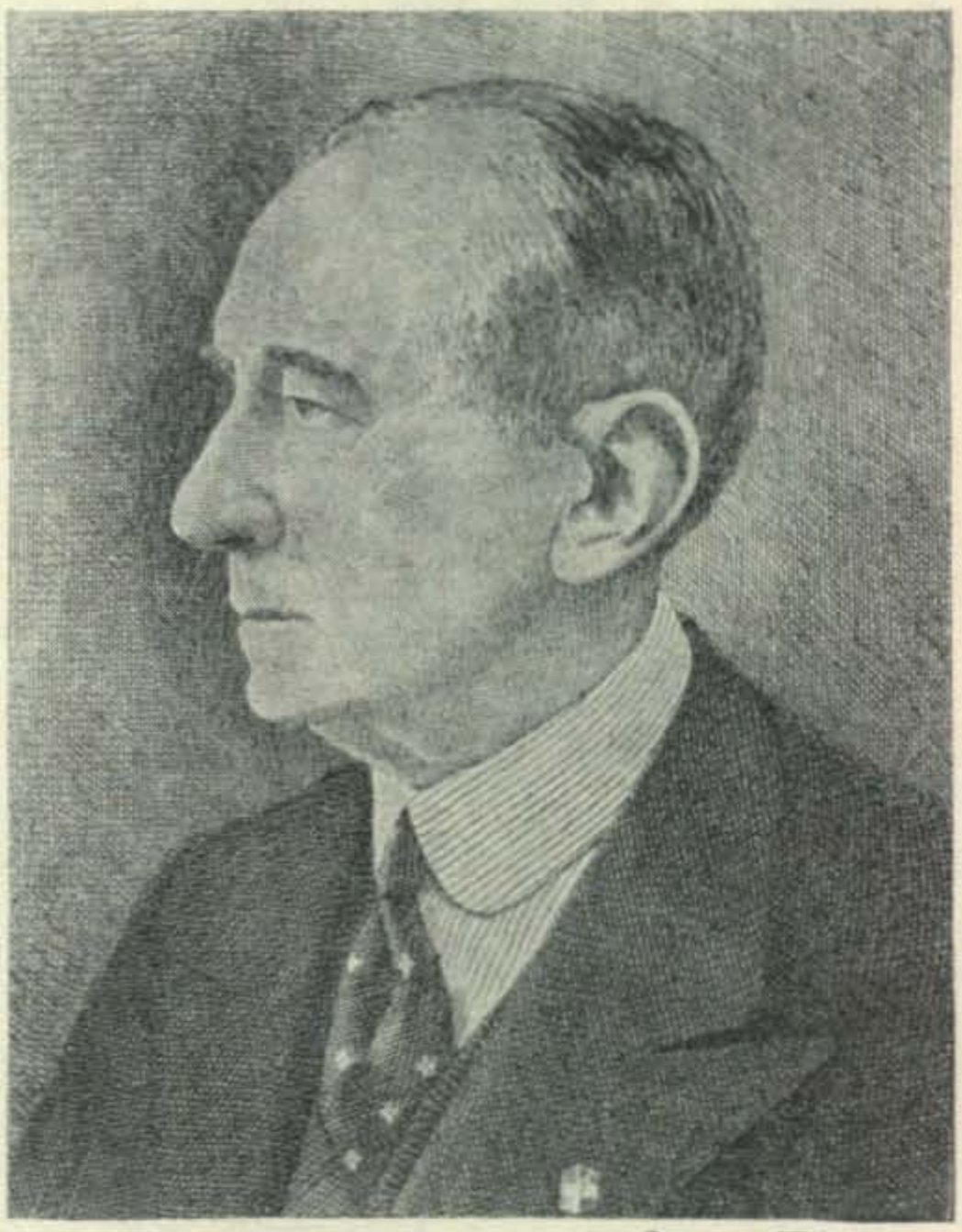
This month, we honor Guglielmo Marconi on the event of the sixtieth anniversary of his first transatlantic broadcast. We're sure you will enjoy reading the intimate story of Marconi's plans beginning on page 26 of this issue, and how, with only meager scientific knowledge, he planned and executed a feat, which, by todays standards, still stands as one of the greatest experiments of all times.

Somehow this story reads more like fiction than fact and if it were not substantiated by historical documents and the photographs presented here, it would be hard to believe that a gigantic plan such as this could have been carried out with such brilliance.

We wonder, as they sat down to their Christmas dinner, sixty years ago, whether Marconi and his men realized the significance of their short episode on the bleak hills of Newfoundland. All of us, of course, remember with nostalgia, our first QSO and we can certainly appreciate the thrill it must have been for Marconi and his crew when they heard those faint clicks through the atmospheric noise. It is not certain what frequency he used for his experiments; certainly he was not aware of the part played by the Ionosphere in propagating his signals across the ocean. He was certainly not cognizant of antenna requirements and frankly, knew very little of the electronic theories which we take so much for granted today.

Everyone knew that radio waves, like light waves, travelled in a straight line; what then was he trying to accomplish? How could he possibly receive signals more than two thousand miles away? Yet he had to try it—amid cries of "impossible"—if for nothing else but to satisfy his own curiosity. His instinct, and the ability to heed good advice resulted in success and further, led to world wide enthusiasm by amateurs attempting to achieve a similar perforance.

Through the courtesy of the Marconi's Wireless Telegraph Company Ltd. we have reproduced, on this month's cover, an actual photograph of the antenna installation Marconi intended to use for his experiments. Unfortunately, shortly before the experiments were to take place this array was demolished in a severe gale. Because time was running out, he elected to use another, less elaborate antenna, shown on page 31, and on the 12th of this month, sixty years ago, his dream was realized.



Courtesy ITU, Geneva

GUGLIELMO MARCONI
1874 - 1937

We hesitate to predict what the future holds in store for communications during the next sixty years. Space communications has certainly opened new horizons for future radio developments and undoubtedly, amateurs will play as important a role in this era as they have in the past.

It is the pioneering spirit of Marconi that we honor this month. With this in mind we hope that his example may teach others that pioneering instinct can often overcome popular opinion.

Whether Guglielmo Marconi and his friends realized the effect of what he had done two weeks prior to Christmas, 1901, is now unimportant; the fact remains that Christmas, 1961, will be a happier, safer and more enjoyable time of year because of his efforts, sixty years ago.

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Novices here it is! THE NEW GONSET "GOONEY BIRD" WITH MORE POWER AND VERSATILITY!

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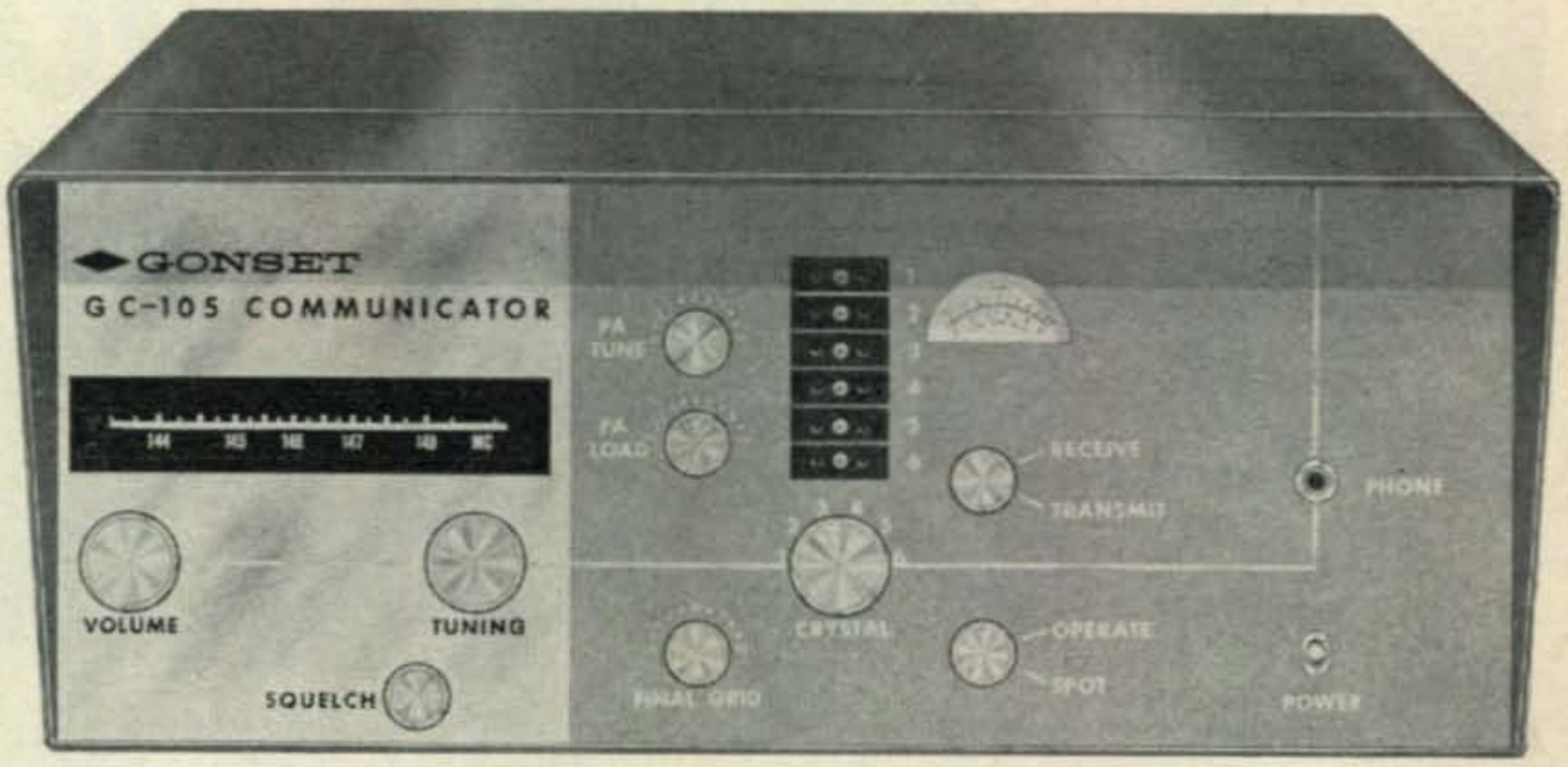

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6. All entries become the property of The Hallicrafters Co. Winners' names and their statements may be published by Hallicrafters. Decisions of both local distributors' and Hallicrafters' judges shall be final.

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Letters..... to the Editor

Language Barrier

Editor, *CQ*:

Re: "I Broke The Language Barrier", p. 53 October, 1961 *CQ*. Please advise Sumner, W1VIV/4, not to worry; he is a normal hot-blooded American ham and we appreciate his concern. He isn't crazy in the least, and when the case history is completed I am sure his attendants will let him go.

However, I strongly urge you to contact the FBI. Sumner has given a foreign citizen our most treasured but simple and best secret code!

Harry O. Philips, M.D., K5RWF
Lone Star Steel Co.
Lone Star, Texas

No Fooling

Editor, *CQ*:

I do not know very much about electronics, and I am wondering if you could help me with my project. I would like to build a transistor battery-operated portable phonograph to use for hunting crows. What I need must be able to play a record with enough clarity and volume to call and fool crows for miles around. What I need is a simple schematic diagram of the pickup and amplifier circuits I also would like any information you might have for building such an apparatus.

Lawrence Kreuser
334 North Oakland Ave.
Green Bay, Wisconsin

Can anyone help reader Kreuser?—*Ed.*

Proper Procedure

Editor, *CQ*:

It would be appreciated if radio amateurs, particularly in the United States, were encouraged to adopt the practice of identifying their city and state or vicinity when calling CQ. Many of us listen for traffic contacts in various areas of the United States and find it most helpful when stations identify their location or immediate vicinity. For others who do not, we often check the *Call Book* for this information, sometimes missing the desired contact, particularly when more than one station is calling.

We have also noticed that some stations call CQ many times but give their own call sign very few times and, by the time they finish saying CQ they are lost in the QRM and it is almost impossible to identify their call sign. We suggest regular inclusion of their call sign (and QTH)—maybe after saying CQ 3 or 4 times. We also suggest that calling stations pause and listen at frequent intervals and QSY if they hear a phone patch contact or QSO on the frequency.

It is also noted that some stations, when returning our CQ say our call sign many times before saying their own call sign once or twice at the end and, by the time they say theirs, the QRM has built up and their call sign is not understandable. In some procedures, it is

For Further Information, check number 9, on page 120

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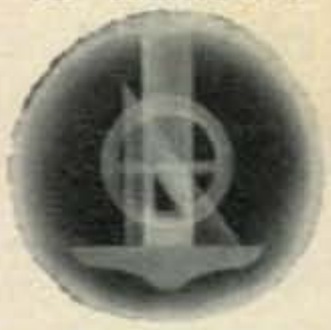

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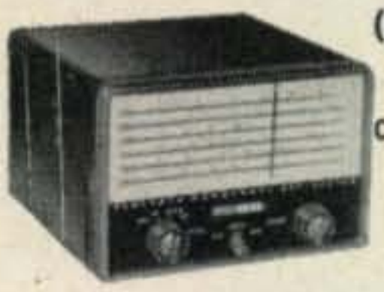

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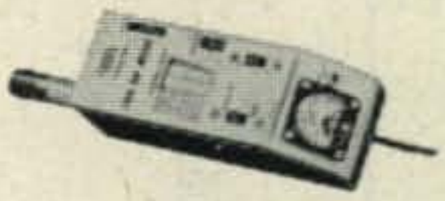

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DYNAMIC CONDUCTANCE TUBE & TRANSISTOR TESTER #666
Kit **$69.95** Wired **$109.95**
TUBE TESTER #625
Kit **$34.95** Wired **$49.95**

RF SIGNAL GENERATOR #324 (150kc-435mc)
Kit **$26.95**
Wired **$39.95**
TV-FM SWEEP GENERATOR & MARKER #368
Kit **$69.95** Wired **$119.95**

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EICO, 3300 N. Blvd., L.I.C. 1, N. Y. CQ-12
☐ Send free Catalog & name of neighborhood distributor.
☐ Send free "Short Course for Novice License." ☐ Send 36-page **STEREO HI-FI GUIDE:** 25c enclosed for postage & handling.

Name.....
Address.....
City..... Zone..... State.....
Add 5% in the West.

ENGINEERS: Excellent career opportunities in creative electronics design. Write to the Chief Engineer.

For further information, check number 10, on page 120

recommended that both call signs be said twice or an equal number of times.

Gloria M. Spears, KZ5GS
Box 157
Balboa Heights, Canal Zone

Fixed-Portable Only

Editor, *CQ*:

Sir, the cover on September 1961 *CQ* frightens me. This portrays an unusually long vertical antenna attached to a Volkswagen sedan.

As an employee of the local power company for over twenty-eight years, I am keenly alert to situations that expose people to the hazards of power circuits.

Construction standards based on the National Electric Safety Code permit overhead road crossings up to 15,000 volts between wires at 20 feet above the road surface. An antenna over 32′ high attached to a car will contact power lines, and the results can be accurately forecast.

Some possibilities are: The antenna (a conductor) will energize the car and could cause a fatal electrocution when the occupant steps from the car. The power conductors could burn down and fall among pedestrians or lay as "hot" wires on the ground as a lethal trap. The faulted power circuit could interrupt vital customers where continuous electric service is necessary for the safety of the public, *i.e.*, hospitals, water companies, traffic signals, telephone systems, radio stations, etc.

The list is endless, but if this letter will save the life or prevent serious injury to one person—an uninformed amateur, a school child, a housewife, etc.—my efforts are justified.

I strongly urge you to call to the attention of all your readers that this antenna installation is *not* meant for mobile use and is intended for fixed-portable use only.

H. N. Babbitt, W3IDO
127 Marion Drive
Canonsburg, Pa.

GET RELIEF FROM GRIEF

WITH

NEW-TRONICS

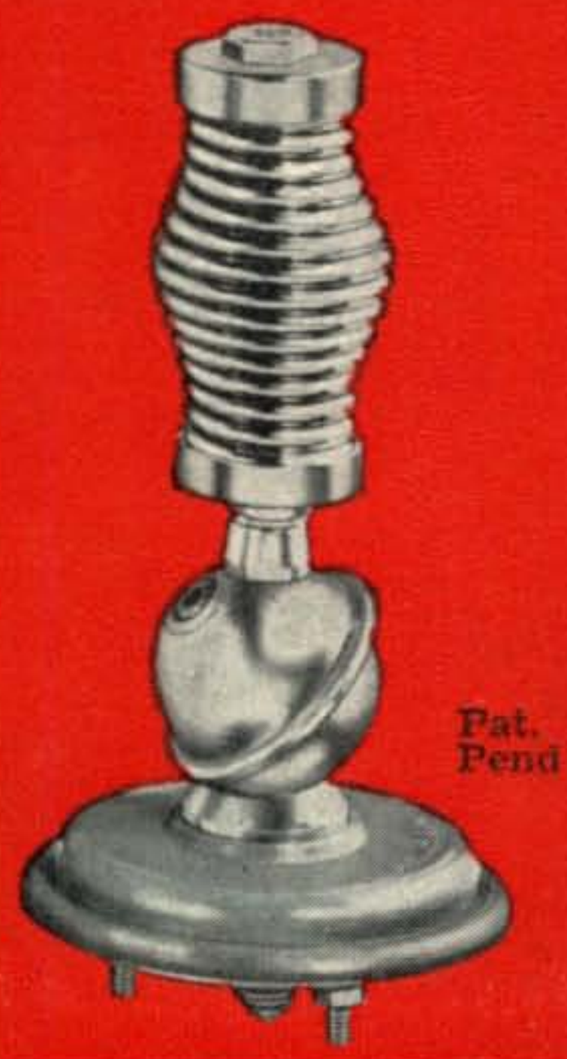
COMMUNICATION PRODUCTS

Mechanically better . . .

. . Electrically superior

FIRST Corrosion-free all stainless ball and spring mount

FIRST basically improved design



TUNABLE ANTENNA FOR CB and AMATEUR (28-30 MC)

MODEL CB-27

Extends to 60". Collapses to 27" Swivel ball base. Sealed loading coil 5' of RG58/U cable PL-259 connector

Tunable stainless top rod section has etched tuning scales permitting field adjustment for either 27 MC Citizens Band or 28-30 MC Amateur Bands.

Pat. Pend.

MODEL NTS-1 — ALL STAINLESS

Ball, base and spring assembly

NO EXPOSED MOUNTING BOLT HEADS

(Long leakage path)

ONE MAN INSTALLATION

LIGHTER WEIGHT

REDUCED SPRING ASSEMBLY LENGTH

Engineered and built to meet the most critical standard, this base, ball and spring assembly has no equal. It will provide long and carefree service. Also available in chrome plated and cadmium plated models.

TUNABLE ANTENNA for COLLINS NOISE BLANKER

MODEL NB-40 (40 MC)

Similar in appearance to MODEL CB-27. Has different electrical characteristics. Broad banding characteristics and tunable feature permits attenuation of power line and car ignition noises.

Complete line of stainless steel whips with set screw type removable adaptors, other antenna models, cable and accessories available for immediate delivery.

New-Tronic antennas look better, work better and last longer than any similar purpose types now available. They are engineered and built to meet the demands of modern communications. With all their extra features they are priced no higher than similar models. See them at your electronic distributors or write for literature.

NEW-TRONICS 3455 Vega Avenue Cleveland 13, Ohio

For further information, check number 11, on page 120

For further information, check number 12, on page 120

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

In the matter of Amendment of Section 12.231 (*a*) (2) of the Commission's Rules Governing the Amateur Radio Service to Make Available the Frequency Bands 7245-7255 and 14,220-14,230 kc in Alaska and Hawaii.	DOCKET NO. 14349

NOTICE OF PROPOSED RULE MAKING

1. Notice is hereby given of Proposed Rule Making in the above-entitled matter.

2. The State of Alaska, Department of Public Safety, requested by letter that the frequency bands 7245-7255 and 14,220-14,230 kc be made available to Radio Amateur Civil Emergency Service (RACES) stations in Alaska. The letter stated that the lack of any 40 and 20 meter frequencies for Alaskan RACES stations coupled with the distances involved in communicating with the continental United States preclude their participation in actual or simulated Civil Defense operations. It would appear that Hawaiian RACES Stations face the same problem.

3. In a Report and Order, Docket 12719, released May 29, 1959, the Commission amended Section 12.231 (*a*) of the Rules making additional amateur frequencies available for RACES. Because of the then existing requirements of other governmental agencies having primary responsibility for national defense functions, however, these additional frequencies were not made available to Alaska, Hawaii or the territories or possessions of the United States. Further coordination by the Commission with the governmental agencies concerned has indicated that the earlier difficulties have been resolved with respect to making the bands 7245-7255 and 14,220-14,230 kc available for RACES operation in Alaska and Hawaii. Accordingly, the Commission is proposing to amend Section 12.231 (*a*) (2) to make the frequency bands 7245-7255 and 14,220-14,230 kc available for use by authorized stations in Alaska and Hawaii.

4. Authority for the proposed amendment is contained in Sections 4 (*i*) and 303 of the Communications Act of 1934, as amended.

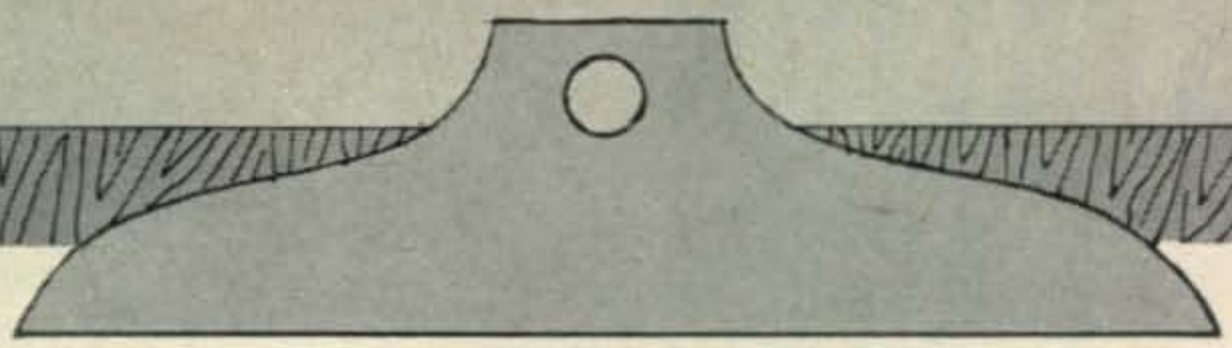
5. Pursuant to applicable procedure set forth in Section 1.213 of the Commission's Rules, interested persons may file comments on or before January 2, 1962 and reply comments on or before January 15, 1962. All relevant and timely comments and reply comments will be considered by the Commission before final action is taken in this proceeding. In reaching its decision in this proceeding, the Commission may also take into account other relevant information before it, in addition to the specific comments invited by this Notice.

6. In accordance with the provisions of Section 1.54 of the Commission's Rules and Regulations, an original and fourteen copies of all statements, briefs, and comments filed should be furnished the Commission.

FEDERAL COMMUNICATIONS COMMISSION
BEN F. WAPLE
Acting Secretary

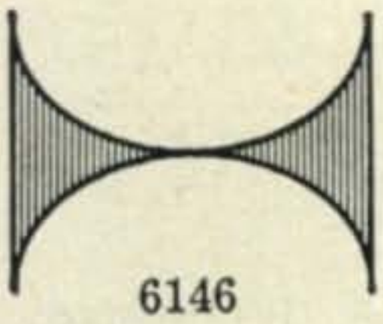
New Certificate

A very handsome certificate is being awarded by the Apple Pie Hill Amateur Radio Club, Inc. for working five or more of their members. Membership includes: W2CFB, CHL, EMZ, ENS, FWY, HOS, MZR, MZT, PG, UWA, WCY; K2HAJ, KBF, KMP, MLK MOH, OJV, PZV, RVA, VFT; WA2AWE, DPR, GNC, HDK, NCW, QOW, QPD, RFX, RFZ, RGJ, TRN, TRO, UHL, and WV2QOM. Jack Hilton, WA2DPR is Certificate Chairman and his QTH is West Creek, New Jersey.

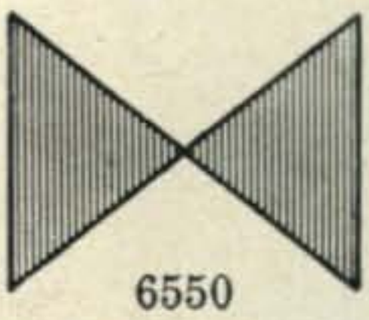


WHY 6550's IN THE 200V?

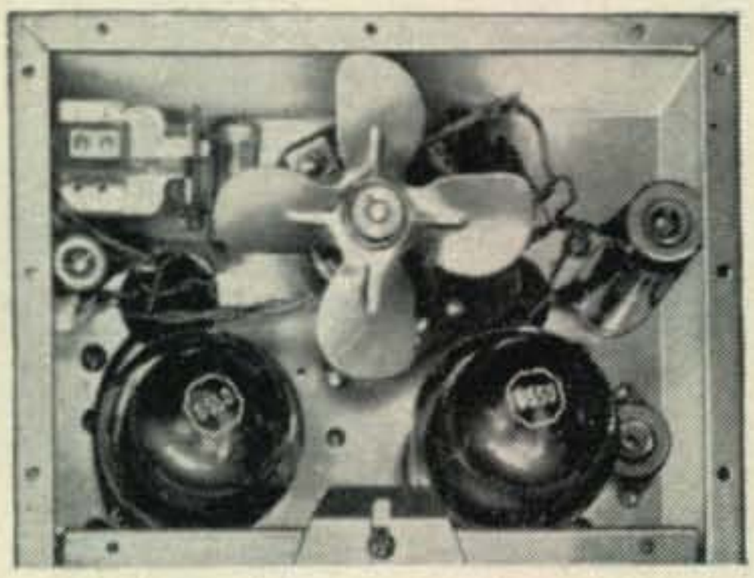
You have asked this question many times. The answer is because they are more linear than any other tube for a 100 watt output transmitter. The design objective for the 100V and 200V was to obtain 100 watts output before grid current flow. Many tube types were tried, and those that did not draw grid current prematurely suffered from excessive bias curvature. See typical patterns below: Bias curvature causes intermodulation distortion that tends to broaden the radiated signal.



6146



6550



Our observation is that most tubes primarily designed for Class C service make very poor linear amplifiers. It stands to reason that tubes designed for high fidelity audio applications will have the least amount of distortion when operating as a linear RF amplifier.

The 6550 has a CCS Plate dissipation of 35 watts, which is more than any other tube in it price class. More dissipation means more power output capability per dollar. It has short internal lead structure and a low loss base making it very suitable for Linear RF service, which was quite a surprise to the manufacturer.

Special Note! Due to unprecedented customer demand, factory stock of 200V's has been sold out. We are moving quickly to produce more units. Watch this column for early announcement of availability. A fine product like the 200V is worth waiting for.

73 Wes

Write for a 200V brochure
with detailed specifications.

Wes Schum, W9DYV

Central Electronics, Incorporated

A subsidiary of Zenith Radio Corporation — 1247 W. BELMONT AVENUE CHICAGO 13, ILLINOIS

For further information, check number 13, on page 120

Free Ignition Booklet

The Champion Spark Plug Company, Toledo 1, Ohio is once again making available its 16 page booklet entitled *Giving Two-Way Radio Its Voice*. This booklet is for the mobile operator who is looking for an anthology of ignition suppression ideas for the car or boat. The booklet is free and can be obtained by writing to their Automotive Technical Service Dept.

New Rochelle, N.Y.

The Communications Club of New Rochelle, N. Y. is holding its Turkey dinner on Wednesday, December 27. Reservations can be obtained by writing the club at P.O.B. 971, New Rochelle, N. Y. Dinner is $5.00 per person.

417A

W2KER informs us that he has 417A's to give away at four for a dollar (at that price they are a give-away). The buck is for packing and shipping. His address is 38 Aldridge Road, Chappaqua, N. Y. *Please,* youngsters preferred.

Green Sheet

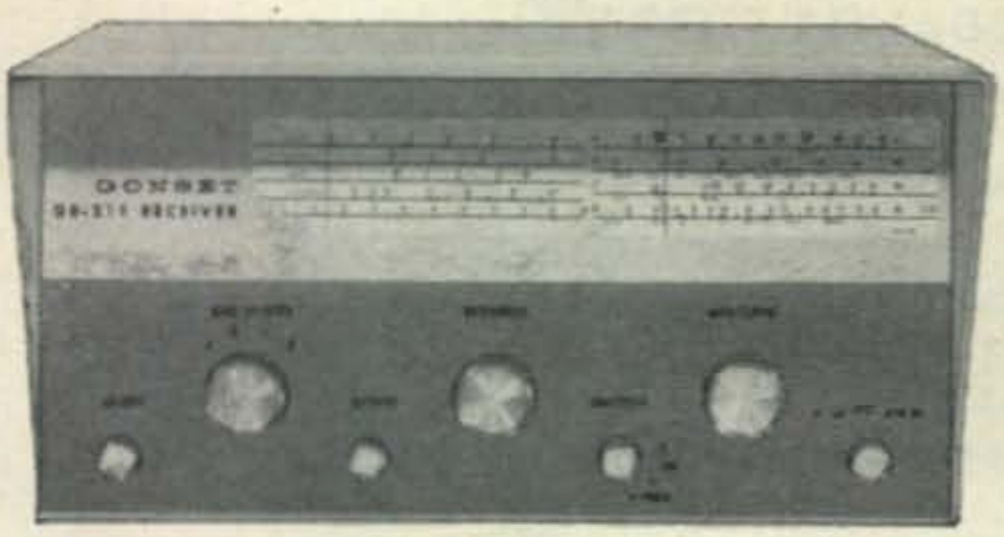
Barry Electronics is now making available their latest component and equipment catalogue. The *Green Sheet* is chuck full of valuable surplus as well as commercial test equipment. Semiconductors, transformers, chokes, meters, wire, etc. are also featured. The catalogue is free and can be obtained by writing to them at Box A, 512 Broadway, N.Y.C. 12, N.Y.

Hoosier "500" Award

The Indiana Radio Club Council, Inc. has designed and inaugurated a rather unique award based on working members and officers of the Council. Complete rules can be obtained by writing Ruth Litwiler, K9MZV, 3311 South Tacoma St., Indianapolis, Indiana. Self-addressed-stamped envelope requested.

John DiBlasi, W2FX (left) and Ralph Barber, W2ZM, have been re-elected president and executive secretary, respectively of the Quarter Century Wireless Association for 1962-1963. They are shown here with the Association's new gold-and-blue banner, adopted to celebrate its founding fifteen years ago. Membership in the QCWA is open to hams who have held licenses continuously for twenty-five years or more. Many members can boast of forty or more years of activity, and a few have reached the half-century mark. Present enrollment is about 3,000 and growing steadily.

GET THE MOST FOR YOUR MONEY WITH GONSET'S NEWEST RECEIVERS!



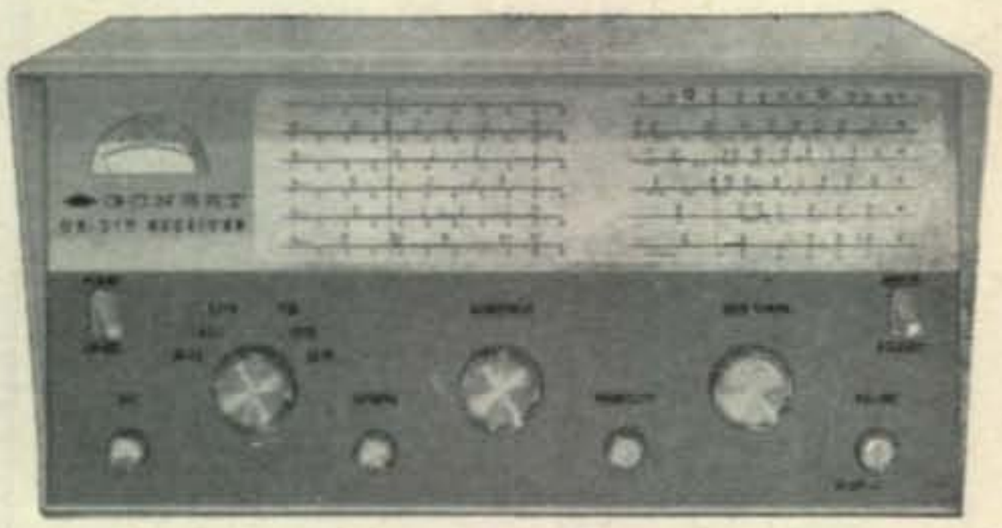
THE BEST ALL-BAND BUY—

GR 211

General coverage from standard broadcast through 34 mc band, including WWV, foreign & Voice of America.

- Printed circuit techniques and advanced design for extra sensitivity, better, quieter reception, even on highest frequency bands.
- 5 tubes plus 2 solid state rectifiers, TRANSFORMER-POWERED (not ac/dc) for higher over-all gain, better signal-to-noise ratio.
- Circuit features leading to higher sensitivity include quality, high-Q, permeability-tuned coils.
- Two full-vision, illuminated, slide-rule type dials provide instant identification of broadcast and short-wave frequencies.
- Vernier tuning knob counter-weighted for smooth, non-critical short-wave tuning.

Amateur net price **$69.50**



ONLY DUAL CONVERSION RECEIVER PRICED UNDER $100!

GR 212

- Dual conversion for increased selectivity.
- Variable BFO.
- Sensitivity: At least 6 db $\frac{S+N}{N}$ at 1 μv (mod. 30% at 400 cps) input on all H.F. Bands.
- Two full-vision, illuminated, slide-rule type dials provide instant identification of broadcast and short-wave frequencies.
- Panel-mounted "S" meter.
- Band-spread tuning knob is inertia flywheel weighted for smoothest tuning.
- Separate band-spread dial for amateur bands.

Amateur net price **$99.50**

GONSET®

DIVISION OF YOUNG SPRING & WIRE CORPORATION

801 SOUTH MAIN STREET, BURBANK, CALIFORNIA

For further information, check number 15, on page 120

E-Z WAY QUALITY SERVES YOU BEST... *Year After Year!*

- NO GUYS
- TILTS OVER
- CRANKS UP & DOWN

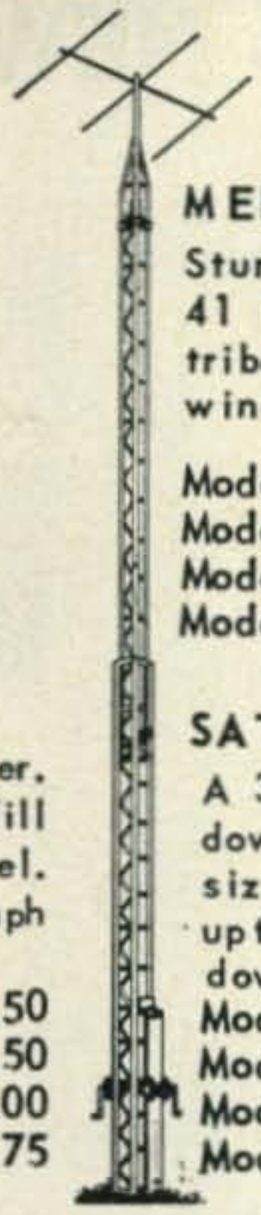
55,000 PSI HIGH TENSILE STEEL FOR MAXIMUM STRENGTH!

CHALLENGER

Standard duty two section Tower. Cranks up to 40' and down to 24'. Will support 3 el., 15 M Mini-beam or 3 el. tribander at 40' in winds up to 50 mph without guys.

Model RBD 40-P (painted)	$ 99.50
Model RBD-40-G (galv.)	134.50
Model with GPK D-40.....	50.00
or BAK-D (building attach kit).	6.75

RBD-40



HOT DIPPED GALVANIZED AFTER FABRICATION.

MEDALIST "40"

Sturdy two section tower. Cranks up to 41 ft. and down to 24 ft. Supports a triband or equivalent at 41' in 70 mph winds or 125 mph when cranked down.

Model RBS-40P (painted).....	$169.50
Model RBS-40G (galv.).....	209.50
Model GPK-S40 (ground post)....	75.00
Model BAK-S40 (building attach)..	10.50

SATELLITE "60"

A 3 section tower. Cranks up to 58' and down to 25'. Will support a 4 el., 20M full size beam or a 6 el. triband at 60' in wind up to 60mph. . .NO GUYS! 140mph cranked down.

Model RBX 60-3p (painted).....	$335.00
Model RBX 60-3G (Galv.).....	410.00
Model GPK 60-3 (ground post).....	120.00
Model BAK-X (building attach)....	17.00

RBS-40

RBX-60-3

THE TOWER WITH ALL THE PLUS FEATURES

- * Self-supporting to 34 ft.
- * Famous E-Z Way Rotor Head.
- * Light weight 10 ft. section weighs only 29 lbs.
- * Climbable ladder on three sides.

NEW "HP" Economy Series

The HP series is a low cost Ham tower that is built to take it. The famous E-Z Way design has incorporated 55,000 PSI steel into the manufacture of all towers. Light weight and easy to erect. Hot dipped galvanized, electric arc welded and comes complete with base plate and wall bracket.

Model HP-34

only $84.95

Model HP-44.....	101.90
Model HP-54.....	118.85

HP

G-10

G-10. . . FOR HAM, CB, TV or TWO WAY.

E-Z Way's "G-10" is all NEW! Here is the Tower designed to take it, with durability built-in every inch of its superb construction. 55,000 PSI steel ... X-Type bracing ... Light weight, 10 ft. sections weigh only 29 lbs. These are only a few outstanding features that make this tower the strongest of its kind in the field. Fast, easy erection, up to 280 ft. guyed, or 40 ft. self-supporting. Completely electric arc welded and hot dipped galvanized after fabrication.

The NEW "Stack Pole" lets you really get up there!
DETAILS TO BE ANNOUNCED 1962

G-10

WRITE FOR COMPLETE DETAILS ON ALL E-Z WAY TOWERS.

E-Z WAY TOWERS, Inc.

P.O. BOX 5767 TAMPA 5, FLORIDA

For further information, check number 16, on page 120

BEST LIKED GIFT UNDER THE TREE!

See imaginative Mosley design of new CM-1 low cost ham band receiver at your dealer now!

FEATURES and PERFORMANCE:

Diode detector for AM and product detector for SSB, CW.
Calibration every 5 kc.
WWV reception at 15 mc.
SELECTIVITY: 2.5 kc. at -6 db.
Automatic noise limiter.
SENSITIVITY: ½ microvolt for 10 db. signal-to-noise ratio on ten meters.
STABILITY: Less than 500 cycles drift after one-minute warm-up.
Less than 200 cycles change for 10% line voltage change.
IMAGE and IF REJECTION: 35 db. minimum.

The new Mosley CM-1 communications receiver offers you tried and proved components in a truly imaginative design concept. This compact new design gives you outstanding performance formerly only available in much higher priced receivers. Its unique crystal controlled first oscillator gives you excellent selectivity and freedom from image and other objectionable responses. The CM-1 employs five identical dual-purpose tube plus four semi-conductor diodes to perform all functions usually requiring more expensive 12 tube sections.

Net Price, only $169.95

Matching Speaker, Model CMS-1. Net Price, $16.95

(slightly higher west of the Rockies and outside the U.S.A.)

Write for name of dealer handling the CM-1 in your area.

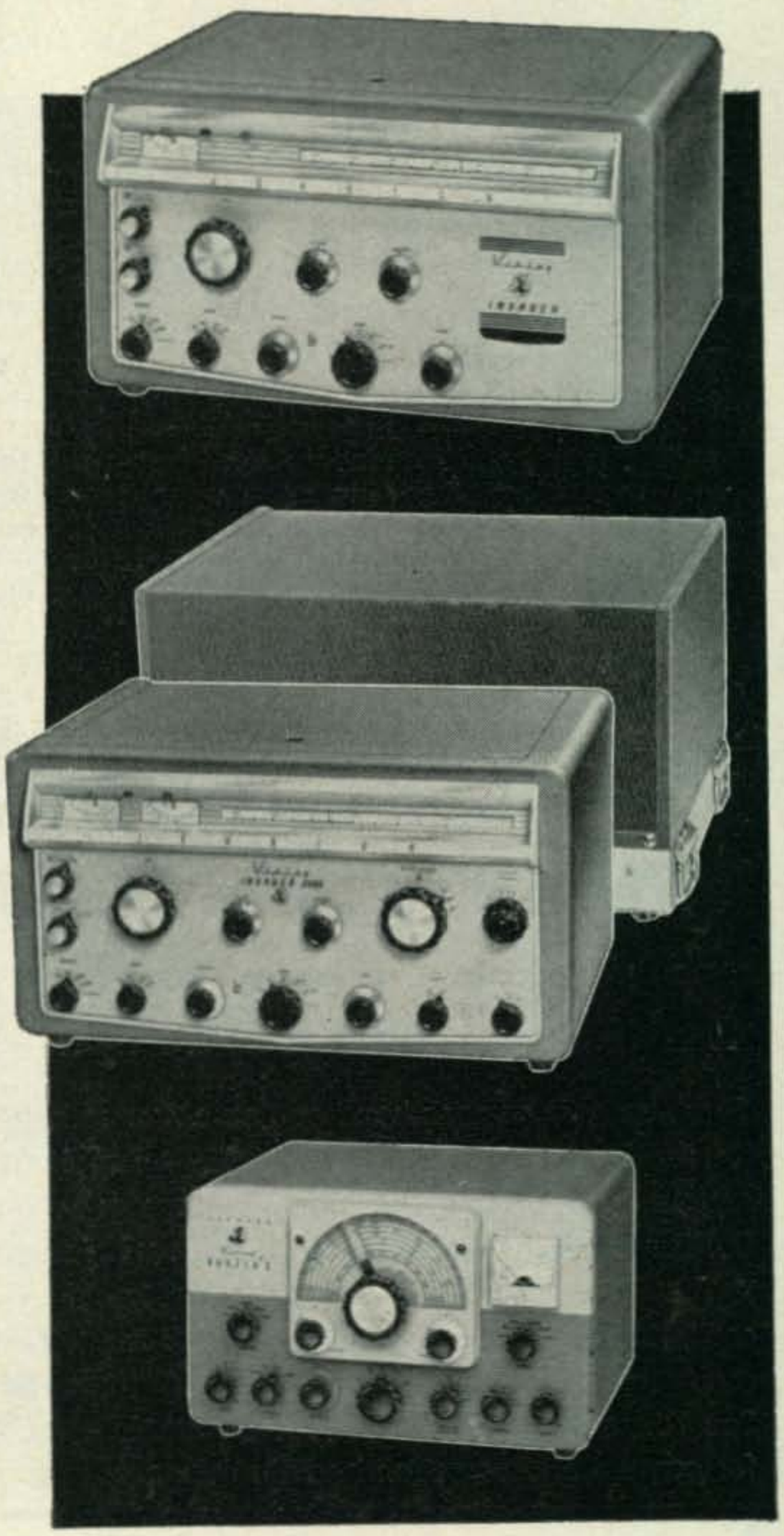
Mosley Electronics, Inc.

4610 North Lindbergh Blvd.
Bridgeton, Missouri

For further information, check number 17, on page 120

Choose your next transmitter

3 of the hottest and newest!



INVADER—More exclusive features than any other Transmitter/Exciter on the market today! Specially developed high frequency, symmetrical, multi-section band-pass crystal filter for more than 60 db sideband suppression—more than 55 db carrier suppression! Instant bandswitching 80 through 10 meters—no extra crystals to buy—no realigning necessary. Delivers solid 200 watts CW and P.E.P. SSB input; 90 watts input AM. Built-in VFO—exclusive RF controlled audio A6C and ALC (limiter type) provide greater average speech power. Wide range pi-network output circuit—extremely smooth VOX and anti-trip circuits. Fully TVI suppressed. Self-contained heavy-duty power supply. Wired and tested with tubes and crystals.

Cat. No. 240-302-2—Amateur Net $619.50

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

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

INVADER 2000—Here are all of the fine features of the "Invader", plus the added power and flexibility of an integral linear amplifier and remote controlled power supply. Rated a solid 2000 watts P.E.P. (twice average DC) input on SSB; 1000 watts CW; and 800 watts input AM! Wide range output circuit (40 to 600 ohms adjustable). Final amplifier provides exceptionally uniform "Q". Exclusive "push-pull" cooling system. Heavy-duty multi-section power supply. Wired and tested with power supply, tubes and crystals.

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

RANGER II—Now—a new version of the popular 75 watt CW or 65 watt AM "Ranger". The "Ranger II" transmitter also serves as an RF/audio exciter for high power equipment. Completely self-contained instant bandswitching 160 through 6 meters! Operates by built-in VFO or crystal control. High gain audio-timed sequence keying, TVI suppressed. Pi-network antenna load matching from 50 to 500 ohms. With tubes, less crystals.

Cat. No. 240-162-1
Viking "Ranger II" Kit—Amateur Net . . . $249.50

Cat. No. 240-162-2—Viking "Ranger II"
Wired and tested—Amateur Net $359.50

FREE
New Catalog
Write today for our newest amateur Catalog! Available now . . . contains photos, schematics and detailed specifications!

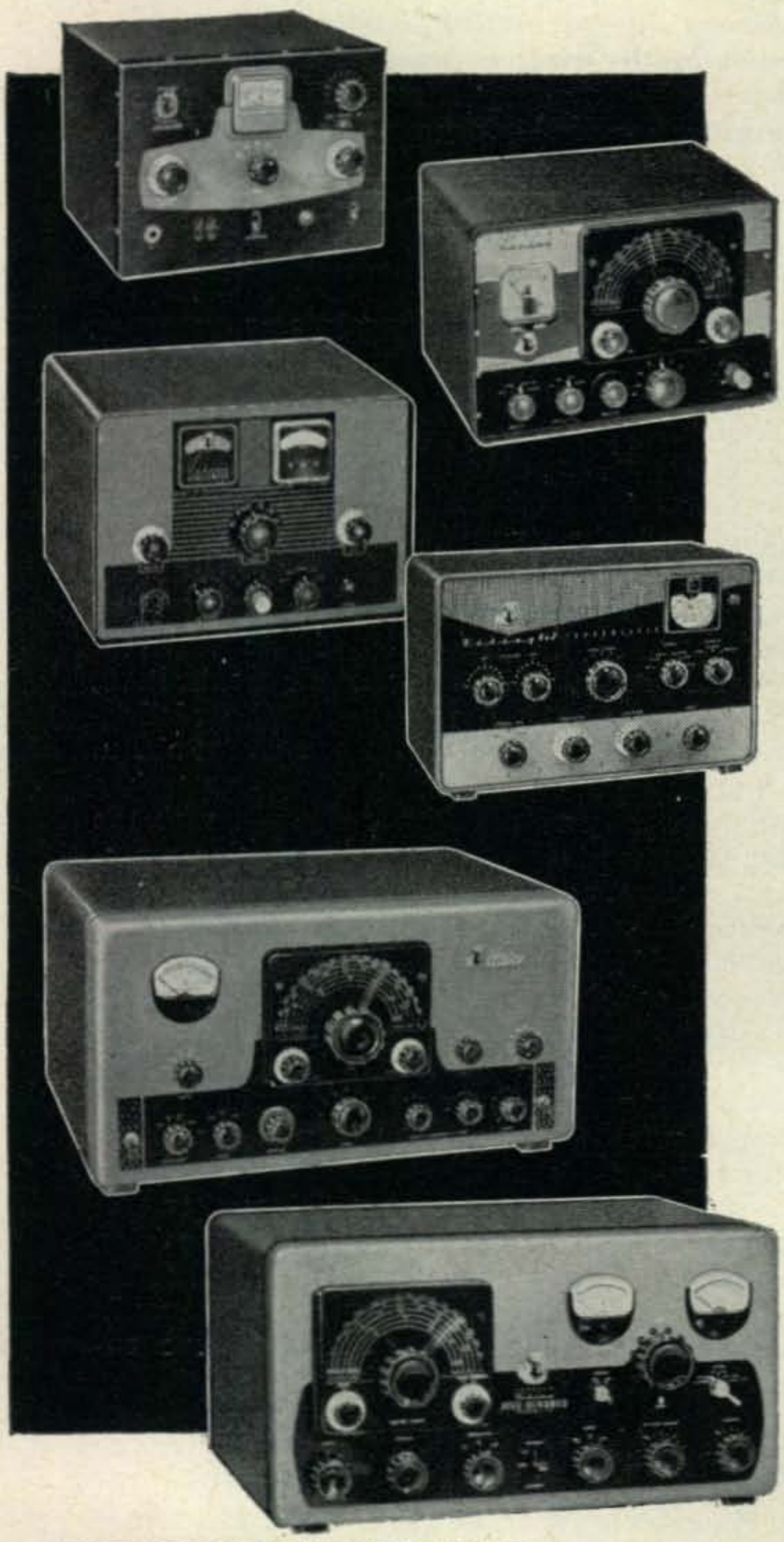
FIRST CHOICE AMONG THE NATION'S AMATEURS

Viking®

E. F. JOHNSON COMPANY • WASECA, MINNESOTA

from the VIKING line . . .

6 popular feature-packed transmitters!



ADVENTURER—Self-contained . . . 50 watts CW input . . . rugged 807 transmitting tube . . . instant band-switching 80 through 10 meters. Crystal or external VFO control—wide range pi-network output—timed sequence keying. With tubes, less crystals.

Cat. No. 240-181-1 Kit—Amateur Net . . . $54.95

NAVIGATOR—40 watts CW input . . . also serves as a flexible VFO exciter. 6146 final amplifier tube—band-switching 160 through 10 meters. Built-in VFO or crystal control. With tubes, less crystals.

Cat. No. 240-126-1 Kit—Amateur Net . . $149.50

Cat. No. 240-126-2
Wired and tested—Amateur Net $199.50

CHALLENGER—70 watts phone input 80 through 6; 120 watts CW input 80 through 10 . . . 85 watts CW on 6 meters. Two 6DQ6A final amplifier tubes. Crystal or external VFO control—TVI suppressed—wide range pi-network output. With tubes, less crystals.

Cat. No. 240-182-1 Kit—Amateur Net . . $114.75

Cat. No. 240-182-2
Wired and tested—Amateur Net $154.75

6N2—Rated 150 watts CW and 100 watts phone—offers instant bandswitching coverage of both 6 and 2 meters. Fully TVI suppressed—may be used with "Viking I, II", "Ranger I, II", "Valiant" or similar power supply/modulator combinations. Operates by crystal control or external VFO with 8-9 mc. output. With tubes, less crystals.

Cat. No. 240-201-1 Kit—Amateur Net . . $129.50

Cat. No. 240-201-2
Wired and tested—Amateur Net $169.50

VALIANT—275 watts input CW and SSB (P.E.P. with auxiliary SSB exciter) 200 watts phone. Instant band-switching 160 through 10 meters—built-in VFO or crystal control. Pi-network output matches antenna loads from 50 to 600 ohms. TVI suppressed—timed sequence keying—built-in low pass audio filter—self-contained power supplies. With tubes, less crystals.

Cat. No. 240-104-1 Kit—Amateur Net . . $349.50

Cat. No. 240-104-2
Wired and tested—Amateur Net $439.50

FIVE HUNDRED—Full 600 watts CW—500 watts phone and SSB (P.E.P. with auxiliary SSB exciter). Compact RF unit designed for desk-top operation. All exciter stages ganged to VFO tuning—may also be operated by crystal control. Instant bandswitching 80 through 10 meters—TVI suppressed—high gain push-to-talk audio system. Wide range pi-network output. With tubes, less crystals.

Cat. No. 240-500-1 Kit—Amateur Net . . $749.50

Cat. No. 240-500-2
Wired and tested—Amateur Net $949.50

FACTORY AUTHORIZED SERVICE

Instead of shipping to our factory, equipment to be serviced may also be sent to:

Empire State Elect. Service
139-140 Hillside Ave.
Jamaica, New York

Park-Armature Co.
1218 Columbus Ave.
Boston 20, Mass.

For further information, check number 21, on page 120

Guglielmo Marconi and the Sixtieth Anniversary of Trans-Atlantic Wireless Communication

BY GEORGE JACOBS*, W3ASK

This month marks the 60th anniversary of Marconi's historic bridging of the Atlantic Ocean with wireless signals. CQ honors the memory of this epic event, and the man responsible for it, by re-telling some of the fascinating details leading up to and surrounding the first successful communication by wireless between Europe and North America[1]. The Editors of CQ believe that the following intimate story of Marconi's life-long experiments with wireless communication will appeal to both old-timer and Novice alike. Marconi is not only the father of wireless communication, but in a sense he is also the father of amateur radio, for his burning drive to press forward into the then still unexplored regions of radio and his native eagerness to try to do the "impossible" are symbolic of the spirit which subsequently gave rise to amateur radio.

SIXTY years ago, at exactly 12:30 P.M. on December 12, 1901, an event was taking place on a windswept hill near St. John's, Newfoundland that was destined to affect profoundly the life of every inhabitant of the globe.

An on-the-spot observer on that chilly December day would have seen a small group of grown men struggling on a rock-strewn hill overlooking St. John's harbor, attempting to control the flight of a large kite. Trailing from the kite there is a wire which enters one of the run-down, abandoned military barracks located on the hilltop.

Inside the building, a young man sits concentrating on a strange assortment of electrical apparatus arranged on a table before him. As noon approaches, his expression becomes more intent. Twelve o'clock passes, then twelve-thirty. Very soon now the strain will be over. He knows that this day will be recorded as either just another cold bleak day in Newfoundland or it will go down in history as the beginning of a new era in the field of communications.

He continues to wait, a telephone receiver held tightly to his ear. Suddenly he hears something; three faint clicks in the receiver, the Morse Code designation for the letter S, repeated several times. There can be no doubt now that six years of patient experimenting has succeeded, yet he is ever the cautious scientist. Passing the receiver to his assistant for confirmation, he asks: "Can you hear anything, Mr. Kemp?" Kemp nods, indicating that he too has heard the three faint clicks. Thus was accomplished the twentieth-century miracle of long-distance wireless communication. The radio signal heard that day on the chilly Newfoundland hilltop had spanned the Atlantic, travelling nearly 2100 miles from a transmitting station located at the southwestern tip of England near the small Cornish town of Poldhu.

For Guglielmo Marconi, the thinly-mustached twenty-seven year old Italian scientist with the telephone receiver glued to his ear, this represents a supreme climax to six years of patient experimenting, and the accomplishment of a feat called "impossible" by many of the world's eminent scientists.

Fortunately for posterity, among Marconi's small staff of assistants on the hilltop that day was a photographer who recorded many of the day's exciting events on film. Figure 1 pictures Marconi in the abandoned barracks building at St. John's Newfoundland on December 12, 1901. On the table next to him is the receiving equipment used to copy the first trans-Atlantic signal. Figure 2 shows several of Marconi's assistants struggling to get the kite-borne antenna into the air.

Marconi's Early Years

Guglielmo Marconi was born April 25, 1874 at Marzabotto, near Bologna, Italy. His father was a wealthy Italian banker, and his mother came from an aristocratic Irish family.

The future great man of radio grew up as a delicate and studious child. Young Marconi attended no schools, but received all of his education under the guidance of private tutors in Italy and in England. He became very inter-

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*PROPAGATION and SPACE COMMUNICATIONS Editor, *CQ*.

[1]Much of the historical data contained in the following report appeared originally in "Men of Radio—Part II" by William R. Wellman (*CQ*, July 1952). Additional information and photographs (some of which appear in print for the first time in this country) were provided through the courtesy of the Marconi's Wireless Telegraph Company Limited, of Chelmsford, Essex, England.

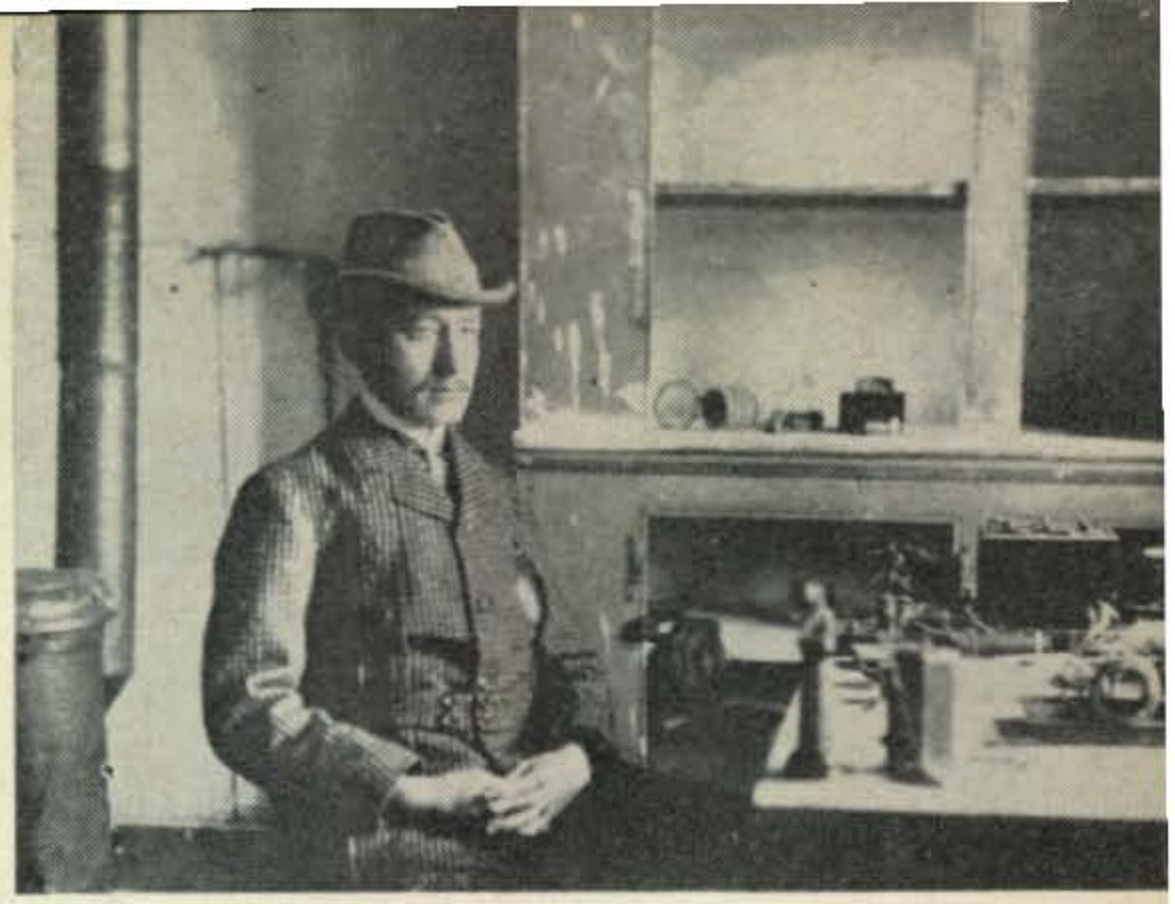

Figure 1: This picture was taken in an abandoned military barracks atop a hill overlooking the harbor at St. John's, Newfoundland shortly before noon on December 12, 1901. It shows the twenty-seven year old Marconi seated next to the receiving equipment that he used for picking up the first trans-Atlantic wireless signals less than an hour after this picture was taken. *(Photo courtesy Marconi's Wireless Telegraph Company Limited.)*

ested in science at an early age, and as a young boy he read widely in the excellent scientific library in the Marconi home. During his teens he followed with fascination the work and experiments of the German scientist Heinrich Hertz who had successfully generated and detected electromagnetic waves in the laboratory. Reflecting back on his early years, Marconi himself has said: "The idea of transmitting messages through space came to me suddenly as a result of having read in an Italian electrical journal about the work and experiments of Hertz. My chief trouble was that the idea was so elementary, so simple in logic, that it seemed difficult to me to believe no one else had thought of putting it into practice."

With this challenging idea in mind, Marconi began to duplicate Hertz's equipment. In 1894, when he was twenty years old, he set up a Hertz generator in the garden of his father's large estate. The generator, which he had constructed himself, consisted of an induction coil which discharged through a spherical spark-gap. To demonstrate that Hertzian waves could be used for signalling, Marconi added an interrupter to the circuit and transmitted Morse Code signals to a spark-gap detector located several hundred yards away. In subsequent experiments that year, he increased the distance over which "wireless" messages could be sent by several hundred more yards. Although this was a greater distance than had ever been spanned previously with Hertzian, or electromagnetic waves, Marconi knew that he must extend even this range by several hundred, or perhaps thousands of times if his system of wireless communication was to be of practical value.

Marconi's Antenna & Coherer Detector

Marconi's initial experiments used equipment similar to that developed by Hertz. He soon found, however, that by replacing Hertz's antenna, which consisted of short horizontal rods connected to each terminal of the spark-gap and surrounded by a parabola-shaped metal reflector, with an antenna of his own design, he could receive the transmitted signal at greater range. Marconi's antenna consisted of two elements; a copper cylinder, mounted on a tall mast and a rod embedded in the earth. Each element was connected to one terminal of the spark-gap. It is interesting to note that for many years thereafter, the elevated antenna, together with the ground connection, remained a necessary part, and indeed a symbol of radio. It is still used as part of the insignia of the American Radio Relay League and of many other radio organizations throughout the world. A grounded antenna is referred to, even today,

Figure 2: Marconi's assistants preparing to erect the kite antenna on a hilltop near St. John's, Newfoundland which was used to receive the first trans-Atlantic wireless signals on December 12, 1901. *(Photo courtesy Marconi's Wireless Telegraph Company Limited.)*

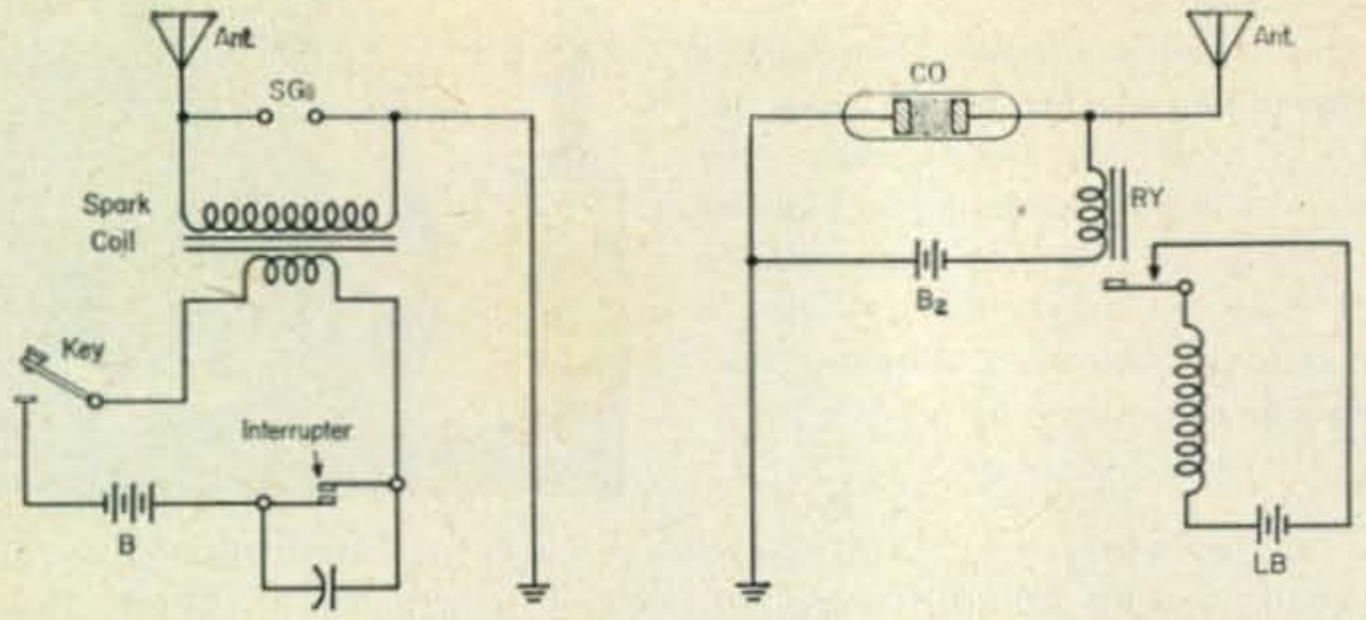

Figure 3: The type of transmitter and receiver used by Marconi during his early experiments in the 1890's. The transmitting coil is powered by the battery, B and the antenna and ground are connected directly to the spark gap, SG. At the receiver, the coherer detector, CO is connected between antenna and ground, and actuates the relay and sounder, RY. Later, Marconi replaced the relay and sounder with a telephone earpiece. Note that no attempt was made to tune either the transmitter or receiver. The range of this equipment was about a mile, and it operated on a frequency of about 1000 *megacycles*.

as a *Marconi* antenna, and this was one of Marconi's first original contributions to the science of radio.

Although his antenna had extended the range of his wave generator, or transmitter, Marconi soon realized that there was little hope of real long-distance communication without an improved receiving system; Hertz's spark-gap receiver was far too insensitive. Marconi read with considerable interest of the work of Sir Oliver Lodge, an English scientist who had developed a new type detector using iron filings. Again Marconi's genius for refining and improving came to fore, and in a short time, using Sir Oliver's method, he developed a greatly improved detector which he called a *coherer*. Marconi's coherer employed fine nickle and silver filings (instead of iron) between two silver plugs, enclosed in an evacuated tube. It was called a coherer because wireless waves had the effect of causing the filings to stick together, or cohere, which reduced their electrical resistance. Marconi connected the coherer detector to a battery and a telephone receiver, and to his elevated antenna system. (See fig. 3). He could then hear when his transmitter sent out signals. He also adapted a Morse inker, which when attached to the coherer circuit, provided a permanent record of signals on a moving tape. Using this new equipment, by 1896, Marconi was able to receive wireless messages in his house sent from a transmitter located on a hill nearly two miles away. Almost as important as the improvement in range was his discovery that signals could be picked up when the transmitter was placed on the far side of the hill, thus proving that the waves were capable of passing through obstacles.

Despite his success and the steady increase in range, Marconi's work had thus far attracted little attention. Aside from his family, his tutors, and a few others, no one seemed to be interested. Yet Marconi was certain that his system of sending wireless messages had commercial, and perhaps even military value. With this in mind, he offered the results of his research to the Italian government, but the offer was declined.

Experiments in England

Disappointed that he could not interest his own government in his work, Marconi's thoughts turned to England where the British Admiralty, foreseeing the possibility of the use of electromagnetic waves for signalling, offered a monetary award to anyone producing "a means by which a ship approaching a friendly port by night could signal her presence and her identity, without revealing her presence, visibly or audibly, to the enemy." His decision to go to England was dictated also by the fact that he spoke English almost as a native language, and his family had many friends in that country.

He arrived in England during early 1896, carrying letters of introduction to a number of important persons, including one to Sir William Preece, Technical Director of the British Post Office. In his position, Preece was responsible for the British telephone and telegraph networks, and had himself previously conducted experiments with wireless transmission. During Marconi's first demonstration of his wireless system in England, conducted for Sir William, he successfully transmitted messages from the roof of the Post Office building in downtown London to a receiver on the Thames Embankment a little less than a mile away. Sir William Preece was very interested in Marconi's results and encouraged him to continue his experiments.

In subsequent experiments Marconi spanned greater and greater distances. In July, 1896, he bridged the Bristol Channel with wireless sig-

nals, a distance of almost *nine miles*. This experiment conclusively demonstrated the advantage of the Marconi elevated antenna, as signals could not be received until the transmitting antenna was elevated to a considerable height.

Although accurate instruments for measuring wavelengths were not available at the time, calculations based on the circuit parameters used in these early experiments show that the transmissions were taking place at wavelengths in the *microwave* region, or at frequencies on the order of 1,000 megacycles! Commenting upon Marconi's work at the time, Sir William Preece wrote that the new system of wireless communication will "reach places hitherto unaccessible" and that "for shipping and lighthouse purposes it will be a great and valuable acquisition." Sir William was a man of considerable foresight.

In late 1896, Marconi applied for a patent from the British government for his wireless system; he subsequently received the now famous No. 7777. This is considered to be one of the most important patents ever issued as a result of the far-reaching effects it has had upon mankind.

Ship-To-Shore Transmission

With the Admiralty prize in mind, Marconi next gave attention to the possibility of signalling from a ship at sea using radio waves. He adapted the Marconi antenna for shipboard installation by making use of the ship's structure and the sea as the grounded element, and running a long vertical wire up the ship's mast as the radiator. Using this shipboard antenna, the coherer detector and a "high power" spark-gap transmitter, Marconi, in a demonstration for Queen Victoria, successfully established wireless communication between the Queen in her residence on the Isle of Wight and the Prince of Wales on board the Royal Yacht at anchor several miles off shore in the Solent Channel. The Admiralty prize was Marconi's[2]!

During July, 1897, the first company, Wireless Telegraph and Signal Company Limited, was formed to develop Marconi's new wireless communication system for commercial use. Marconi became the firm's Chief Engineer. Three years later the name was changed to *Marconi's Wireless Telegraph Company Limited,* a name which has stood, and continues to stand today, as a hallmark of quality and leadership in the field of radio communications.

One of the first projects of the new company was the installation of wireless equipment in lightships and lighthouses, at the direction of the British Admiralty and the Lloyd's Corporation. In 1899, the French government invited Marconi to conduct wireless tests across the English Channel, between England and France. These tests, conducted over a distance of thirty miles, were highly successful. Newspaper reporters who witnessed the tests gave Marconi much valuable publicity, a fact which probably was quite instrumental in directing public attention and support toward his ideas.

The value of wireless for emergencies at sea was first shown during April, 1899, when a British lightship radioed for help as it was being battered to pieces by heavy seas off the English coast. In response to the radio call, help arrived in time to remove the crew and thus prevent loss of life.

Later that same year, Marconi clinched public acceptance of wireless communication by sending the results of the international yacht races from a tug, stationed at the Sandy Hook, New York, race course, to shore. This was the first instance of the use of wireless for covering a sports event. As the *Shamrock* and the *Columbia,* contenders for the famous American Cup sailed the course, Marconi followed, reporting the series in detail, transmitting hundreds of individual reports to shore.

Now only twenty-five years old, Marconi was well on the way toward international recognition as a scientist. Although he was the leader, he was not, however, the only one in search of a commercially acceptable method of wireless communication. The science had progressed to the point where signalling over a 200 mile range was feasible and a race had begun to extend the range and improve reception. Among those pitted against Marconi in this race were DeForest and Fessenden, in the United States and Slaby in Germany. The Russian scientist, Popoff, had achieved notable results with his experiments, as had Bose in India, but Marconi had managed to keep ahead of the field and as early as 1900 hinted that even the Atlantic might not prove to be a barrier to wireless. His principal concern, however, continued to center upon communication between ships at sea and shore stations. He visualized powerful land stations on both sides of the ocean having a range great enough to maintain contact with a ship in mid-Atlantic. In this way, a ship would always be in touch with shore and much of the risk of ocean travel would be nullified.

A Try At The Impossible

Many eminent scientists of the day, however, disagreed with Marconi.

On the basis that radio waves, like light waves, travel in straight lines, they theorized that wireless communication was limited to the horizon. Wireless signals travelling beyond the horizon, they claimed, would continue in a straight line through the atmosphere and be lost in space; the signal could not curve around the earth's surface.

It was in this controversial atmosphere that Marconi decided to try the impossible. He felt that the future of wireless telegraphy could only be assured by a convincing and dramatic demonstration of its potentialities for long dis-

[2]The "prize" subsequently amounted to more than £60,000 which was awarded to Marconi by the British Admiralty in the form of royalties over a 15 year period.

tance communication. He decided that nothing less than bridging the Atlantic would meet the situation!

For there to be any chance of success, thought Marconi, an unobstructed over water path was essential. Cornwall, in the southwest of England, quickly suggested itself as a transmitting location, and a satisfactory site was found at Poldhu Point, a few miles north of the Lizard, a finger of land jutting into the sea just east of Land's End, where the English Channel flows into the Atlantic Ocean.

Construction of what was to be the most powerful wireless station in the world at the time, began in October 1900. Professor J. A. Fleming, a well-known authority on high-tension alternating current work, and who later invented the diode vacuum tube, had been appointed scientific advisor to the Marconi Company and was mainly responsible for the design of the transmitter and the antenna system.

By some trick of fate, there appears to be an element of luck associated with almost all of mankind's greatest discoveries, and Marconi's was no exception. Up until the time that the Poldhu station was completed, all of Marconi's wireless experiments were conducted in the microwave range, at frequencies of approximately 1,000 megacycles. It was Fleming who suggested that the Poldhu station use a longer wavelength (lower frequency) and an antenna of massive size. Based entirely on *intuition,* Marconi agreed to Fleming's proposal. There was no propagation data available at that time and Marconi could not have fully realized the consequence of this decision. We now know, however, that his success was due primarily to this choice of frequency. The first trans-Atlantic signals were on a frequency somewhere between 150 and 300 kilocycles, and were propagated across the ocean by reflection from the ionosphere, a fact which was unknown to Marconi, and wasn't disclosed until twenty-three years later. If Marconi had decided to attempt this experiment in the microwave range, it is certain that it would have failed, since frequencies in this range are too high to be reflected by the ionosphere, and do not generally travel beyond the horizon. As uncanny as it seems, Marconi's decision to use a longer wavelength and a large antenna, although based on intuition, led to the success of the first trans-Atlantic wireless communication!

Construction at Poldhu proceeded during the summer of 1901. The transmitter was to have a power of about 10 kilowatts, which was on the order of 100 times greater than anything previously attempted. (See figure 4). The impressive antenna system consisted of twenty 200 foot masts erected in a circle (see cover photo). During early August, using a temporary transmitting antenna, the first long-dis-

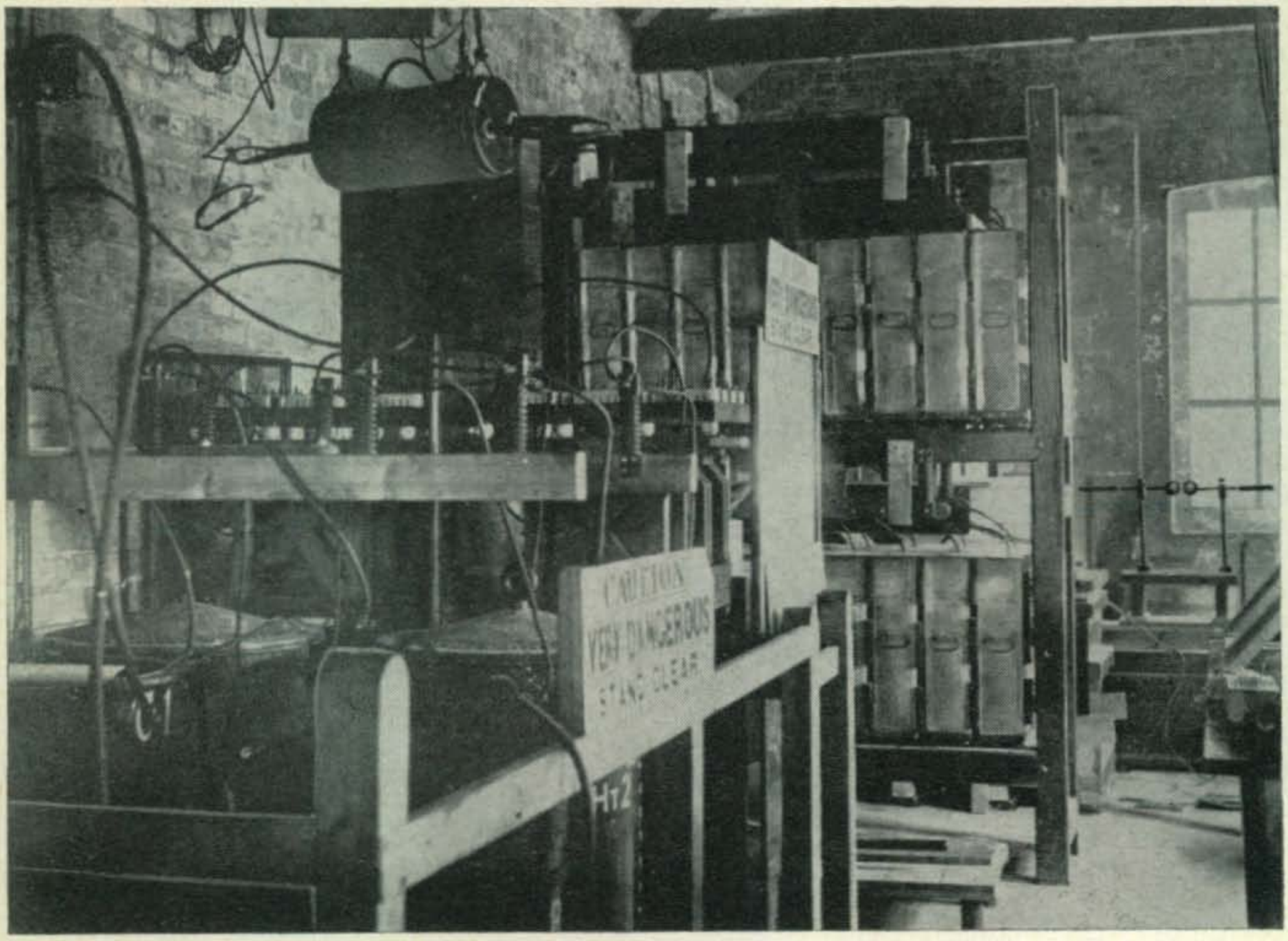

Figure 4: The transmitter at Poldhu, England with which the first wireless signal was transmitted across the Atlantic on December 12, 1901. The power of the transmitter was about 10 kilowatts. It was designed by J. A. Fleming and Marconi. *(Photo courtesy Marconi's Wireless Telegraph Company Limited.)*

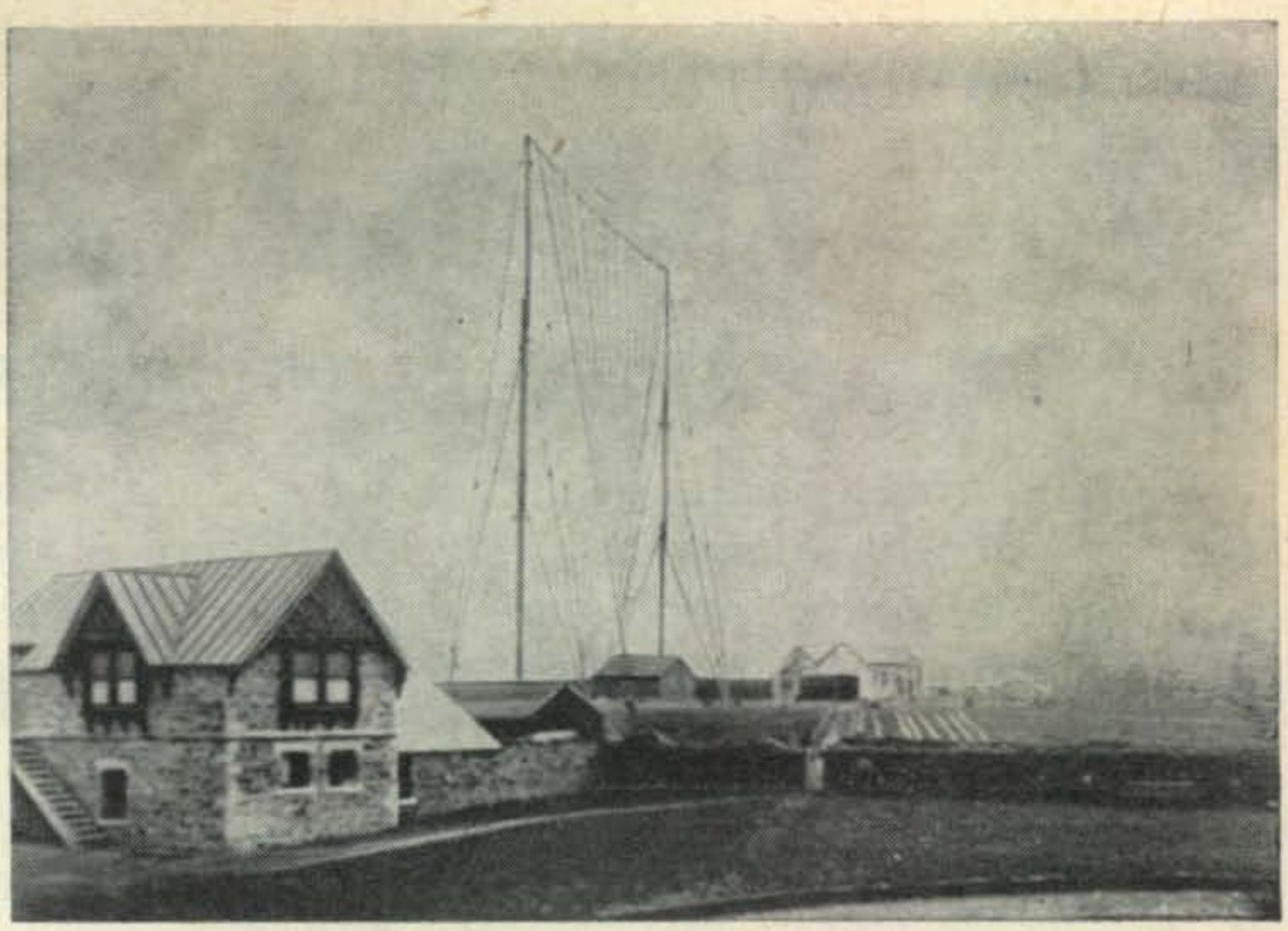

Figure 5: The 150 foot masts supporting the 60 wire fan-shaped antenna which radiated the first trans-Atlantic signals from Marconi's transmitting station at Poldhu, England. This antenna replaced the elaborate system shown on this month's cover, which was wrecked by a gale shortly before the trans-Atlantic tests began. *(Photo courtesy Marconi's Wireless Telegraph Company Limited.)*

tance tests were conducted successfully from the Poldhu station, over a distance of 225 miles to Crookhaven on the west coast of Ireland.

Work continued on the elaborate antenna system which was to be used for the trans-Atlantic tests. But on September 17 there was a serious setback when a heavy gale destroyed the antenna just as it was nearing completion. It was replaced by a less elaborate antenna consisting of a vertical fan of 60 wires suspended between two 150 foot wooden masts (see figure 5). By mid-November, 1901, all was ready at Poldhu.

The Trans-Atlantic Test

For a receiving site Marconi chose St. John's, Newfoundland since this was the town in North America that was nearest to Poldhu, the distance between the two being just under 2100 miles. The government authorities made available to Marconi for housing his apparatus, an abandoned military barracks on Signal Hill, a barren, rocky rise of land overlooking the entrance to St. John's harbor.

Marconi sailed for Newfoundland on November 27 with his two assistants, Kemp and Paget, arriving in St. John's on December 5. By December 9, their preparations for a temporary receiving station were sufficiently far advanced for instructions to be sent to Poldhu by cable, requesting that wireless transmissions begin on December 11. No complete message was to be sent by the Poldhu station, just continuous repetition of the Morse letter S (three clicks or dots) starting at 12:00 noon and to continue until 3:00 P.M. each day, St. John's time (1500 to 1900 GMT).

December 10 was spent in experimenting with balloons for raising the receiving antenna, but several broke away in the high wind. When another balloon was lost on December 11, it was decided to try a kite-born antenna. They did manage to fly a kite that day to which was suspended 600 feet of antenna wire, only to find out that variation of the antenna capacity as the kite rose and fell prevented the effective use of the receiver's tuned circuits. Although some reports say that Marconi may have received a very faint signal from Poldhu on December 11, his own log fails to substantiate this. That night he quickly made some changes in the receiver, transformer coupling the coherer detector and telephone earpiece to the antenna circuit in order to avoid the capacity effect of the kite antenna.

On Thursday, December 12, 1901, Marconi's assistants, after losing one kite in a squall, managed to fly a kite with an antenna suspended from it. At 12:30 P.M., local time, faint but unmistakalbe signals were first heard by Marconi, and verified by Kemp, through the atmospherics. The three faint clicks heard in the telephone earpiece was the Morse letter S, the pre-arranged signal from Poldhu, on the other side of the ocean nearly 2100 miles away. Signals were also heard at 1:10 and 2:20 P.M. — the era of long-distance wireless communications had begun.

Finalé

Marconi's contribution to the development of wireless communication did not end with this success. It would require far more space than is available here to tell the complete story of the vast industry he founded, and of his many further explorations into all phases of radio communication, until his untimely death in 1937. Noteworthy of at least brief mention, however, is his development of the horizontal, or beam antenna system in 1905; his pioneering use (along with radio amateurs) of the high frequencies for long-distance radio communications during the early 1920's, when this range of frequencies was considered to be "useless" by many of the experts at the time; his pioneering experiments during the late 1920's and early 1930's with transmission at v.h.f. and u.h.f., conducted primarily from his floating laboratory aboard the steam yacht *Elettra;* his

[*Continued on page 102*]

Transmitting Tubes—How To Use and Abuse Them; Part II

BY WILLIAM I. ORR*, W6SAI

Part I of this series dealt with some of the problems encountered with transmitting tubes that were a direct result of the operating temperature of the tube. This second, and concluding part covers circuit design, parasitic suppression and component parts.

THE schematic of a transmitter or amplifier rarely provides the constructor with sufficient information concerning circuit layout or choice of proper components. In many instances, the designer must pick up this information by experience. This is often the costly way, as a design error or poor component choice can often lead to costly equipment failure or to tube damage!

The whole problem of circuit design, parasitic suppression, and choice of components can be summed up in one thought: *maintain isolation between output and input circuits.* This idea is easy to express, but not so easy to accomplish!

All component parts of the grid or input circuit (and earlier stages) must be isolated from the plate circuit compartment. Similarly, plate circuit components must be kept out of the input compartment. If this situation is achieved, a condition of maximum circuit stability will result.

Unhappily, tubes and circuit components are not perfect. They are finite in size, and thus are a fraction of the wavelength at which they operate. Capacitors have residual inductance, and tube lead inductance enters the picture. The problem of component size can be partially solved by making tubes and parts smaller. However, until some genius miniaturizes the watt, the problem of radiating heat in smaller and smaller spaces becomes formidable. As a result, it becomes impractical to reduce the size of tubes and components to the vanishing point.

Because of their physical size, bypass capacitors have a certain critical frequency above which their effectiveness is impaired. At the same time, the internal structure of vacuum tubes becomes large in relation to the wavelength as the frequency of operation is raised. As these two effects grow, the circuit efficiency is impaired, and the tube operation becomes less efficient. Proper circuit design will help to reduce these unwanted effects to an absolute minimum.

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The Common Screen Circuit

It must be noted that the screen lead of the tetrode or pentode tube (and connections to it via the socket) are common to both the input and output resonant circuits. Because of the plate-screen capacitance of the tube, the r.f. plate voltage developed in the output circuit causes an r.f. current to flow out the screen lead to the chassis (ground). In the case of a push-pull stage, this current may flow from the screen terminal of one tube to the screen terminal of the other tube. Similarly, due to the control grid-screen capacitance of the tube, the r.f. voltage in the input circuit will cause an r.f. current to flow in this same lead to the chassis, or to the opposite tube of the push-pull circuit.

The inductance of the screen lead is common to both the input and output circuits. This inductance, though small, is important, and its effect becomes more pronounced as the operating frequency of the tube is raised. At audio frequencies and low radio frequencies, the screen lead inductance may be safely ignored, as its effects are negligible. As the frequency of operation of the tube approaches the higher portion of the r.f. spectrum the lead inductance plays an increasingly larger part in the operation of the tube and the circuit. At some high critical frequency, the inductance can no longer be ignored, as it starts to affect the operation of the tube. In addition, the residual inductance of the tube socket and screen bypass capacitor enter into the picture as the frequency of circuit operation is raised.

The tetrode elements involved in feedback circuits are shown in fig. 1. These circuit elements are inherent and inside the vacuum enclosure of the tube and include the residual interelectrode capacitances, and the inductance of the screen lead. The r.f. voltage developed in the plate circuit (E_p) causes a current (I) to flow through the plate-screen capacitance and also through the inductance (L) in the screen lead. The passage of this current through (L) develops a voltage ($-E$) which has a polarity opposite to that of the r.f. plate voltage.

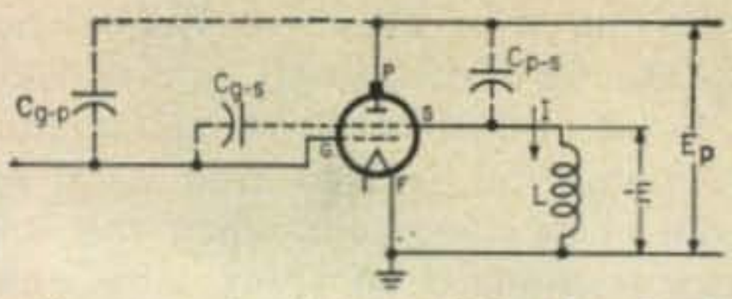

Fig. 1—The tetrode characteristics involved in parasitic feedback circuits include the interelectrode capacitances of the tube and the inductance of the screen to ground path *(L)*. The plate-screen capacitance, together with the inductance of the screen-ground path, develops a potential *(-E)* on the screen which is a portion of the r.f. plate potential. Screen inductance *(L)* is made up of internal inductance of the screen lead, plus inductance of socket and screen bypass capacitor.

Analysis of the Tetrode Neutralizing Circuit

These circuit elements have been arranged in fig. 2 with a graphical representation wherein the height above or below the zero line (X-axis) represents the magnitude and polarity of the r.f. voltage of that part of the circuit with respect to the filament r.f. potential (normally zero). Because all of the circuit components involved are pure reactances, the voltages are either in-phase or out-of-phase and so can be represented as positive or negative with respect to each other. Voltages plotted are the components of the r.f. output voltage (E_p) and grid driving voltage is not shown. The plate (P) is shown at a high positive potential. If the circuit is perfectly neutralized, the grid (G) lies on the zero potential line (filament potential) insofar as any action of the r.f. plate voltage (E_p) is concerned. *When no component of output voltage exists between grid and filament, the circuit is neutralized and a condition of maximum isolation exists.*

The voltage developed in the screen lead inductance (L) places the screen (S) at a negative r.f. potential ($-E$) with respect to ground. The total r.f. voltage between plate and screen comprises the plate voltage (E_p) plus

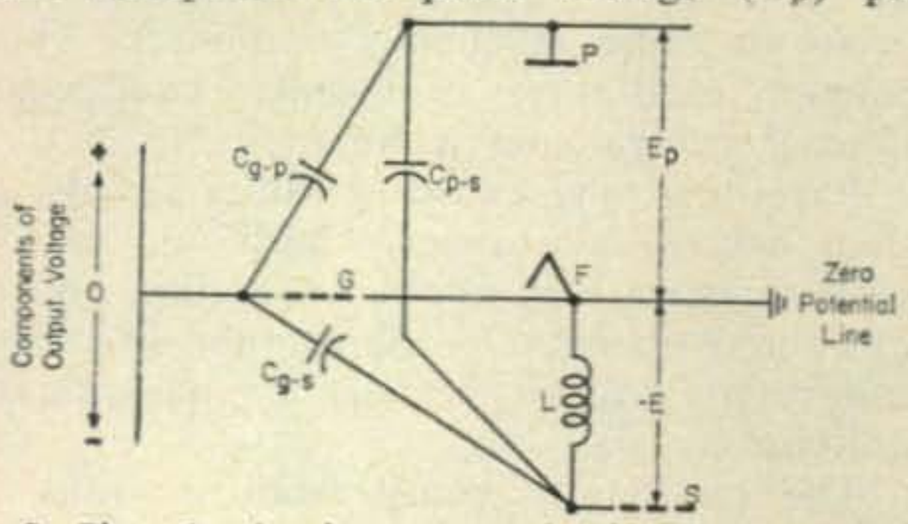

Fig. 2—The circuit elements and r.f. voltages of the tetrode may be arranged in graphical form, wherein the height above (or below) the X-axis represents the magnitude and polarity of the voltage of that part of the circuit with respect to the filament potential. In a grid-driven circuit, the filament is normally at ground potential. If no component of the output voltage is developed between grid and filament, the circuit is neutralized. Shown above is the representation of a tetrode tube at the self-neutralizing frequency.

the screen lead inductance voltage ($-E$). This total voltage is applied across a potential divider consisting of the grid-plate capacitance ($C_{g\text{-}p}$) in series with the grid-screen capacitance ($C_{g\text{-}s}$). When this potential divider is suitably matched to the magnitude of E_p and $-E$, the control grid will have no voltage difference to the filament and (by definition) the circuit is completely neutralized.

The Self-Neutralizing Effect

It should be noted in fig. 2 that the potential dividing action between the grid-plate and the grid-screen capacitances will not be affected by the operating frequency of the tube. On the contrary, the division of voltage between plate and screen, and screen and ground due to the screen charging current (I) flowing through screen lead inductance (L) will vary greatly with frequency. There will, therefore, be some particular frequency at which the potential dividing capacitance places the grid at filament potential as far as plate circuit parameters are concerned. This is called the *self-neutralizing frequency* of the tetrode. At this *one particular frequency*, the tetrode is inherently neutralized due to the circuit elements within the tube structure (and any external added screen lead inductance to ground). The self-neutralizing frequency varies from 25 mc (for large transmitting tubes of the 4-1000A class) to about 100 mc (for small tubes of the 6146 class). The self-neutralizing frequency of external anode tubes (4X150A, for example) is of the order of several hundred megacycles.

Neutralization Below the Self-Neutralizing Frequency

Standard neutralizing circuits suffice below the self-neutralizing frequency of the tetrode tube. Normally, the feedback within tetrodes is a very small fraction of the feedback present in triodes. For low frequency operation, the isolation provided by a tetrode is enough so that in many cases external neutralizing circuits are not necessary to counteract the small amount of feedback. Whether or not neutralization should be used in the higher frequency region of the spectrum depends entirely upon the tube type, the operating conditions, and the degree of isolation desired between input and output circuits. It must be remembered that modern high gain tetrodes can provide almost full output with negligible grid excitation. Unless suitable precautions are incorporated in the electrical and mechanical design of the amplifier, energy feedback (other than that through the tube) will inevitably occur. Suffice to say that unless the tube and stray feedback paths are neutralized a condition can exist that could lead to circuit instability.

Neutralization Above the Self-Neutralizing Frequency

The self-neutralization point offers a clue as to the proper steps to be taken to ensure that

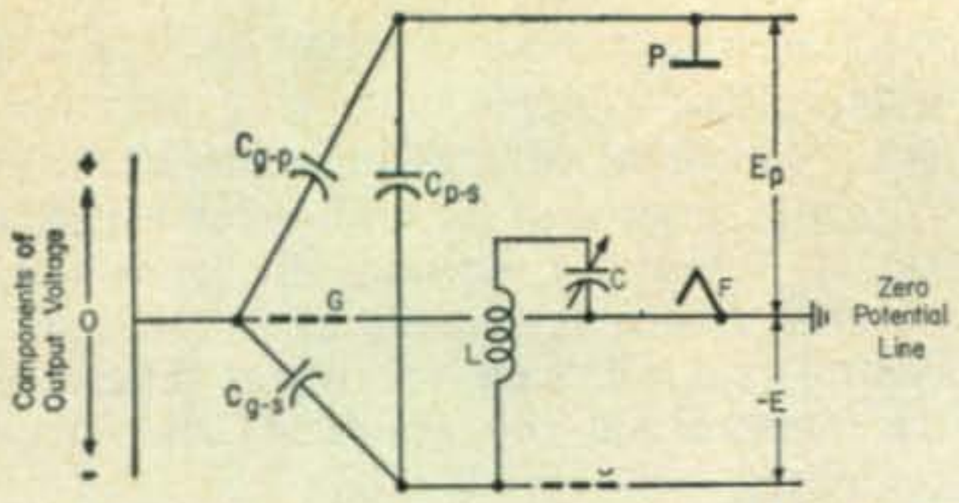

Fig. 3—This illustrates the components of the output voltage of a tetrode tube when the v.h.f. stage is neutralized by added series screen-lead capacitance. This neutralizing technique is frequency sensitive. Varying series capacitor, C, will adjust magnitude of E_p and $-E$ to the potential divider made up of grid-plate and grid-screen capacitances.

the tetrode circuit is properly designed for a high order of stability. When the tube is operated *below* the self-neutralizing frequency, normal neutralizing circuits will apply, as the effect of the screen inductance (L) is small. If the operating frequency is *higher* than the self-neutralizing frequency, the voltage ($-E$) developed in the screen grid lead inductance is too large to allow proper voltage division between the internal capacitances of the tube. Suitable circuit stability and neutralization may be accomplished by moving the self-neutralization frequency of the tube to the frequency of operation, thus reducing the voltage developed across the screen inductance to a negligible amount. One obvious method of reducing the voltage in the screen lead is to series tune the screen circuit to ground so as to lower the total reactance. This circuit may take the form of a variable capacitor placed between screen and ground, as shown in fig. 3. The capacitor is adjusted so as to provide minimum feed-through of energy between grid and plate circuits. This neutralization technique, however, is frequency sensitive and the capacitor must be adjusted if an appreciable change in operating frequency is made.

A second neutralization technique is to alter the potential divider network made up of the tube capacitances (fig. 4). This can be done by adding capacitance external to the tube between grid and plate. The value of this capacitance is roughly equal to that value normally used to neutralize the tube at lower frequencies, and can take the form of a small wire or rod standing up beside the tube "looking" at the plate. This configuration is also frequency sensitive and requires readjustment when the operating frequency is changed an appreciable amount.

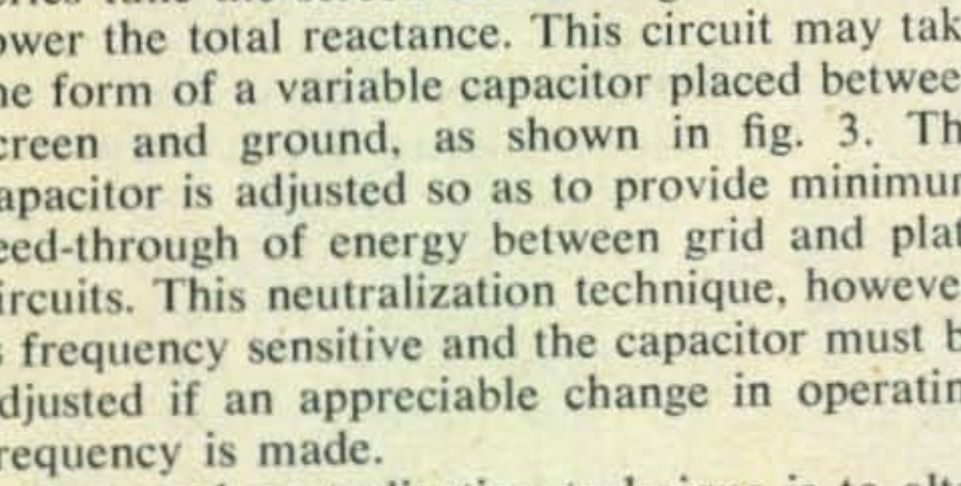

Fig. 4—This illustrates the components of the output voltage of a tetrode tube when the v.h.f. stage is neutralized by added external grid-plate capacitance (C_{ext}). This neutralizing technique is also frequency sensitive. The capacitance of the potential divider is adjusted, in this case, rather than the screen circuit impedance (L).

If a tetrode r.f. amplifier operating above its self-neutralizing frequency must tune over a range of frequencies, it is probably easier to use the series screen tuning technique and make the control available to the operator. This capacitor will be of the order of 50 or 100 mmf.

Another method of moving the self-neutralizing frequency of the tetrode to the operating frequency is shown in fig. 5. The screen is bypassed to the filament circuit of the tube, and inductance is introduced in the common filament and screen ground lead. In effect, the filament is tapped up the screen inductance to a point where the r.f. voltage difference between grid and filament is zero insofar as the components of the plate voltage are concerned. This configuration will be found to be self-neutralized at a higher frequency than if filament and screen terminals were separately bypassed to ground.

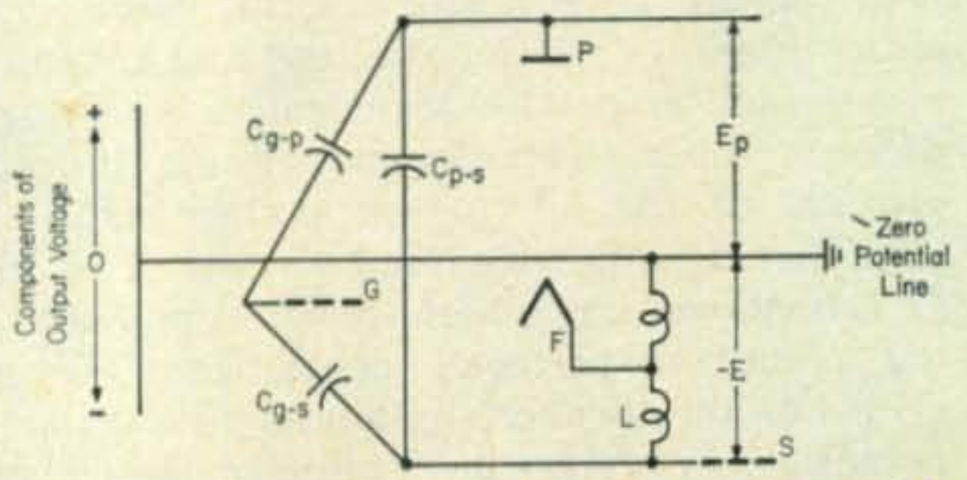

Fig. 5—The components of the output voltage of a tetrode tube may be neutralized by adding inductance to the common screen and cathode return. Grid and filament are maintained at same negative potential with respect to zero potential point.

Parasitic Oscillation

Parasitics are undesirable oscillations either of very high or very low frequency which may occur in radio frequency amplifiers. The unwanted oscillation is usually unaffected by normal neutralizing techniques.

Parasitics may cause spurious signals, other than normal harmonics, "hash" on each side of the carrier, key clicks, instability, and other unwanted phenomena. Short tube life, or tube failure may result because of parasitic oscillations.

The oscillations result from spurious series or parallel resonant circuits that exist as part of the normal tube connections. As most modern tubes exhibit considerable power gain well into the v.h.f. portion of the spectrum, it is very easy for the tube to oscillate at some random frequency determined by the parasitic resonant circuit. Insufficient circuit isolation will enhance the tendency of the tube to oscillate at the parasitic frequency.

Parasitic oscillation may take place at the operating frequency of the tube, at some lower

frequency determined by unwanted resonant circuits, or at some higher frequency at which the screen lead inductance of the tube has permitted a flow of energy between the grid and plate circuits. Elimination of low frequency and operating frequency parasitic oscillations can be accomplished by proper neutralizing techniques and avoidance of resonant circuits in r.f. chokes and auxiliary circuit wiring.

V.h.f. parasitics are a separate and distinct problem that often requires considerable circuit finesse and sophistication to conquer. In general, v.h.f. parasitic oscillations in tetrode transmitting tubes take place well above the frequency of self-neutralization, and neutralizing techniques designed to stabilize the circuit at the operating frequency often tend to make matters worse in the frequency region at which the parasitic oscillations take place. That is to say that low frequency neutralizing schemes often permit additional feedback of unwanted energy above the self-neutralization frequency! The problem can be solved in two ways: by increasing the self-neutralizing frequency of the tube and circuitry, or by lowering the frequency of the v.h.f. parasitic oscillation (increasing the inductance of the parasitic circuit). With proper techniques, the frequency of parasitic oscillation can be made to approach the self-neutralizing frequency of the tetrode and so suppress the parasitic. In addition, the v.h.f. parasitic circuit can often be loaded to such a degree that the tube gain at this frequency is not high enough to sustain oscillation.

The v.h.f. parasitic oscillation involves the interconnecting leads of the tube, the bypass capacitors, and the tuning capacitors. All of these elements possess residual inductance, and are a part of the v.h.f. circuit that permits oscillation (or instability). As shown in fig. 6, the v.h.f. parasitic circuit usually uses the capacitors of the fundamental tuned circuits as bypass capacitors, and the associated grid and plate leads for the inductances of the parasitic tuned circuit. For most tetrode transmitting tubes, the v.h.f. parasitic oscillation usually falls in the 90 to 170 mc region.

During parasitic oscillation, considerable r.f. voltage exists on the screen of the tetrode tube, and the screen bypass capacitor may be damaged by excessive voltage. It is wise, therefore, to employ a capacitor whose d.c. working voltage is equal to twice the maximum screen voltage. In addition, the screen capacitor must be rated to carry the r.f. current flowing between screen and ground. The capacitor should have low lead inductance and should be wired into the circuit with the shortest possible connections.

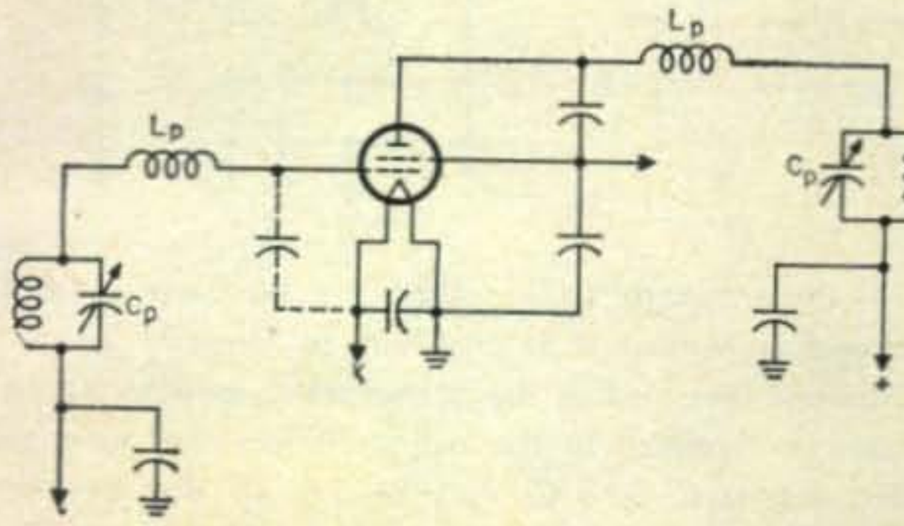

Fig. 6—Parasitic circuit of the tetrode amplifier uses lead inductance (L_p) and distributed capacitances for tuned circuits. Plate and grid tuning capacitors (C_p) usually serve as bypass capacitors at parasitic frequency. Parasitic oscillation may be eliminated by loading the spurious circuit, or by lowering parasitic frequency to the self-neutralizing frequency of the tube.

Parasitic Suppression

There are several practical methods of parasitic suppression, all of which involve varying the parasitic frequency of the circuit, or inserting "lossy" suppression devices at the parasitic frequency.

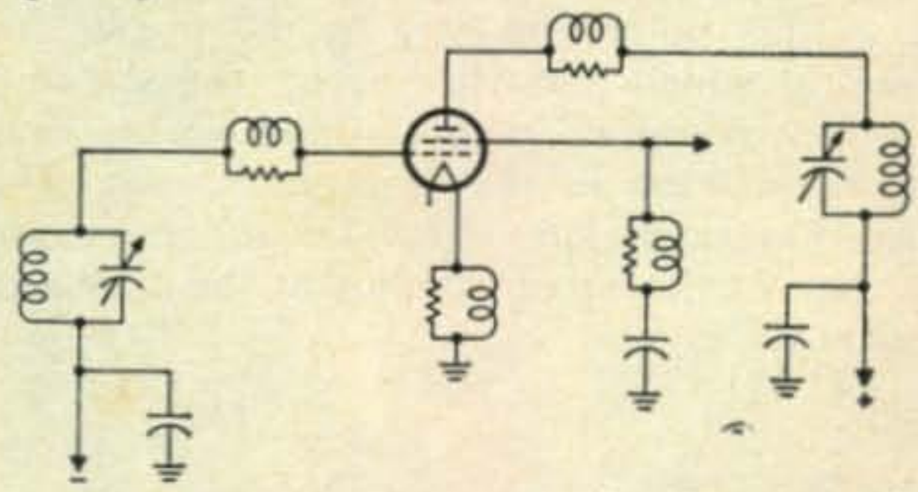

Fig. 7—Parasitic suppressors may be placed in plate, screen, grid, or filament paths. Suppressor must have sufficient wattage to dissipate that portion of fundamental power flowing through resistor. As voltage drop across suppressor increases with frequency, 10 and 6 meter operation places greatest load upon suppressor designed for v.h.f. parasitic circuit.

Plate Circuit Suppression—Shown in fig. 7 is an *R-L* type plate circuit parasitic suppressor. A small coil and resistor combination is placed in series with the plate lead between the tube and the tank circuit. The suppressor may be made up of a non-inductive resistor of 50 to 100 ohms, shunted by three or four turns of #12 wire, about ½-inch diameter and ½-inch long. In some cases it may be necessary to use such a suppressor in both grid and plate leads. The suppressor operates on the principle that

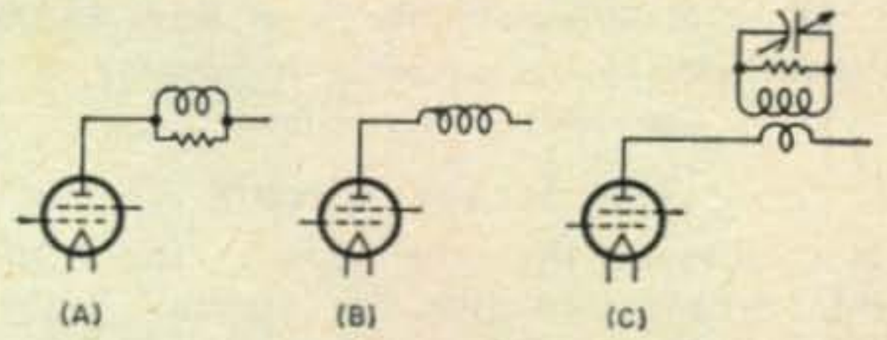

Fig. 8—Resistor-capacitor combination (A) in plate lead serves as efficient parasitic suppressor. The small r.f. choke (B) lowers parasitic frequency to the self-neutralizing region of tube. A parasitic suppressor may be tuned and coupled inductively to plate circuit for v.h.f. operation of a tube (C). The suppressor is tuned to the approximate parasitic frequency by a 30 mmf trimmer capacitor. The link coil in plate lead is two turns of the same size and configuration as parasitic coil. A high-power (kilowatt amplifier level) parasitic suppressor may make use of 43 ohm "Globar" 10 watt resistor (Workman, Inc., model RF-43) usually found as a TV replacement item.

the resistor is placed across an appreciable portion of the v.h.f. parasitic resonant circuit, but is shunted by the coil for the lower frequency fundamental signal.

Plate Circuit Choke—A simple form of v.h.f. choke can be placed in the plate lead, as shown in fig. 8. The size of the choke may vary considerably, depending upon the tube and circuit layout, and will run from four to ten turns of #12 wire, about ½-inch diameter. The presence of this choke in the frequency determining portion of the circuit lowers the frequency of the possible v.h.f. parasitic so that it falls near the self-resonant frequency of the tube and bypass leads.

Screen Circuit Suppression—As the screen of the tetrode is a portion of the parasitic circuit, it is possible to incorporate a suppression device at this point (fig. 9). At the higher frequency at which parasitics occur, the screen is no longer at ground potential and a suppressor may be inserted in the lead, as shown. This device has negligible effect on the bypassing efficiency of the screen circuit at the operating frequency.

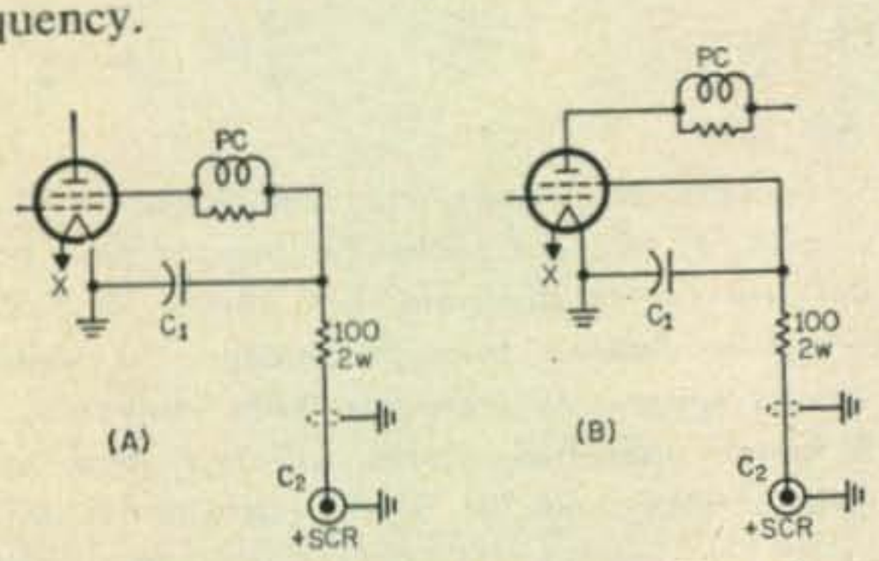

Fig. 9—Screen isolation of the tetrode tube is of prime importance. To decouple the screen from external influences, the screen lead should enter the amplifier chassis via a coaxial capacitor (C_2) such as the Sprague "Hypass" type. The screen lead within the amplifier is shielded, and is decoupled from the screen terminal by a 100 ohm, 2 watt composition resistor. The screen bypass capacitor (C_1) should have low internal inductance. One of the best types to use is the Centralab #858-1000. The parasitic suppressor may be placed in the screen lead (A), or in series with the plate lead (B). Note that the screen bypass capacitor is returned to one grounded filament lead.

The Screen Circuit

It is obvious that the screen circuit of a tetrode tube is sensitive to external voltages, and every attempt should be made to ensure that the screen remains as close to filament potential as is possible. In addition, precautions should be taken to prevent external sources of r.f. power from feeding energy *into* the screen circuit, thus introducing unwanted voltage into this element of the tube. It is necessary, therefore, to decouple the screen lead from the power supply circuitry as shown in fig. 9. Screen voltage is introduced to the amplifier via a coaxial type capacitor mounted on the chassis, and is fed to the tube socket by means of a length of shielded wire. The screen is

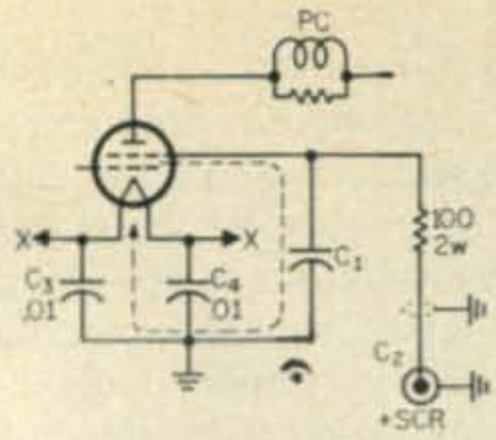

Fig. 10—Bypassing both filament leads to ground introduces the filament capacitors (C_3 and C_4) into the screen-filament circuit (dotted line). Inductance of filament capacitors is thus introduced into r.f. path between screen and filament, which enters into the neutralizing scheme shown in fig. 2.

further decoupled from the power source by means of a series resistor and shunt capacitor combination.

The screen-filament return should have as low an r.f. impedance as possible. Choice of screen bypass capacitor is important, as is the physical placement in the layout. Tubes having double screen terminals (the 4-250A family, for example) should have each screen terminal bypassed *to the adjacent filament terminal*. Disc-type, 1.2 kv ceramic capacitors may be employed, using the shortest possible leads. Placing the screen bypass capacitors to ground introduces the filament bypass capacitors into the screen-filament circuit, and should be done with caution.

If a low inductance bypass capacitor is available, it is possible to strap the socket screen terminals together and bypass the strap to ground via a parasitic suppressor as shown in fig. 9A. This technique works well to at least 30 mc, but has not been tried in the 50 mc region. The configuration of fig. 9B, however, has been found to work well in the 50 mc region for tubes whose self-neutralizing frequency lies above 50 mc.

The Filament Circuit

It is of utmost importance that the filament circuit of the grid-driven amplifier be maintained at ground potential. This is not as easy

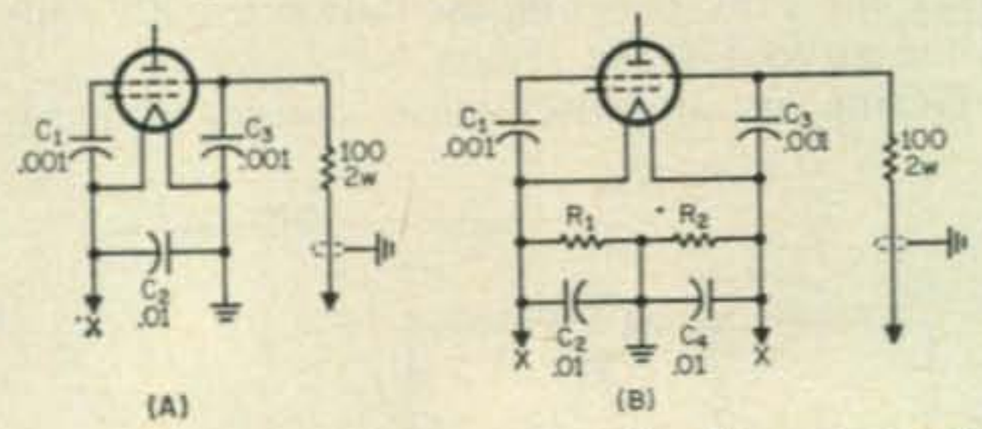

Fig. 11—In order to ensure that the filament remains at ground potential it is prudent to directly ground one filament terminal at the tube socket, and to bypass each screen terminal to the adjacent filament terminal (A). Capacitors C_1 and C_3 may be 1.2 KV disc ceramic units. High voltage units are required, not only to withstand the screen voltage, but to allow sufficient r.f. current carrying capacity, which is roughly proportional to the voltage rating of the capacitor. Each filament leg may be grounded by *R-C* combination (B) if balanced filament circuit is desired. Capacitors C_2 and C_4 may be 600 volt, .01 mf disc ceramic units.

to do as it sounds, as the filament leads within the tube have considerable inductance, and the filament bypass capacitors are not without residual inductance. In order to ensure that the filament is at ground potential it is prudent to directly ground one leg of the filament to the chassis at the tube socket (fig. 11). If it is desired to balance the filament circuit to ground, each filament leg may be bypassed to ground with a low inductance capacitor, shunted with a 10 ohm, 2 watt composition resistor. The resistor will "de-Q" the capacitor and the *R-C* combination presents a relatively low impedance path to ground well into the v.h.f. portion of the spectrum.

Wide Band Neutralization Technique

It is apparent that neutralization techniques must change as the operating frequency of the tetrode tube passes through the frequency of self-neutralization. It is possible to make a tetrode amplifier operate smoothly through this transition region by changing the neutralization system. In some equipments, this is automatically accomplished by the bandchange switch, as shown in fig. 12.

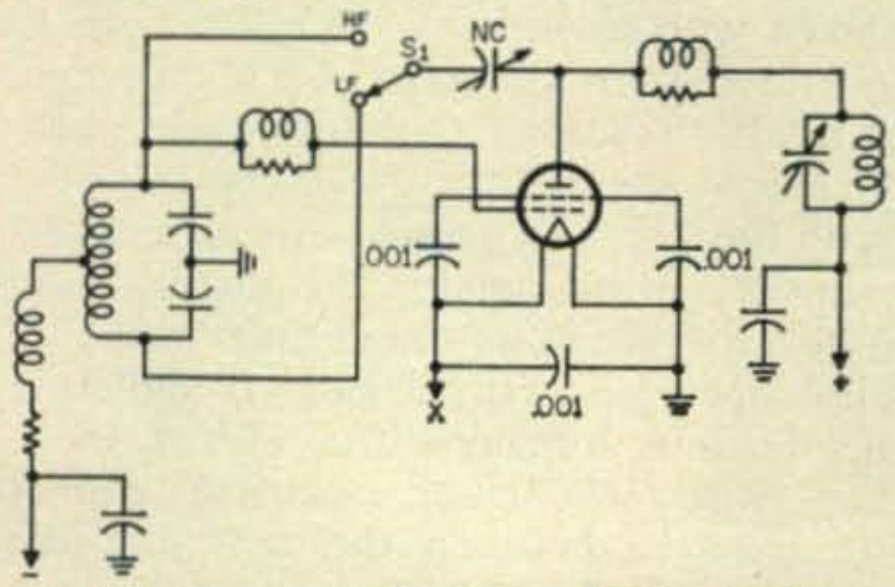

Fig. 12—Effective neutralization of tetrode tube operating on both sides of self-neutralizing frequency may be achieved by switching the neutralization circuit in conjunction with bandswitch position. Operation at the self-neutralizing frequency requires that external neutralization circuit be disconnected.

Checking for Parasitic Oscillations

Parasitics are most easily found in a stage by running it with a full plate and screen voltage, no excitation, and sufficient bias to limit the plate current to a safe value. The screen voltage should be applied through a protective series resistor which will limit the screen current to a safe value if and when the stage breaks into oscillation. A variable voltage transformer (Variac) on the primary of the high voltage (and screen) power supply is advantageous, and the supply should be fused.

The stage is coupled to a dummy load and tuned up in correct operating shape. Protective bias is applied at all times. If a variable voltage primary transformer is not at hand, a lamp bulb should be added in series with one leg of the primary circuit of the high voltage supply. As the plate current increases during a period of parasitic oscillation, the voltage drop across the lamp increases, and the effective plate and screen voltage drops. Bulbs of various sizes may be tried to adjust the voltage under testing conditions to the correct amount. Don't test for parasitics unless some means of voltage control is at hand. When a stage breaks into parasitic oscillation, the plate current increases violently and some protection for the tube under test must be used. Monitor both the plate voltage and the plate current, as well as the screen current.

The r.f. excitation to the stage is now removed. The grid, screen, and plate currents should drop to zero with cut-off bias applied to the tube. Grid and plate tuning capacitors are adjusted to minimum capacitance. No change in resting currents should be observed. If a parasitic is present, grid current will flow, and there will be an abrupt increase in plate current. The high voltage should be set so that oscillation maintains itself without exceeding the various dissipation ratings of the tube. Frequency of oscillation may be determined with an absorption wavemeter brought near the plate circuit of the stage. Suppression circuits may now be applied to the stage, and their effectiveness can be judged by the ease of parasitic oscillation, or the complete lack thereof.

When the stage is modified so that it can pass the above test, the protective bias is reduced until the tube dissipates the full plate rating when maximum plate voltage is applied, under condition of no grid excitation. Stage gain is extremely high, and it may be that the parasitic oscillation will show up once again. Further suppression measures must therefore be applied to the circuit.

It is common experience to develop an engineering model of a new item of equipment that is apparently free of parasitics, and then find troublesome parasitic oscillations in production units. The reason for this is that the design has a parasitic tendency that remains below the verge of oscillation until some minor change in layout, circuitry, or tube parameters raises the gain of the parasitic circuit enough to start oscillation.

In most high frequency transmitters there are a great many resonances in the tank circuits at frequencies other than the desired operating frequency. Most of these parasitic resonant circuits are not coupled to the tube and have no significant tendency to oscillate. A few, however, are coupled to the tube in some form of oscillatory circuit. If the intra-stage isolation is not complete enough, oscillation at the parasitic frequency results. Those spurious circuits existing just below oscillation must be found and swamped to a safe level.

A method of accomplishing this is to feed a signal from a grid-dip oscillator into the grid of a stage and to observe the signal level in the plate circuit. The oscillator is tuned over the range of 50 to 200 mc. The test is made with all operating voltages applied to the stage, but with no fundamental excitation. The tuned

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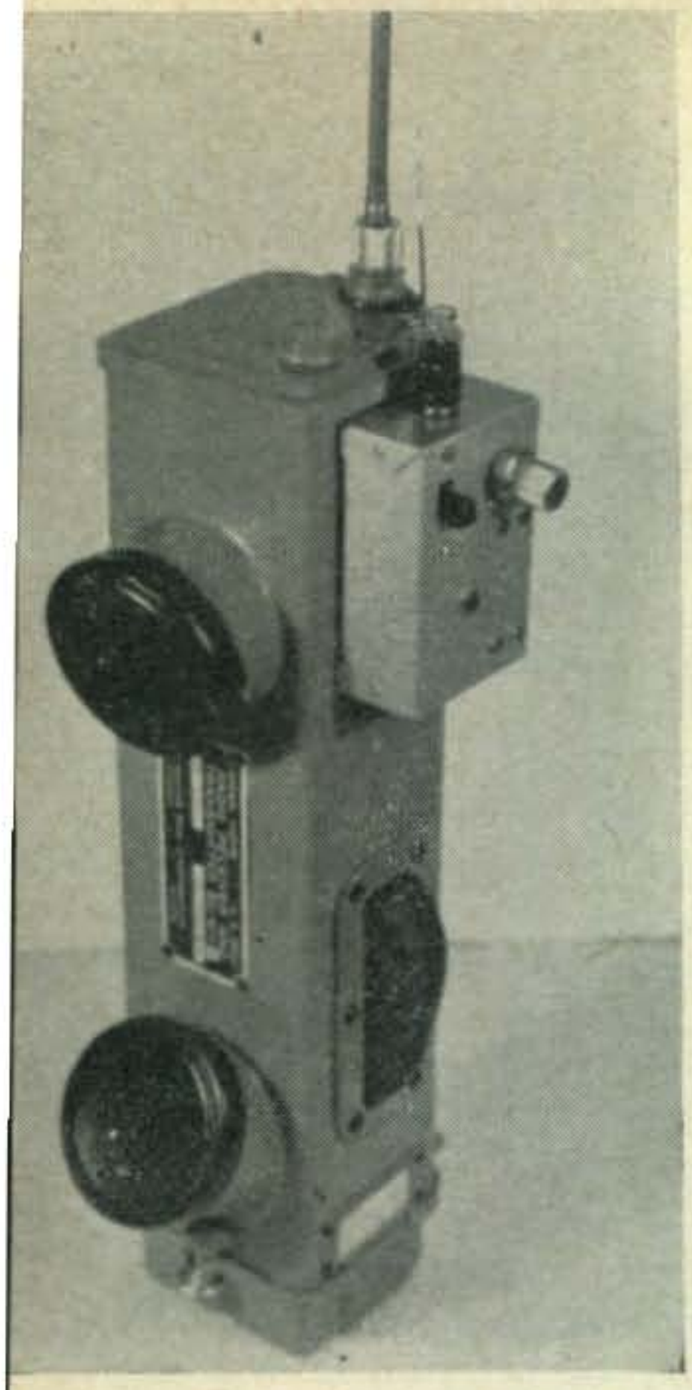

A Transistorized "Add-On" B.F.O.

BY KENNETH H. KERWIN, II*, K6UXO
and WILLIAM L. CARR†, K6DRV

With the addition of this simple, inexpensive device, any phone receiver with a 455 kc i.f. becomes capable of s.s.b. and c.w. reception. Entirely self-contained and battery powered, it is ideal for portable work and mobile installations employing converters operating into the automobile broadcast receiver.

THE need for such a device as described in this article first came to the attention of the authors shortly after they had completed the restoration of an old World War II "Walkie-Talkie," the BC-611. This military surplus transceiver incorporates quite a good, although crystal-controlled, 'phone receiver, which is easily capable of nighttime out-of-state reception. Since the authors' unit was tuned to 3885 kc, it was not long before amateur s.s.b. signals made their appearance. Unfortunately, the BC-611 has no b.f.o., and those signals were quite unintelligible. It was therefore decided to construct a b.f.o. to be used in conjunction with this unit.

The requirements for such a device, especially for s.s.b. reception, are actually fairly stringent. The original intention was to mount the b.f.o. inside the case of the BC-611, and this necessarily imposed the twin requirements of very small physical size and very low power drain. Although the idea of internal mounting was later rejected as impractical, and because it was thought that the device might enjoy a greater usefulness as a self-contained unit, the notions of small size and low power drain remained attractive. Additional requirements considered appropriate for a device of this type are a high degree of stability, physical ruggedness, sufficient output for adequate b.f.o. injection and low cost.

Circuit Characteristics

The circuit shown in fig. 1 was developed to meet the above specifications. Employing transistorized circuitry and miniature components, the complete unit is about the size of a pack of cigarettes when mounted in its case. Its power requirements are satisfied by a single 1½ volt penlite cell, with a current drain of only 25 microamperes. (Operation has been achieved with as little as .15 volts, with a corresponding drain of about 14 microamperes.) Battery life should, therefore, approach the shelf life of the cell.

With the 1½ volt power source, output from the unit is approximately 2.5 volts peak-to-peak into the 3.2 megohm input impedance of an oscilloscope. This output proved sufficient for adequate injection into the i.f. of most receivers with no actual electrical connection being required between the unit and the receiver.

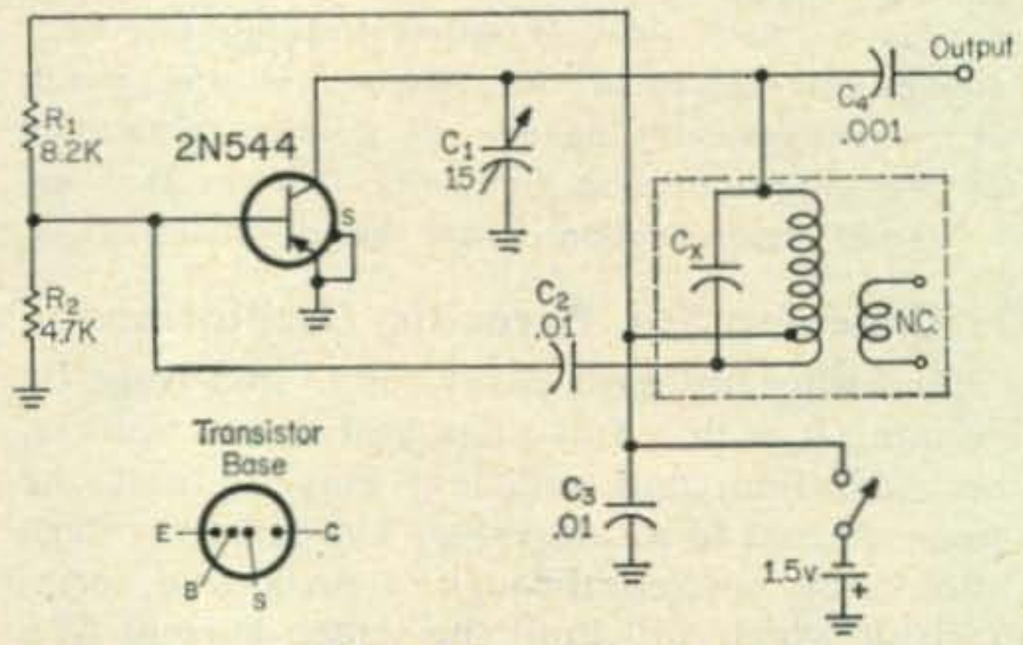

Fig. 1—Circuit of the add-on b.f.o. The i.f. transformer, L_1, is a J.W. Miller 9-C2 miniature unit. The resistors are ½ watt and the fixed capacitors are ceramic. Capacitor values less than 1 are in mf, greater than 1 in mmf.

Stability, both long- and short-term, was found to be excellent. The circuit is not critical as to changes in supply voltage, the output frequency varying only about 1 kc from the center frequency of 455 kc with a voltage excursion from 1.55 (value of a fresh cell) to 1.0 volts. The corresponding change in output was a drop from 2.5 to 1.5 volts peak-to-peak. Vibration of the unit, including throwing it

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violently against the desk top while operating, produced no observable permanent alteration of the pitch of a c.w. note.

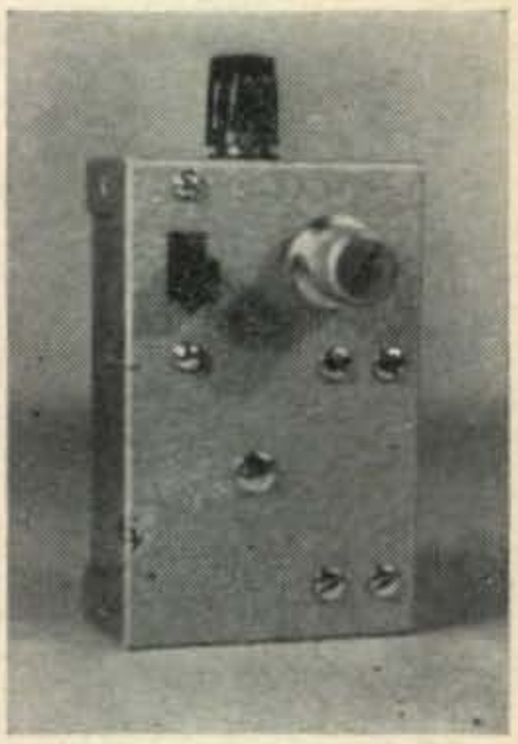
A small dependence of output frequency upon temperature was noted, as could be expected with a semiconductor oscillator of this type; but this is not serious from room temperature to considerably above, and is minimized by placing the transistor in free air within the case. It might, however, become somewhat bothersome should it be desired to mount the unit within the cabinet of some other piece of equipment which contains heat-generating components such as tubes or transformers. If such mounting is contemplated, care should be taken to locate it either in a cool place or in one in which the temperature remains fairly constant with time, if maximum stability is to be recognized.

Circuit Details:

As will be seen from consideration of fig. 1, the oscillator circuit employed is a modification of the series-fed Hartley oscillator, with the tank in the collector circuit. Forward bias for the transistor is obtained from the voltage divider formed by R_1 and R_2; and the tank itself is a miniature transistor i.f. transformer. Frequency control of the b.f.o. is achieved by C_1, which is connected, electrically in series with the much larger C_3, between the top and tap of L_1. This somewhat unorthodox tuning scheme was employed so that the rotor of C_1 cound be grounded to the chassis, thereby eliminating any possible problems with hand capacity effects, and yet still allowing the use of the Hartley circuit with its convenient tank. Through the use of C_1, the operating frequency of the unit may be varied approximately $\pm$ 5 kc from the center frequency of 455 kc.

The heart of this circuit is the tank coil, L_1, with its associated resonating capacitor C_x and tuning capacitor (PITCH CONTROL) C_1. Components L_1 and C_x are combined in the subminiature transistor i.f. transformer, J. W. Miller part number 9-C2. This extremely small transformer has a tapped primary, resonated to the vicinity of 455 kc by the internal capacitor C_x, with an impedance suitable for matching the collector of the transistor. A low impedance secondary, originally intended for matching to the impedance of the following stage in a receiver, is not used in this circuit.

With the exception of the i.f. transformer, everything in this circuit is straightforward. The transistor, an RCA type 2N544, was selected because its electrical characteristics suited the needs of the b.f.o. and because it was at hand. No doubt, other transistors of similar characteristics would prove equally satisfactory in this circuit, with possibly an alteration in the bias voltage divider being necessary to suit the transistor used.



Front view of the b.f.o. showing on-off switch and pitch control. Output binding post is located on top.

Construction:

Construction of the b.f.o. is relatively non-critical. The unit is housed in a 3¼" × 2⅛" × 1⅛" aluminum snap-fit chassis box (LMB #872), with output being delivered through a binding post located on the top of the box. The size of the unit and parts placement are not critical, and the device may be constructed in either a larger or a smaller container as desired, or even built into an existing piece of equipment.

The only special alteration which must be performed concerns the i.f. transformer. In order to be able to tune the oscillator to a center frequency of 455 kc, it will probably be found necessary to remove the shield can from the transformer, and screw the ferrite tuning slug out beyond the normal limit imposed by the top of this shield. Clip off the pins so marked in fig. 2 to prevent shorting to the secondary winding, being especially careful not to crack or chip the base of the transformer. The internal resonating capacitor, C_x, is contained in the base and might easily be damaged if care is not taken.

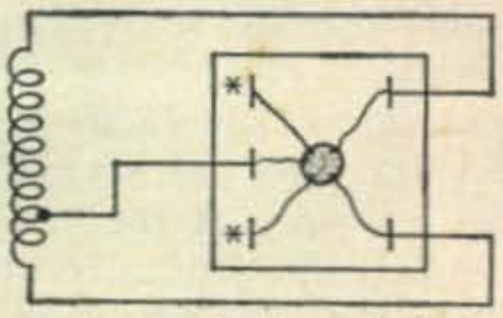


Fig. 2—I.f. transformer basing diagram. The secondary lugs are cut off near the base to prevent shorting.

All parts, with the exception of the battery, OFF-ON switch, and PITCH CONTROL, C_1, are mounted on a five-lug terminal strip; the center lug of this strip is used for mounting, and

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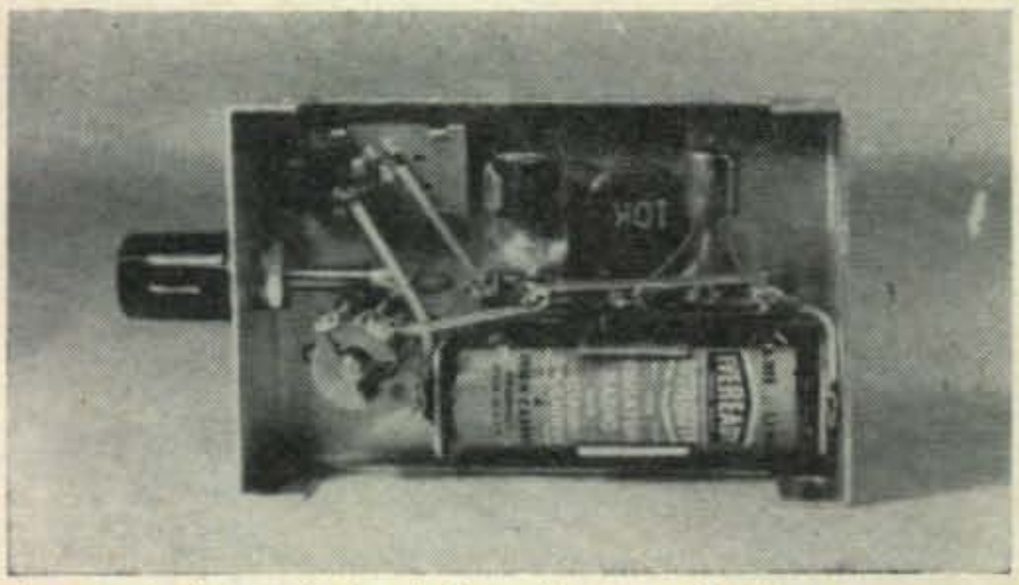


Internal view of the b.f.o. Almost all the components are mounted on the terminal strip. The pitch control, C_1, a Hammarlund MAC-15, is in the lower left corner. The i.f. transformer, shield removed, is just to the right of the slide switch.

Prolonging Bias Battery Life

BY ARTHUR ERDMAN*, W8VWX

Bias battery life span is shortened by the grid current that acts as a charging current. By discharging exactly the same amount of current, the useful battery life will equal its shelf life, 2 years.

MANY radio amateurs still prefer to use a battery for protective fixed bias on the grid of the final amplifier tube. However, the amplifier grid current flows through the battery in a direction so as to charge the battery. Because a dry battery cannot accept much charge, the current eventually ruins the battery.

If a discharging current can be drawn from the battery that equals the grid current, there will be zero net current through the battery. Small hearing aid type batteries can be used regardless of the magnitude of the grid current and the battery will last approximately shelf life (two years).

The discharging current is drawn by placing a proper value resistor, R, in parallel with the bias battery when grid current is flowing. Figure 1 shows such a discharging circuit that can be used for a.m. phone operation.

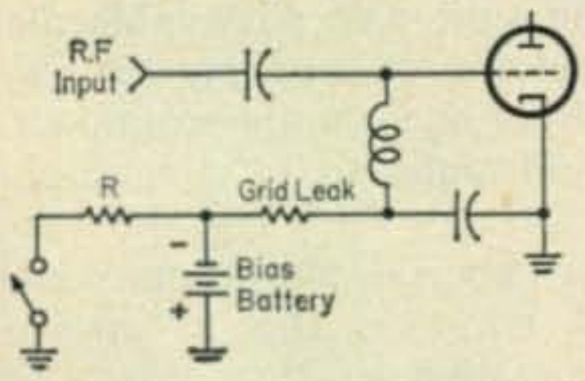


Fig. 1—Basic circuit to prevent charging bias battery. The contacts in series with *R* must be closed when r.f. is applied and open all other times

The contacts shown in fig. 1 close when the transmit-receive switch is thrown to "transmit". If a keying relay is used for c.w. operation, an unused pair of contacts on the relay can be used to connect the resistor.

The value of the resistor is obtained by dividing the bias battery voltage by the normal value of grid current. For example, if the bias battery voltage is 45 volts and the grid current is 10 ma, the resistor value is 4500 ohms. The wattage is found by ohm's law ($W=I^2R$) to be 0.45 W and a 1 watt resistor is used to allow a safety factor.

For break-in c.w. operation the added resistance can be conveniently obtained from a blocked-grid keying circuit arrangement shown in fig. 2. The resistor, R, is the same as in fig. 1, while the added components comprise the key click filter. Resistors R_1 *and* R_3 control the break characteristic while R_2 controls the make.

The key click filter values shown are only representative. Your particular circuit may require different values. I have been using the circuit shown in fig. 2 for nine years. The keying is easy to adjust, and the battery lasts over two years. Previously, the 10 ma grid

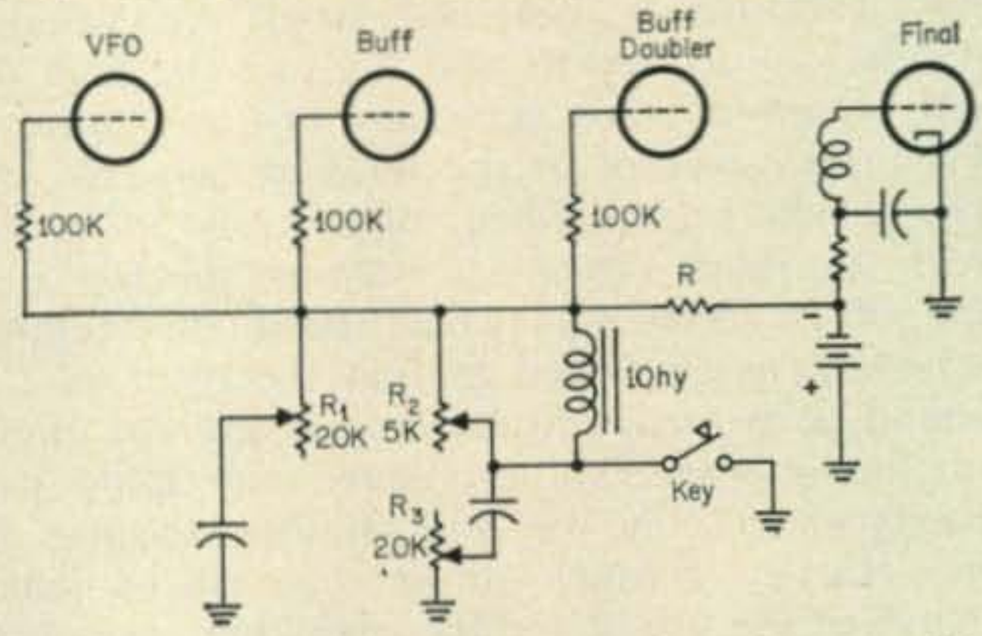


Fig. 2—Blocked-grid keying combined with a zero bias battery current circuit. Calculation of the value of R is explained in the text.

current caused the battery to have a high internal resistance in a matter of months. The terminal voltage of the dead battery would rise as high as 150 volts, while the grid drive would drop off.

The straightforward circuit shown in fig. 1 is also recommended to replace a poorly regulated line powered bias supply. ■

"As a matter of fact, at the present time I've got more audio than I can use. . . ."

*241 Garden Road, Columbus 14, Ohio.

A Handy Transistor Tester

GEORGE P. PEARCE*

Frequently, the experimenter using transistors does not know if the transistor is NPN or PNP or if it is even operative at all. The tester described will show the type of transistor inserted in the clips and also indicate whether or not it will amplify.

WHEN assembling transistorized equipment you may save yourself a lot of time and trouble if you take the precaution of checking each transistor to be sure it is of the correct type and in good operating condition. There is no need to make a series of precision laboratory tests, for frequently all you want is to be sure of the type of transistor and its working order. A simple tester that will perform these functions is shown in fig. 1 and the photograph.

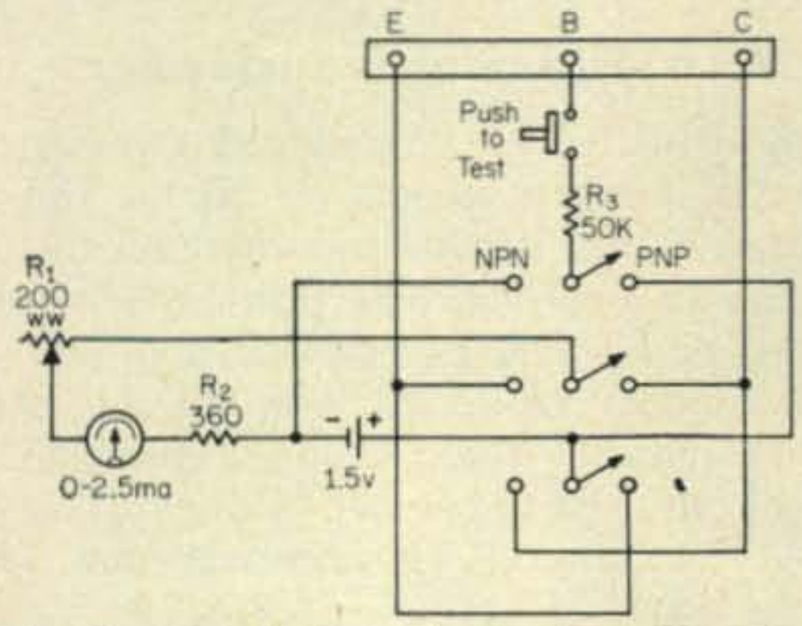


Fig. 1—Circuit of the simple transistor tester. It will show whether a transistor is PNP or NPN, test leakage and amplification. The "push to set" button may be installed or a simple jumper from the E to B post may be used.

For a rapid test of a transistor, be it either PNP or NPN, it need only be connected across the terminal strip provided for E, B and C. However, setting of the meter is first accomplished by a shorting switch between the E and B terminals or a simple jumper wire across the same points on the terminal posts. When a short is present across E and B, R_3, a 200 ohm wirewound pot, is adjusted for full scale deflection on the meter (2½ ma).

Now the transistor is connected to the terminal posts. (This can be done quickly if "Press to Insert" type posts are used.) If the meter swings full scale the transistor is shorted no matter what type, NPN or PNP.

If there is no meter movement at all depress the "Press for Test" button and if the pointer still does not move then the slide switch is probably in the wrong position. Shift the slide switch to the second position (NPN or PNP) and observe the meter reading. It should now show a slight reading. This reading represents the emitter-collector leakage.

Depress the "Press for Test" button and the meter should indicate an incerase of several divisions. If, however, no increase is shown, the transistor is defective.

A meter of higher sensitivity may be used, such as a zero to one ma, if the limiting resistor, R_2, is raised in value. ■

Panel view of the handy transistor tester. The zero to 2.5 ma meter may be replaced with a zero to 1 ma meter if greater sensitivity is desired. See text.

*1809 Richmond Drive, N. E. Albuquerque, New Mexico

". . . so if I don't come back on the next transmission, you'll know what happened . . ."

Modifying The Viking I

BY JACK MYERS*, W5KKB

The author describes the modifications made to his Viking I. These modifications are not complex and do not detract in any way from the appearance of this popular transmitter. Some of the changes are applicable to any transmitter and all can be used on the Viking II.

THE Viking I transmitter was introduced over 10 years ago and, with its newer version, the Viking II, has become one of the more popular amateur transmitters. I have had a Viking I for the last 4 years and have made several modifications to it that may be of interest to other Viking owners. While these modifications have been made on a Viking I, they all should work satisfactorily on a Viking II, and some will even be applicable to the DX-100 and other similar transmitters. No originality is claimed for any of the modifications described, although none have appeared exactly as they do in this article.

Antenna Relay

An internal antenna relay is simpler, cheaper, and saves connectors when compared with the customary outboard coaxial relay. The relay, a Potter Brumfield KT11A (115v ac d.p.d.t), is mounted on the final capacitor mounting bracket (BKT_2). Remove the rear bolt that fastens BKT_2 to BKT_3 and mount the relay in that hole with the body of the relay behind C_{30} with the terminals facing up. The projecting tab may have to be removed from the relay to facilitate mounting. The receiver antenna jack should be mounted on the TVI screen directly behind the relay and a hole punched in the back of the cabinet to allow access to the jack. The 115 volt leads are twisted together and run along side the big coax, through the chassis, and to the plate pilot light. The wiring diagram is shown in fig. 1.

*443 Centenary Drive, Baton Rouge 8, Louisiana

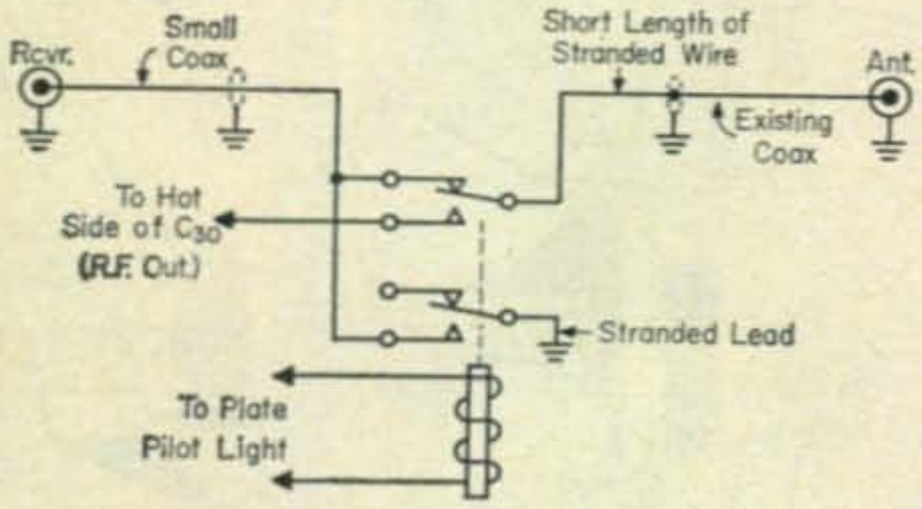


Fig. 1—Circuit showing the changes necessary to add an inboard antenna relay to the Viking I.

Increasing Grid Drive

More grid drive can be obtained by the following four steps:

1. Replace C_{20} with a 75 mmf 450 volt mica capacitor.
2. Replace C_{25} with a 220 mmf 450 volt mica capacitor.
3. Replace R_{19} with a 22K 1 watt resistor.
4. Replace R_{23} with a 100K 1 watt resistor.

V.f.o. Filament Transformer

Warm-up drift can be reduced considerably if the v.f.o. filament is left on all the time. A small transformer can be mounted on the side of the chassis near L_3. The primary should be connected across the power line and one side of the secondary grounded. The hot side of the secondary goes to the r.f. filter connected to pin 7 of the v.f.o. power socket. The old filament lead should be removed and taped out of the way.

Six Meter Operation

The Viking I puts out about 30 watts or so when doubling to six. Power input is best held below 100 watts, although the author has worked over 16 states and had many long QSO's running 150 watts. To put the Viking on six, follow these steps:

1. Make the modifications specified under "Increasing Grid Drive."
2. Reduce L_8 to one turn.
3. Replace the lead from L_1 to the blocking capacitor with a coil made of 15 turns of No. 20 hookup wire, ⅜-inch diameter, 2 inches long.
4. If possible, check the resonant frequency of the parasitic choke in the final plate lead before trying out the Viking on Six. If the choke is resonant very close to the six meter band, remove a turn or two. This was not necessary in my Viking, but is included since some of these chokes are resonant at very close to 50 mc.

This modification will affect the final tuning on other bands, which will tune at a lower tank setting than before. Six will tune at a final tank setting of about 97-99, ten at about

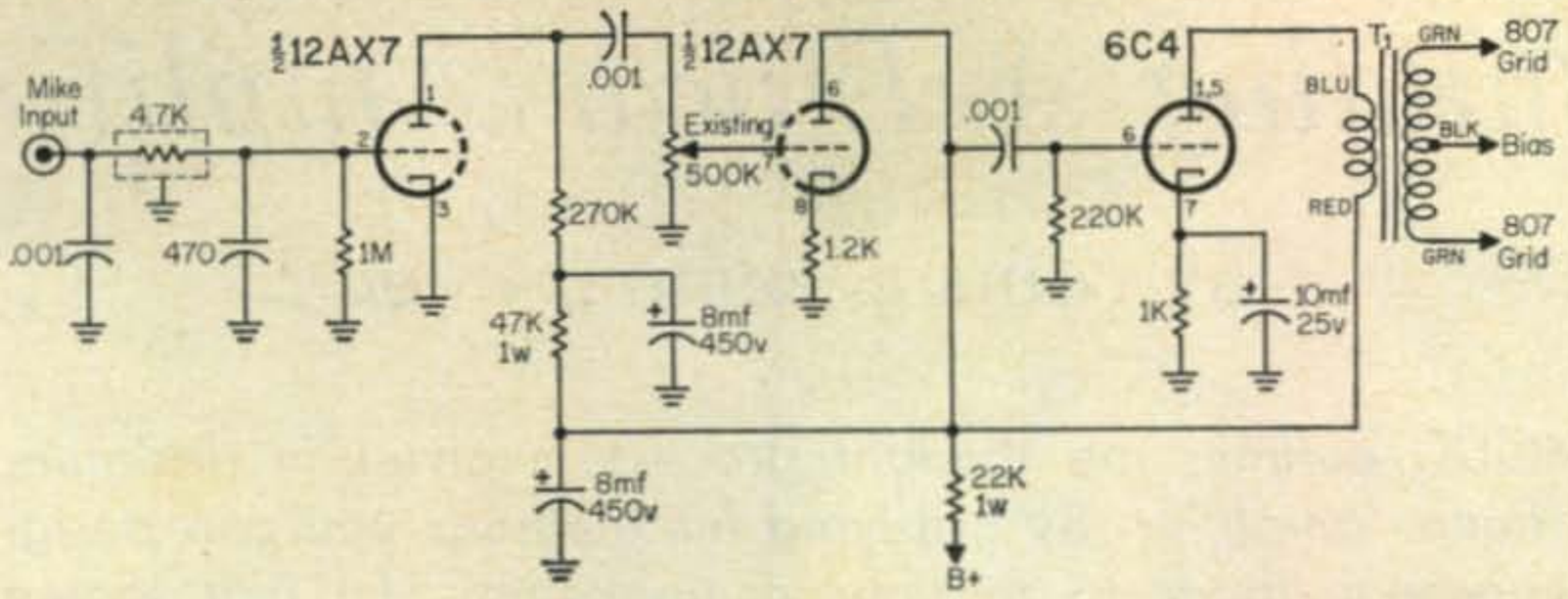


Fig. 2—Circuit of a new speech amplifier that may be used to increase the Viking I audio. Careful shielding of the input circuit is required to prevent r.f. pickup. Transformer T_1 is 7K-15K to push-pull grids with a 1:3 ratio (Stancor A-53-C).

88, fifteen at about 82, twenty at about 73, and forty at about 49. Eighty and one sixty will be affected very little. On six, use 6.250 to 6.375 mc crystals and tune the oscillator to 12.5 mc and the buffer to 25 mc. The final is tuned to the *second* dip, with the COUPLING set at 7 and the FINE COUPLING at zero. Operation should be possible to at least 51 mc.

To use the Viking v.f.o., connect a 20 mmf silver mica capacitor across the 11 meter padding capacitor, C_{56}. Set the v.f.o. dial to 28.640 mc, put the BAND SWITCH on 11, and tune the receiver to 50.0 mc. By tuning C_{56}, you should be able to set the v.f.o. to 50.0 mc. If not, try a slightly larger or smaller capacitor across C_{56}, depending on whether the v.f.o. frequency is too high or too low. The v.f.o. can be directly calibrated in the space below the 28.640 to 29.700 calibration, using a dark lead pencil. The v.f.o. should cover slightly more than the first megacycle of the band. If a Heathkit v.f.o. is being used, it may be tuned to six meters without modification.

Audio

Most Viking I's seem to lack sufficient audio gain. The first logical step for the Viking I owner is to make the following changes, which will effectively convert the audio system to that used in the Viking II:

1. Change R_3 to 1M.
2. Change R_4 to 470K.
3. Remove C_5, R_9, C_6, and R_8.
4. Change R_7 to 470 ohms.
5. Add a 10 mf 25 volt electrolytic capacitor across R_7 with the negative lead grounded.
6. Add a 22K resistor from pin 5 to pin 6 of V_2.
7. Add a 100 ohm resistor in series with the grid lead to each 807.
8. Add a 22 ohm resistor in series with the plate lead to each 807.
9. Add a 0.01 mf disc ceramic capacitor across the primary of the modulation transformer, T_4.

If these modifications do not give enough audio gain, use the circuit of fig. 2. The first speech amplifier socket hole must be punched out to accommodate a 9-pin socket for the 12AX7. If you install the push-to-talk system described next and use a 750 ma rectifier, use the DC voltage for the 12AX7 filament to reduce hum. When this system was installed, enough gain was obtained with the gain set at 2 using a D-104 mike. The 0.001-mf coupling capacitors were chosen to cut down the low frequency response. If more low frequency response is desired, use larger values. The outside foil of these capacitors should be connected to the plate circuits and the leads should be kept short to prevent r.f. pickup. Be sure to shield the mike circuit, since the high gain preamp will be more sensitive to r.f. pickup than the old preamp.

Push-to-talk

The p.t.t. system of fig. 3 gives three methods of control; a p.t.t. mike, the panel plate switch, or a remote switch connected through J_{102} (this can be used for a foot switch or connected to

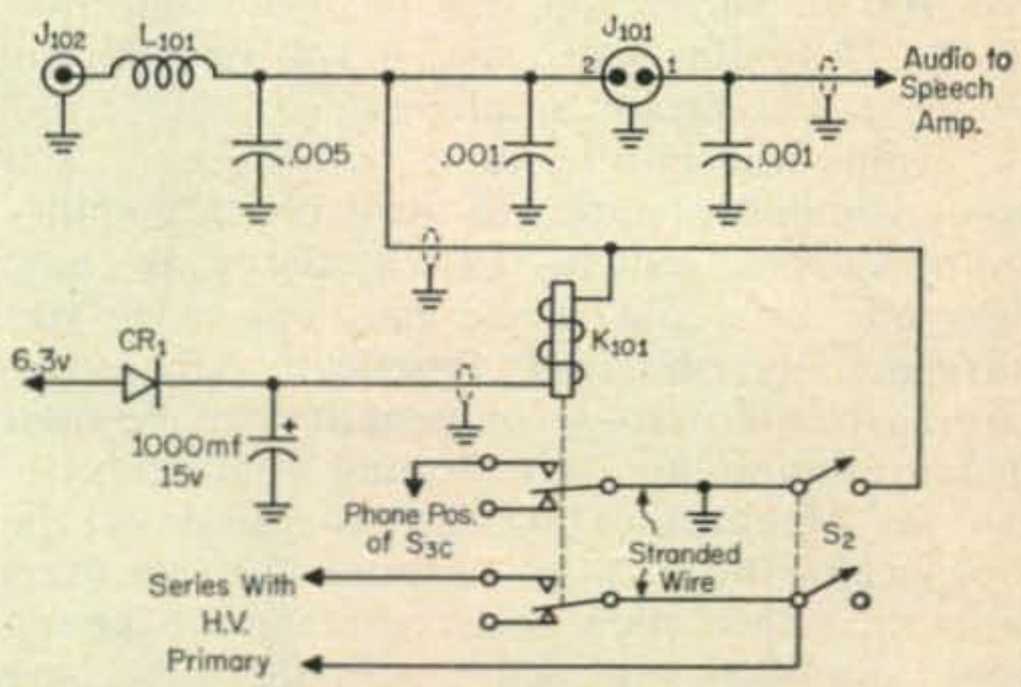


Fig. 3—Circuit of the push-to-talk modification of the Viking I. Connector J_{102} is placed on the rear of the transmitter and may be used for remote control while J_{101} is substituted for the existing front panel mike jack. The relay, K_{101}, is a 6 v.d.c. Potter Brumfield KT11D. The rectifier CR_1, may be a 750 ma unit and supply the filament of the 12AX7 speech amplifier of fig. 2. Inductor L_{101} is a TVI choke and is 4.7 mh (IRC CL-1).

the receiver standby switch or even used with a p.t.t. telephone). The relay is operated with d.c. to prevent the introduction of hum to the audio. The relay should be mounted directly behind the plate switch. Mount it on a bracket and secure the bracket to the screw that holds the front of the tank coil to the chassis. A ground lug should be mounted on the chassis

[*Continued on page 98*]

Building A Linear Amplifier

BY LOUIS L. BRENT*, WØUC

WØUC outlines the thought process involved in designing a linear amplifier. By applying his methods you can design your own linear to fit your components. The unit shown, which operates on 80, 40, 20, 15 and 10 meters, makes use of a homebrew bifilar input choke.

EVER consider using a linear amplifier to boost the output of that 100 watt transmitter of yours? For the amateur who wants additional power, it's a consideration worthy of thought. A bit of sober reflection reveals that there are several thousand of these transmitters in circulation. DX-100's, Viking's, B&W's, etc., not to mention hundreds of home-built jobs patterned along commercial lines. They do a fine job in their own right but many, including myself, have wished we could have "a bit more of the same". It would be swell to have a 400 or 500 watt DX-100 or Viking or . . . . Well let's stop our idle dreaming and see what can be done about it. The solution? Build a linear amplifier! Cost? Not too much. If you now have a transmitter in the 75 to 100 watt class, it will be sufficient to drive the linear amplifier.

Surplus transmitting tubes, transformers and other components are still available in quantity from various outlets. Check the junk box, dust off those old tubes, find out what you have and use the stuff. Practically any transmitting triode, tetrode or pentode can be used if information on its operating characteristics can be obtained. Make an appraisal of the tube's capabilities. You are more likely to overestimate rather than underestimate the power your amplifier will deliver. If the tube you select is small, put 2, 3 or 4 in parallel to attain the desired power level. With a bit of background information and a few pointers here and there, you should be ready for the undertaking.

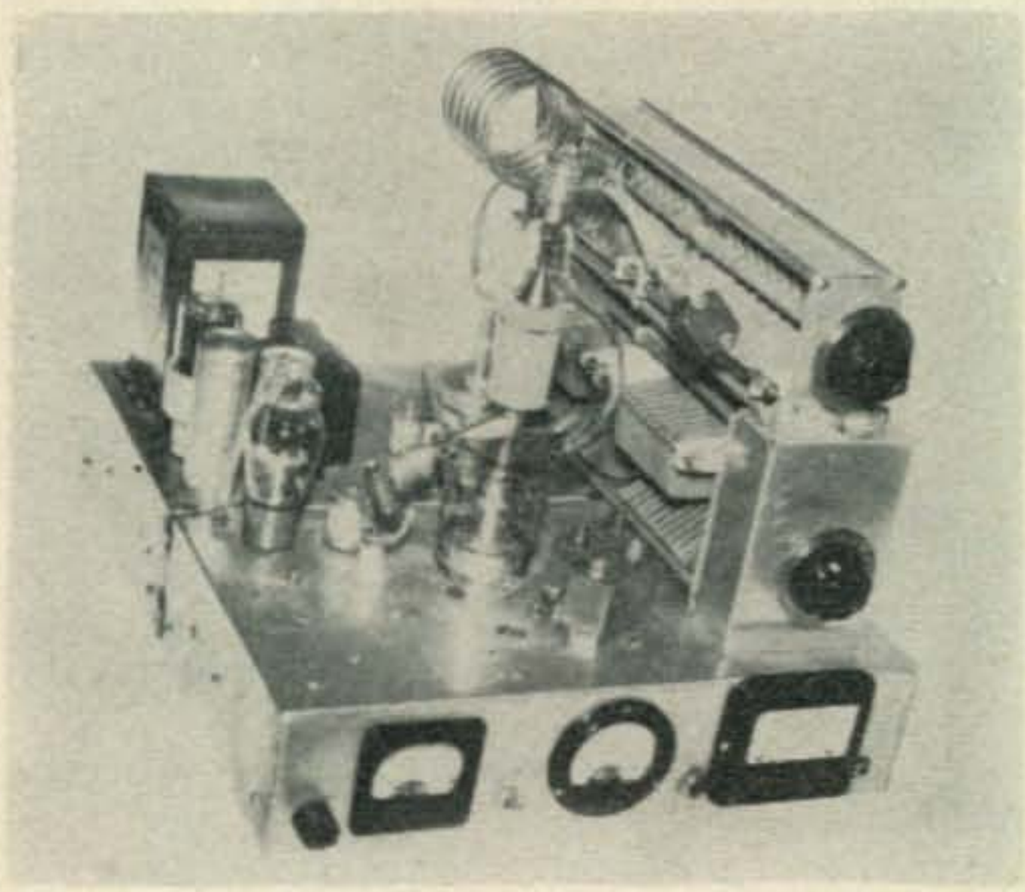
Background

Linear amplifiers are not new and there is no mystery to their operation. They have been used in radio and audio service for years. By linear, we refer to an amplifier whose operating characteristics are such that a signal applied to its input will be amplified (enlarged) with a minimum of distortion. Like enlarging a photograph! A linear amplifier may be operated (biased) class A, B or AB. It is never operated class C because of the inherent distortion in this class of amplifier. Remember, we want an amplifier capable of building up a complex waveform (voice frequencies) without changing the original characteristics. For fidelity of reproduction, the class A linear is best, but it's efficiency is low. Class B and AB linear amplifiers offer good fidelity of reproduction and medium to good efficiency. By definition, efficiency is the ratio of useful output energy to input energy, usually expressed as a percentage, or

$$\text{Efficiency } \% = \frac{\text{power output}}{\text{power input}} \times 100.$$

It is reasonable to expect efficiencies of from 33 to 45% for class B and 50 to 70% for class AB linears.

To put the problem on a practical basis, your linear must be designed to operate either class B or AB and you have a choice of using



Front view of the 450TL linear. The unit is assembled on two chassis bolted together and spot solder along the seam. This bias supply is in the rear left corner and the pi-network tuning capacitors are stacked on the right. The lower unit, C_2, is much larger than necessary but was surplus and on hand. The meters read, from left to right, bias voltage, grid current and plate current.

*4224 Kossuth Avenue, St. Louis 15, Missouri

triodes, tetrodes or pentodes, Try to find as large a tube (plate dissipation) as you can, because, for this particular application (low level a.m.) it takes a lot of power input to get good power output. For example, a class B linear amplifier operating at 2500 volts, 300 ma (750 watts input) will deliver about 255 watts to the antenna for an efficiency of 34% (neglecting other factors). The "low level" simply means that modulation is applied to a stage preceding the final amplifier. This may not look impressive, particularly since in the past, we have considered only the *power input* if our transmitters. Measure the power output of your present transmitter into a fixed load and see what I mean. Two hundred fifty five watts into the antenna is quite a hefty signal.

Other advantages of the linear are; no additional high power modulator and power supply is required, no final amplifier keying problems (for c.w.), no neutralizing, no tuned input stage; only the plate (output) is tuned and no change of any kind in the amplifier is necessary when you graduate to single sideband.

A linear amplifier will boost the output of any small transmitter to larger output without altering the original signal characteristics. A power gain of from 7 to 10 or more is realized. Now for a word of caution: make certain that your present transmitter is entirely stable; that it is free of spurious emission. If you have a marginal signal now, amplifying it certainly won't improve it. Clean up that rig *first* then consider amplifying its output.

Here is an abbreviated account of how I planned and built a linear amplifier for my rig.

Planning and Building

I wanted a linear amplifier to build up the a.m. output of my B&W 5100-B. I also wanted more "punch" on c.w. and s.s.b. To build a suitable amplifier, should triodes or tetrodes be used, and should they be grid or cathode driven? These questions were resolved by establishing design and operating parameters for the new amplifier. For maximum efficiency, the amplifier should utilize the full output of the exciter. For simplicity, an untuned input; for stability, no requirement for neutralization. The amplifier should operate Class AB or B, for reasonable output for applied input.

A grounded grid, cathode driven triode amplifier was decided upon. The amplifier was to operate on 20, 40, 75 and 80 meters. Cost of new components was to be trivial. I planned to use a single high plate dissipation tube instead of a pair of smaller tubes connected in parallel.

Looking on the basement shelves, I spotted a fair sized "jug" (Eimac 450TL) which had not seen service since it's 1957 retirement from a commercial transmitter. I would build around this tube if its characteristics were suitable. First, a general characteristics sheet on the

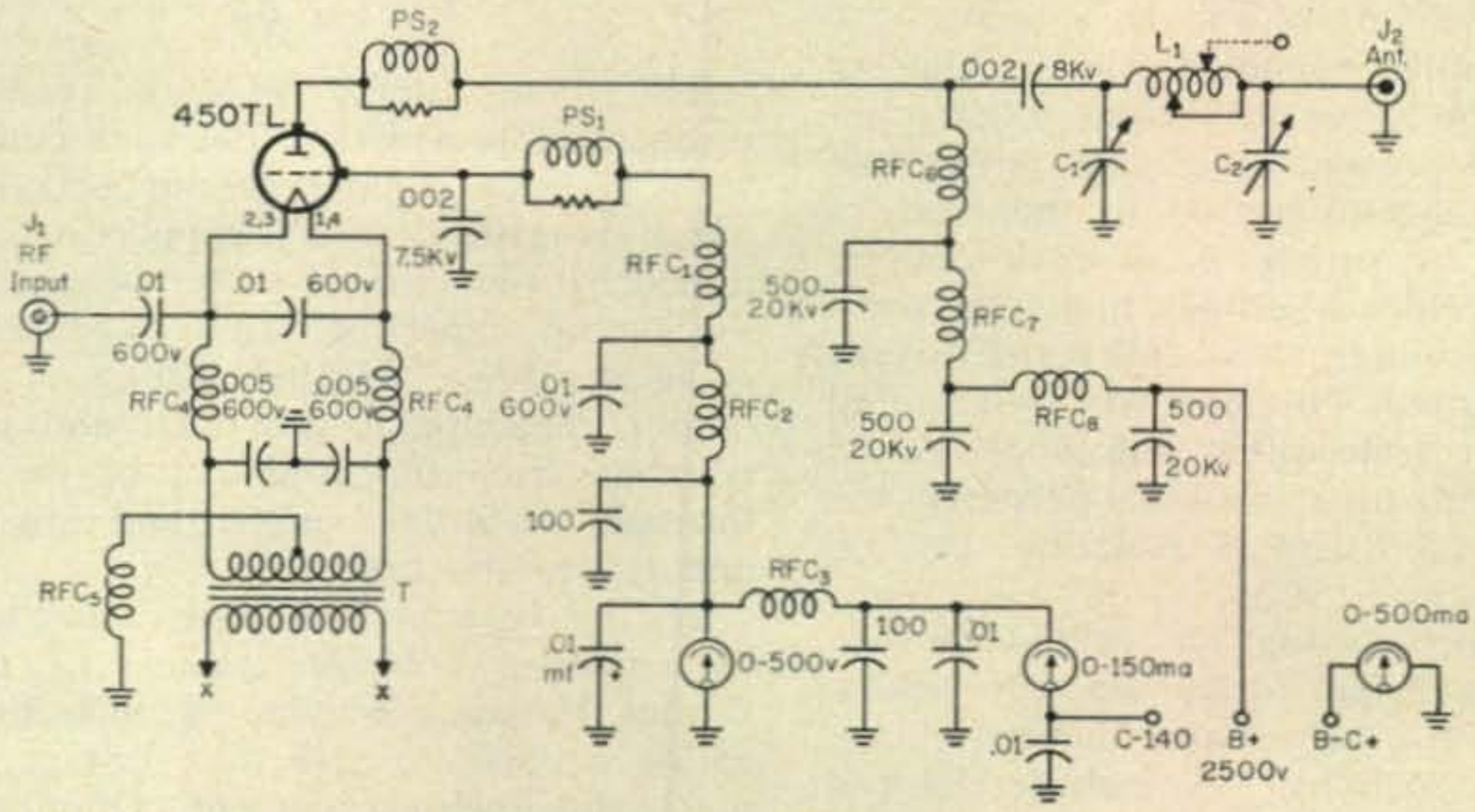


Fig. 1—Circuit of the grounded grid linear amplifier. The output circuit configuration may be changed by shorting C_2 and tapping the coil, L_1, at a suitable point as indicated by the dotted line and as explained in the text.

C_1—Dual section 100 mmf, 9 kv breakdown, Johnson 100DD90

C_2—300-300 mmf paralleled.

L_1—10, 15, 20 Meters—6t of ¼" copper tubing, 2¾" diam., 3½" long, employing one section of the 100-100 mmf tuning capacitor, C_1.
40 Meters—9t of ¼" copper tubing, 3" diam., 4½" long with both sections of C_1 paralleled. (200 mmf)
80 Meters—16t of #10E, 3½" diam., 3" long with both sections of C_1 in parallel.

PS_1, PS_2—Parasitic suppressors, Ohmite P-300.

RFC_1—60t #22E, 5/16" diam. close wound.

RFC_2, RFC_3, RFC_7, RFC_8—27t #20E, ⅜" diam., 1" long, self supporting.

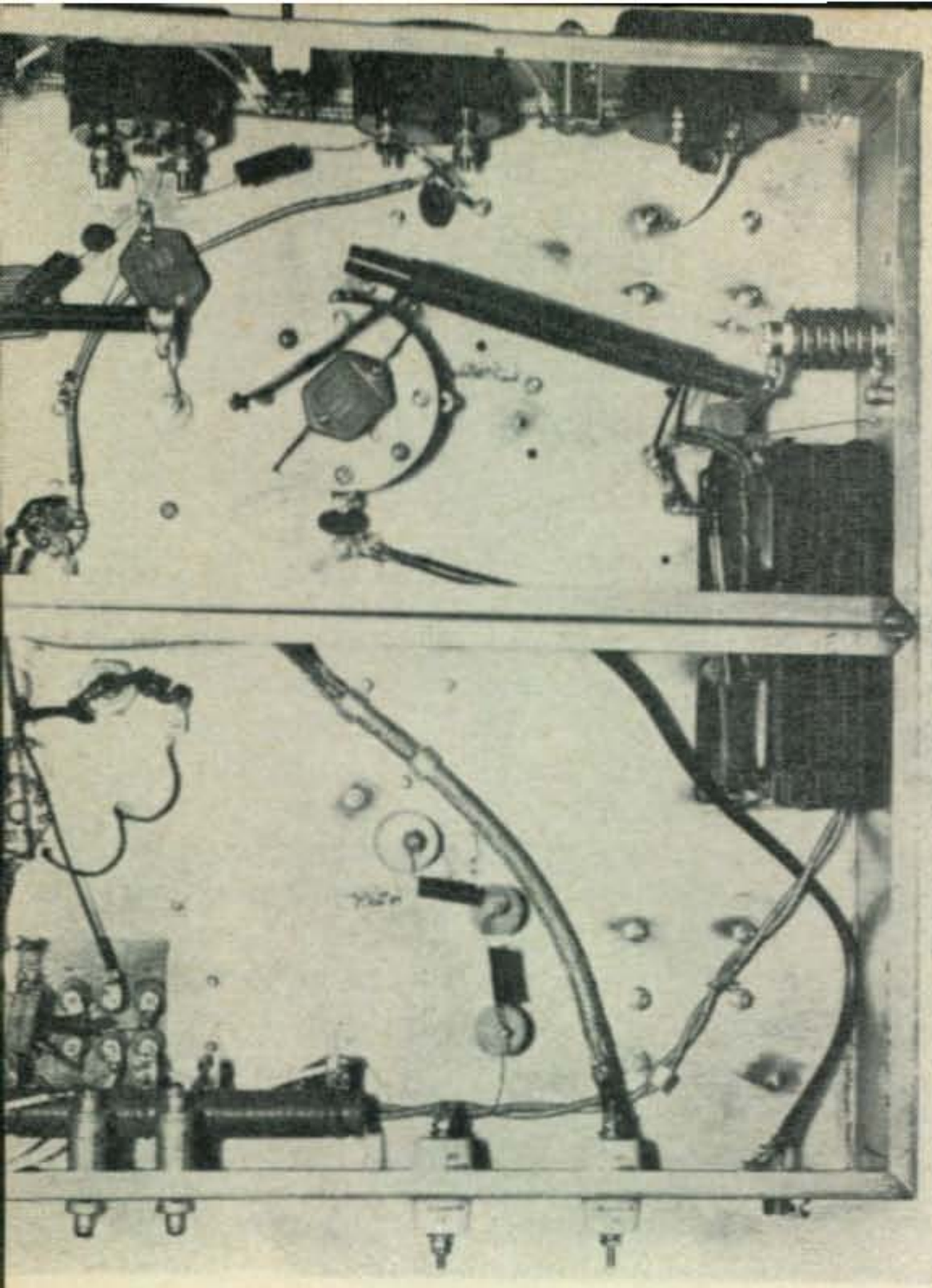
RFC_4—25t (each winding) bifilar wound, #10E on ½" diam., 7½" long ferrite rod. (Rod is Lafayette part #MS-333)

RFC_5—From 1 to 2.5 mh @ 500 ma. (Surplus unit was used but may be a National R-154U)

RFC_6—National R-175

RFC_9—45t #14E, 1" diam., Close wound.

T—7.5 v.c.t. @ 12 A., Thordarson 21F17.



Bottom view of the linear. The two filament transformers on the right center were paralleled and may be replaced by the single unit listed in the parts list. The bifilar input coil wound on the ferrite rod can be seen across the center of the upper chassis. The line filter chokes in the lower right are surplus units and can be replaced by those listed in the parts list of fig. 1.

450TL from Eimac. "Let's see, transconductance 5000 micromicromhos, output capacitance 0.6 micromicrofarad, (good so far) plate impedance (computed) reasonable; input impedance (computed?) also reasonable; filament requirements, 7.5 volts at 12 amperes. A pair of 7.5 volt 8 ampere transformers were paralleled to give 7.5 volts at 16 amperes.

The real problem appeared to be that of getting maximum drive to the amplifier input (filaments) and preventing driving power loss through capacitance-to-ground in the filament transformer(s). A simple *L* network coupler (see fig. 2) provides a proper match between the present transmitter (now called the driver) and the linear input. This unit will be required if your present transmitter has a 50 or 75 ohm output. Filament chokes, properly bypassed, should take care of isolating the filament transformer.

My first efforts, using air wound chokes, resulted in insufficient drive on 20 meters. I then decided on a broadband filament choke. I secured a ½ inch by 7½ inch ferrite rod (65 cents, Lafayette Radio) and wound it with 25 turns (bifilar) #10 enameled wire. Using a ½ inch wooden dowel as a winding form, then sliding the winding off the dowel

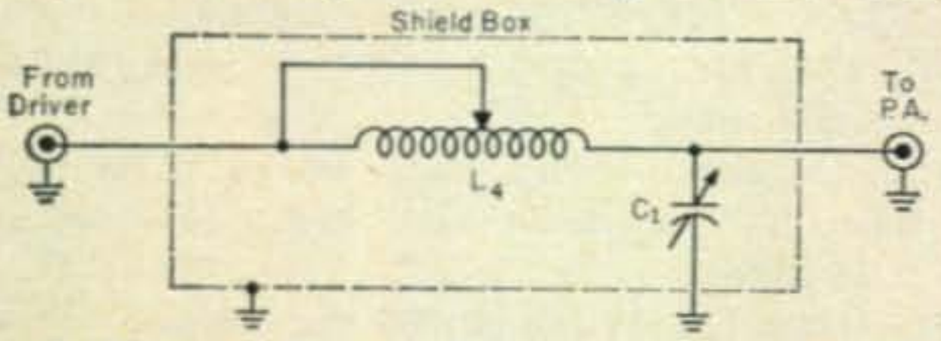


Fig. 2—Network for coupling an exciter, with 50 or 75 ohm output, to the linear. Coil L_1 is 20 turns of B&W #3905-1 coil stock and C_1 is a 200 mmf capacitor.

and onto the ferrite rod. I installed the choke under the chassis near the tube socket and filament transformer. Drive is applied through a .01 mfd disc ceramic capacitor. The tube grid is grounded for r.f. through a .002 mf ceramic capacitor.

Bias, from a 300 volt supply, built on the chassis, is set at minus 140 volts d.c. and regulated by a single 807. Excursions of grid current do not change the bias voltage appreciably.

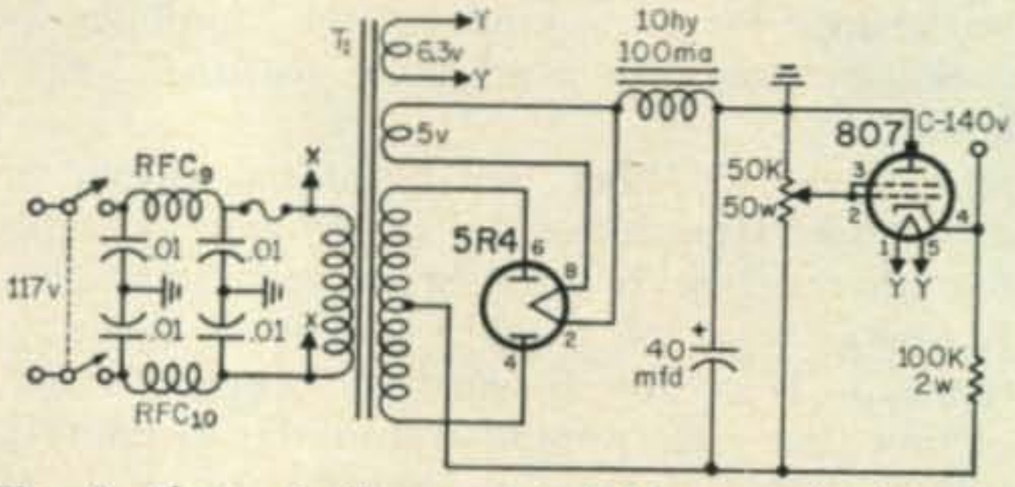


Fig. 3—Electronically regulated bias supply for the 450TL linear amplifier. Transformer T_1 is 700 v 85 ma, 5 v 2 a, 6.3 v 8 a.

The plate tank is shunt fed; parallel resonant or pi-network. The tank coil is wound with ¼ inch copper tubing (except for 80 which is #10E), is self-supporting, and positioned between the plate tuning capacitor and the output capacitor when pi-network tuning is used. When parallel tuning is used, the output capacitor is grounded and r.f. output is taken from the cold end of the tank coil through the usual coupler and low-pass filter and fed to the antenna.

Wiring between the tank capacitor, blocking capacitor, tube plate, plate r.f. choke and B plus terminal is with ⅜ inch braid. Indicating meters are grid bias voltage, grid current, and cathode current. Ohmite parasitic suppressors (P-300) are a good investment. They are used at the grid and plate of the 450TL. All lines leaving or entering the chassis are filtered and bypassed, and/or shielded. Figure 1 shows the complete amplifier schematic.

Results

Does it work? Yes. The final amplifier tube is biased so that 125 watts of power is being dissipated with no excitation. Plate current excursions are from 50 to 300 ma at 2500 volts. In this manner, load demands on the

[*Continued on page 96*]

Neither Rain Nor Hail...

FRANK A. MOHLER*, W2IAZ

HELLO. Is this EXport 3-7987? Good. I am calling from Eatontown and . . .

Eatontown? Well, it's about 18 miles from Freehold where you are and . . .

Yes, Ma'am. By the Monmouth Race Track. Right.

Well, I am calling to give you a message from Germany from your husband Art. I just received . . .

Your husband's name is not Art, it's Carl? Oh, I see. Well, two of the letters, the "a" and "r," are the same in each name and I guess it was easy for someone to mistake Carl for Art, heh heh.

Well, anyway, your husband Carl sent this message by amateur radio from . . .

Amateur radio? Uh, well, that's where a lot of fellows called radio amateurs talk to each other by radio and sometimes transmit messages for people like your husband . . .

No, there is no charge for sending messages by amateur radio.

Yes, I think it is a fine thing too.

Well, this message from your husband is from Berlin Germany and he says . . .

He never was in Berlin? It should be Schmierkase? Well, I guess the radio operator couldn't smell, heh heh, I mean *spell* Schmierkase and felt that it wouldn't make much difference, Berlin or Schmierkase, as long as you got your husband's message. Here it is, Mrs. Smith . . .

Oh, your name is SmithERS, not Smith? I guess the name Smith is so common that some operator must have thought that Smithers was wrong and changed it to Smith, heh, heh. Well, Mrs. Smithers, here is the message:

HONEYPOT IN THREE WEEKS I WILL BE STARTING BACK TO THE STATES YOUR LOVING HUSBAND ART. . . . uh, I mean CARL

Uh, what was that again, Mrs. Smithers? You were laughing so hard, heh heh, that I missed what you said.

Oh. . . . Your husband came home four days ago. Well, uh, that's nice. Goodbye. ■

*187 Broad Street, Eatontown, New Jersey

Mars Bulletins

Air Force MARS Eastern Technical Net

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Dec. 3rd — To be Announced. Dr. S. Rubinoff, Professor of Electrical Engineering, Moore School, University of Pennsylvania.

Dec. 10th — **Illumination at Low Levels** — Dr. Morton Chwalow, Scientist, Frankford Arsenal, U.S. Army.

Dec. 17th — **The Voltage-Tunable Magnetron for Microwave Applications** — Robert I. Reed & George A. Krug, Power Tube Department, General Electric Co.

Dec. 24th — No broadcast.

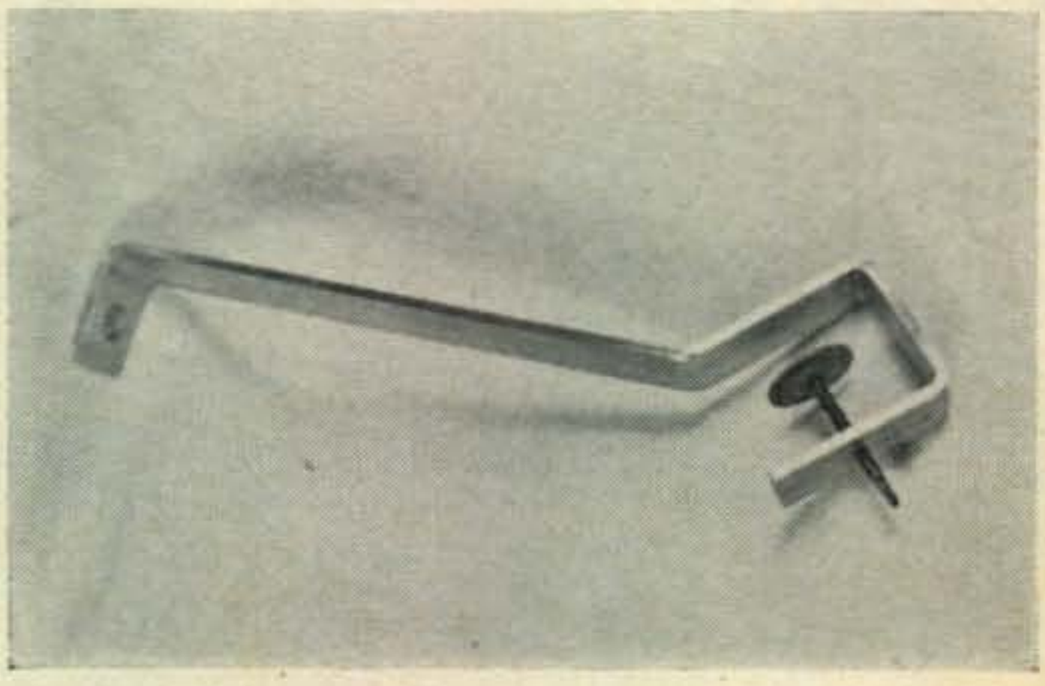
Dec. 31st — No broadcast.

Jan. 7th — **New Electron Tubes for the Modern Era** — Dr. J. E. Beggs, Research Associate, General Electric Research Laboratory.

Jan. 14th — **Thermionic Integrated Micro-Module Circuits for High Temperature Environments** — Allen P. Haase, Mgr., Advanced Development Engineering, General Electric Company.

New Amateur Products

AN interesting innovation on portable mounts for the whip antennas has been introduced by he DPZ Corporation of 67 Wall Street, New York City. The "Port-a-Mount" is designed to fasten on the bottom edge of a window and provides a strong support for a good sized whip. The mount uses 3/16" aluminum and is gold anodized for outdoor weather protection. The overall length is 14¼" and weighs only 9½ ounces. For more information, check A on page 120.



Results of the August 1961 *CQ* W.W. V.H.F. Contest

COMPILED BY BOB BROWN*, K2ZSQ

Storms, Good Ground Wave, Sporadic-*E* and Astronomic scores!

WELL, this was sure one for the books; blooming activity, superb band conditions, a Sporadic-*E* opening, and plenty of logs despite a high-wind electrical thunderstorm on the East Coast. One might well say that this year's August 26-27 V.H.F. Contest was a huge success for the battleworn who were able to endure all that weekend's surprises. Response was the greatest *CQ* has ever been able to boast, both in logs submitted and overall continent-wide participation, including those who didn't send in their records. Even got four scores from England.

But the biggest surprise of all came from Ulster County, New York, and K2OIQ/2 with a whopping score of 11,868,960 in the Multi-operator, Multi-band division. This is double the highest score ever recorded in a *CQ* v.h.f. contest. K2OIQ/2 is actually a club call belonging to the Madison High Radio Club, of Madison, N.J. The boys operated on 6 and 2 meters from Madison High during the fall of '57-spring '58. Then Madison built a new school and they had no way of putting up an antenna, so K2OIQ was off the air. Now the members of the club, Tom Walter, K2PNM; Hal Barney, K2TBN; Dick Bennett, WA2ELM; Stu Jeffery, K2SYW and John Windeler, ex-WA2EME, are all in college and have applied for a new club call; K2UQN, in memory of Dave Ullrich, a student of Rutgers who was killed in an automobile accident last fall. Meanwhile, the boys set up operations on Slide Mountain in the New York state Catskills, elevation, 4,000 feet. From this location, with a 6 and 2 meter portable station (Communicators) they compiled the highest score ever recorded; with 313 contacts in 79 separate counties during the stormy 24 hour period.

HIGH SCORES

World-High	K2OIQ/2	11,868,960
Second Place	W3JMY/3	6,901,400
Third Place	K2UTN	6,562,080
M.B.M.O.	K2OIQ/2	11,868,960
M.B.S.O.	WA2OYV/2	1,235,520
S.B.M.O.	W4BBB/4	5,166,720
S.B.S.O.	W3JMY/3	6,901,400

The real excitement, however, came from the single-band, single-operators. Competition was really steep with seven stations all topping more than three million points. For another first, W3JMY/3, K2UTN, K3IPM, and K9GFQ all hit above 5 millions points. Thirty-five areas reported.

Multi-operator, single-band division was led by W4BBB/4 of Virginia; set up portable at the Cumberland Gap National Historical Park in Tennessee (elevation, 2,500 feet), with a 50 mc score of 5,166,720. Meanwhile, back at the ranch, two Ohio stations, K8CLA/8 and K8EMY/8, trailed second and third respectively, with over three million points. 16 stations in 9 areas entered this competition.

Multi-operator, multi-band, 50-144 and even 220 mc (with K2GLI/2), K2OIQ/2 left a hard act to follow, but K2ZSQ/2 accumulated 5,393,-280 points high atop New Jersey's most elevated area, High Point State Park, in the northwestern tip (elevation 1,800 feet) with 25 watts on 144 mc with operators K2UYH and K2-

*V.H.F. Editor, *CQ*, 67 Russell Ave., Rahway, New Jersey

The crew at K2OIQ/2 which racked up a World High score. Accumulating 313 QSO's in 79 counties made the difference. Left to right: K2TBN, WA2EME, K2SYW and WA2ELM. K2PNM took the snap. That tower is sitting on 4,000 feet of mountain!

SMN, and a Clegg 99'er at 8 watts on 50 mc, manned by K2ZSQ/2 (yours truly). Next in line was W3OID/3, W1YQF/1, and W6HTB/6 respectively, with 3,663,360; 3,024,000; and 2,386,560.

But we've neglected another hardy group; the single-operator, multi-banders. WA2OYV/2 led this steed with 1,235,520 points followed by K9RVG/9 in Illinois with 1,062,600. Even Wyoming entered with W8KNC/7 giving out valuable points and a darned rare county.

Altogether, we have 14 three-million point plaques to send out this time, by far the most ever. And I must say well deserved. Anyone who could endure the conditions that weekend certainly deserves recognition. We at K2ZSQ/2, for example, had to give up any thoughts of tent operation when we arrived at our wind-swept pinnacle at 2 A.M. Saturday, to find driving rain and 25 m.p.h. winds which lasted during the entire contest. Wound up with two stations; 144 mc from a '51 Chevy, and 50 mc from a '53 Chevy. Antennas were "Armstrong-rotated" from the window. Then the generator troubles . . . but that's another story. Another time, when it's all in the past, I can sit back and laugh about it all . . .

In the meantime, we've got another contest coming up in April. Not that we expect any higher scores, but it sure would be nice.

NEXT *CQ* World-Wide V.H.F. CONTEST APRIL 21-22, 1962.

Here is the 2 meter New York winner, WA2IMG.

Electronic Heights is the location which W3JMP/3 used to score 1,587,600 points. They had to be content to take second place, however, running behind W3SYY/3 in Pennsylvania.

Notes & Comments

W3JMY/3—'Was the best contest ever and as you know, we've worked them all . . . *W2IP*—Sorry I did not have more time to "get with it" —had to work . . . *K7BBO*—I like the way you run a contest because it gives the "single-bander" a chance . . . *K1ABR*—Here in W1-land not a note was heard on c.w. in the first 100 kc. What gives? *W6YKS*—Had receiver trouble, but worked everyone I heard! *K4QFV* —Had lots of fun! 144 mc is gaining popularity in this area (N.C). *K4MHS*—Enjoyed the contest very much . . . *K8BHZ*—It's about time someone put on a contest in August! Got a few Sporadic-*E* contacts which were really welcome to our log. Sacked out after efforts toward K9PAF at 3:30 A.M., but was at it again at 8 . . . *W9BQC*—The information needed for exchange and log is very clumsy! Suggest shortening it to just number and county . . . *WA6BCN/6*—Had great fun with 4½ watts at Yosemite National Park . . . *WA6NIJ*—Filter capacitor blew out after the sixth hour, so I guess you know where that left me . . . *KØLES* —First contest I've ever entered and had a great time. I'll be back in April! *WA2FVL* —was real ruff trying to get those 24 hours when there were no nite crawlers around. How about some kind of check-in station when there's no one around? *W2KVA*—Contact #51 was K3HRI/2 to report bus accident on Rt. 9W, south of Nyack, N.Y. Called N.Y. State Police —no injuries! *K8EMY/8*—Great fun here at Sunny Acres Hospital at Werrensville Heights, Ohio. and was hopping! *WA6PTM*—This was the first contest I have ever entered in my nine short months as a ham and I found every moment worth it! *W9CV/7*—Spent a very pleasant week-end atop Sherman Hill, 8,878 ft., near Laramie, Wyoming, and made several 100-mile contacts . . . *K1PAM*—Oh for a v.f.o.! *W6UFJ*—Where were the Los Angeles stations? *K1NAY/1*—Numerous electrical storms kept us off the air periodically, the 12 volt portable generator had to be waxed continuously; Anyway we had loads of fun . . . *K3QAI*—This contest has taught me much in the way of changes that must be made to the shack (a bigger coffee pot is one) . . . *K1PNA*—Excellent rules and regulations—could not be any better. Congratulations on a FB contest . . . *W7QDJ/6*—Would like to see a contest held during one of the major meteor showers with only contacts further away than 100 miles

counting . . . *K3GAU*—I enjoy this type of contest mainly because it gives the low power station half a chance to win . . . *W4BBB*—The first thing we would like to say is that we wish to thank the participants in the contest who gave us the needed contacts that made such a score possible. We did quite a bit of advertising that we would be operating the contest and it seemed to pay off. Many stations were worked who said that they had gotten on just to give us a contest QSO. Operators were K4JNO, K4JWZ, K4OGQ . . . *WA2IMG*—Thanks for contest contact, Bob! *K1NUM*—Much more activity than the last one. From 145.0 to 145.1 was a mess, especially on a Communicator, looked like a solid S9 signal for the whole 100 kc! Good show . . . *K8PCU*—Good ground wave Sunday morning and worked into Cleveland. Heard a W3 but just couldn't make the grade . . . *KN9BBP*—Made all of 500 points. Get out the Booby prize! *WA2KIK*—Most of the boys were very considerate. Comments (in short) 'A blast!' *K1QNQ*—Am enclosing a picture of shack before the contest. You wouldn't believe how it loked after—hi . . . *K8NGR*—Enjoyed the contest but get a bit mad when stations that have been bragging for years about their power suddenly cut it in half when talking about their contest multipliers. Most are honest, but I just wonder about a few . . . *K1DRB*—Had a lot of fun and worked a new state—Maine. *K9GFQ*—The ground wave here was downright exceptional! W4BBB/4 was copied off-and-on early, Sunday (450 miles)! But couldn't make myself heard with 24½ watts! *W7ZFX*—Although we didn't set the world on fire, we did have a good time, plus learning a lot about v.h.f. and contests . . . *W4ZZ/4*—Sorry not able to hit 144 mc harder but operating time is limited here by running this lodge. Can you imagine living at 6,400' elevation and having to work for a living at the same time? *K7EMO/7*—Contacts were made on 144 mc from on top of Sherman Hill, elevation 8,878 feet . . . *WØIUF*—Made QSO with WØENG, along a 300 mile tropo-scatter path. Signal was 6-12 db above the noise . . . *K9GXC*—How about another multiplier for crystal control? *WV2SPG*—Just a line to let you know how much I enjoyed the contest. Just FB . . . *K8UZJ*—Band conditions were neither bad or good. Exchange of info (such as handle, etc.) sure was a change from "CUL." *K2ZSQ/2*—Whew!

Single Band, Single Operator—50 Mc.

The following are the tabulated results of the August, 1961, W.W. V.H.F. Contest. Number groups after call letters denotes the following: power multiplier, hours operated, number of contacts, number of countries and final score.

Arkansas					
K5AZH	5	3	4	3	360
California					
K6KLY	5	21	67	12	168,840
WA6BCN/6	10	15	29	9	78,300
WA6LGE/6	10	16	28	7	62,720
WA6NIJ	10	6	14	4	6,720
W6YKS	5	3	4	3	310
W7QDJ/6	1	3	4	3	72
Colorado					
KØYJG	10	8	84	18	120,960
KØWFT	10	16	44	6	84,480
KØLES	5	7	20	5	7,000
Connecticut					
K1PNA	10	19	58	15	595,080
K1HZJ	5	23	48	19	210,760
Delaware					
K3AXW	3	21	85	31	332,010
Florida					
W4NVV	3	13	56	37	161,616
K4RNG	5	8	51	31	126,480
Georgia					
K4UQM	10	20	90	37	1,332,000
Illinois					
W9CCR	5	23	117	29	780,390
W9EET	5	22	103	31	702,460
K9GHR	5	24	110	26	676,400
K9GXC	10	24	63	30	453,600
K9DMW	10	14	41	3	34,440
Indiana					
K9GFQ	10	22	153	76	5,116,320
W9AYW	10	23	90	40	1,656,000
Iowa					
KØMST	5	18	73	31	407,340
Kentucky					
K4BAD	10	10	19	2	7,600
Louisiana					
W5DNL	3	14	43	25	90,300
Maine					
K1NAY/1	10	10	48	12	115,200
Massachusetts					
K1DIT	10	24	154	50	3,696,000
K1HCC	10	20	88	26	915,200
K1NXN	5	24	85	19	387,600
K1KKS	10	12	70	13	218,400
K1JQT	10	16	53	10	169,600
Minnesota					
KØWYY	10	5	8	3	2,400
Missouri					
WØCMI		21	56	6	73,920
Michigan					
K8IXU	10	12	39	17	291,720
K8TWW	10	13	42	9	98,280
Montana					
WØCPK/7	5	6	6	1	360
W7NOZ	10	1	2	1	40
W7DWR	10	1	2	1	40
Nebraska					
KØTVD	10	19	72	13	177,840
KØERY	5	18	36	8	51,840
KØPQP	25	14	42	8	47,040
North Carolina					
K4GPL	3	8	20	7	6,720
New Jersey					
K2AWS/2	5	22	240	53	3,117,000
K2MHU	10	24	219	43	2,520,160
WA2CWA	10	16	71	23	538,890
WA2BDP	5	16	75	30	360,000
K2PTD/2	10	8	36	24	138,240
New York					
K2UTN	10	24	217	63	6,562,080
W2KVA	10	24	98	34	1,599,360
K2SWI	10	24	89	28	1,196,160
WA2NRV	10	12	28	11	73,920
WA2KIK	10	7	11	3	4,620
Ohio					
W8UAR	10	20	175	57	3,990,000
W8KKF	10	24	135	45	2,916,000
K8RUD	3	22	170	58	1,301,520
K8TFL	10	20	65	34	884,000
W8CZD			94	51	862,920
K8LCC	10	23	74	7	238,280
Oregon					
W7GAU	5	16	29	10	46,400
Pennsylvania					
W3JMY/3	10	24	182	79	6,901,400
K3IPM	10	24	203	56	5,229,280
K3HNP	10	19	114	43	1,862,760
K3HGA	5	22	151	45	1,439,900
W3ETB	10	16	75	25	600,000
K3GAU		10	50	35	178,500
K3QAI	10	14	45	12	151,200
K3KEL	5	17	38	22	142,120
W3BKF	10	7	17	11	26,180
K3EXL	10	7	9	8	10,080
Rhode Island					
K1PAM	5	19	58	13	150,800
Tennessee					
K4YOF	10	20	65	23	598,000
Texas					
K5PSQ	10	17	59	9	180,540
K5ARU	10	24	57	6	164,160
K5BDL	10	9	39	9	35,100
W5AQS	10	9	25	7	31,500
W5TYS	10	12	28	4	26,880
K5PSL	10	10	15	3	9,000
K5QJT	10	6	18	3	3,240
Wisconsin					
K9LBQ	3	21	109	46	631,764
K9PSX	5	23	77	26	460,460
K9VNM	3	14	70	14	41,160
K9HBT	5	12	21	6	15,120
Washington					
W7ZFX/7	10	24	30	11	158,400
K7LQT	10	13	43	6	67,080
K7QIC	3	5	7	4	840
Wyoming					
W9FCV/7	10	10	16	7	22,400
Canada					
VE8BY	5	2	2	2	40

Single Band, Single Operator—144 Mc.

California						
W6UFJ	5	13	65	6		50,700
Colorado						
WØDKA	10	9	23	8		33,120
WØIUF	3	12	35	10		25,200
KØMNQ	5	7	11	4		3,080
Connecticut						
K1IED	5	22	138	48		1,457,280
K1NUM	10	16	33	12		126,720
K1IWM	10	10	31	9		55,800
KN1PTK	10	7	20	6		2,820
Illinois						
K9BBN	10	20	50	12		240,000
K9IOA	10	9	16	4		11,520
KN9HXX	10	9	12	5		10,800
KN9ENZ	10	5	15	3		4,500
K9MOV	10	4	7	2		1,120
Indiana						
K9WZB	10	19	35	13		172,900
W9OVL	10	16	44	10		140,800
Massachusetts						
K1QNQ	10	21	49	13		267,540
W1NOQ	10	16	46	18		264,960
K1DRB	5	13	31	13		52,390
K1MNO	10	11	13	6		17,160
Michigan						
K8PCU	10	22	64	15		422,400
W8NSH	5	19	68	30		387,600
K8VPH	10	17	50	12		204,000
K8NGR	3	18	73	23		181,332
W8ZGW	5	17	35	14		143,300
K8UZJ	10	17	30	12		122,400
W8VRH	10	11	24	9		47,520
K8BHZ	5	13	25	14		45,500
North Carolina						
K4MHS	5	19	41	13		101,270
K4QFV	10	10	28	8		44,800
K4WLX/4	10	4	11	6		5,280
New Jersey						
K2LNS	5	24	160	56		2,150,400
WA2FVL	10	22	84	25		924,000
WA2NMX	10	17	62	22		469,760
WA2BNF	10	11	67	18		265,320
K2MHP	10	10	56	19		212,800
WV2KII	5	19	50	19		180,500
K2KME	3	18	62	20		133,920
K2YFE/2	10	10	35	15		105,000
New York						
WA2IMG	10	20	42	23		386,400
K2GSE	10	9	46	12		99,360
WV2SPG	10	10	21	16		67,200
WA2DRK	10	6	16	12		11,520
W2IP	5	3	7	6		1,260
Ohio						
W8LCA	10	12	35	23		193,200
K8RXD	10	11	30	16		105,600
Pennsylvania						
K3ILD	10	3	6	5		1,800
Rhode Island						
W1FEO	5	2	3	3		180
Wisconsin						
W9JOT	5	10	33	11		36,300
Wyoming						
K7EMO/7	10	1	3	3		180
Canada						
VE3APF	3	18	52	18		44,928
VE3CVC	10	10	17	8		27,200
England						
G2DHV	10	8	9	6		8,640
G5SD	10	1	1	1		20
G2ABB	10	1	1	1		20
G3MCG/M	10	1	1	1		20

Multi-Operator, 50 Mc.

W4BBB/4	10	24	156	69	5,166,720
K8CLA/8	10	24	130	50	3,120,000
K8EMY/8	3	24	285	74	3,036,960
W3SYY/3	10	24	110	55	2,783,000
K2YMZ/1	10	24	110	41	2,164,800
W3JMP	5	24	135	49	1,587,600
K8PBE	5	18	62	36	1,401,760
K2SIR/3	10	20	60	29	696,000
W1ACT	10	23	67	20	616,400
K3LZS	10	18	52	20	374,400
W3IAF	3	7	10	1	1,200
KNIRRR	10	18	53	15	286,200
K9VTK	10	19	53	13	261,820
WA2MDT	3	13	41	12	38,376
KN9FNB	10	3	5	3	900
KN9BBP	10	5	5	1	500

Single-Operator, Multi-Band[1]

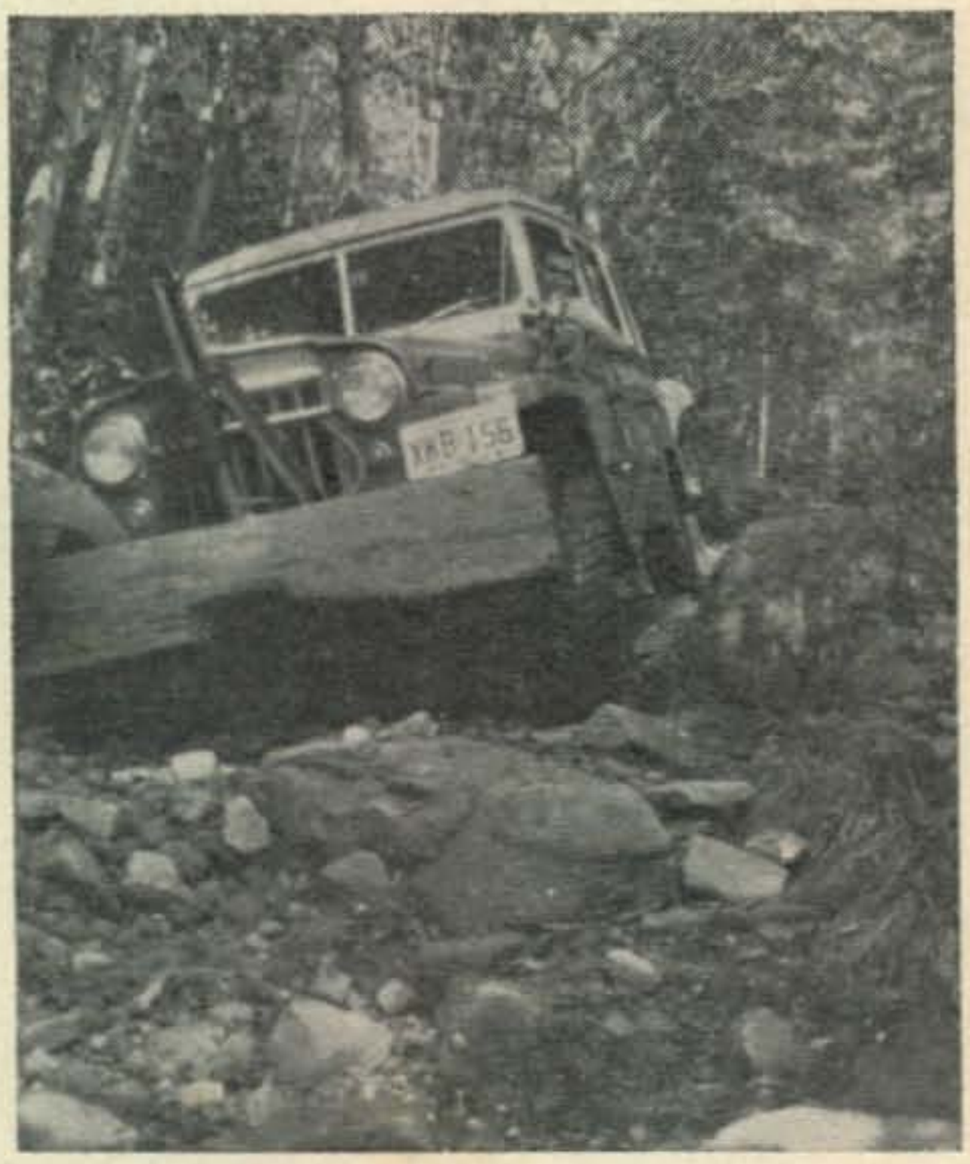
WA2OYV/2	3	24	156	55	1,235,520
K9RVG/9	5	23	140	33	1,062,600
K9DWR	5	23	81	33	614,790
KØKPQ	3	15	95	43	376,650
W9DJ	10	19	68	14	361,760
K7BBO	5	24	85	17	346,800
WA2HFO	10	15	54	16	259,200
WA6PTM	5	21	148	8	248,640
W4ZZ/4	5	15	40	25	142,540
K1ABR	3	12	71	20	102,240
K5TXX	10	18	31	9	100,440
K4SWN	10	20	47	15	69,580
W8KNC/7	10	9	16	6	20,520
W2ABQ	3	6	32	10	9,720
W4VIW	10	12	16	2	7,680
W9BQC	10	7	10	4	5,600

Multi-Band, Multi-Operator

K2OIQ/2	10	24	313	79	11,868,960
K2ZSQ/2[2]	10	24	212	53	5,393,280
W3OID/3	10	24	144	53	3,663,360
W1YQF/1	10	24	175	36	3,024,000
W6HTB/6	10	24	226	22	2,386,560
WA2CHP	3	24	255	60	1,944,000
K9VSA	5	24	166	39	1,553,760
K2QPN	3	24	124	38	678,520
K2GLI/2[3]	3	16	122	50	585,600
K6KQD	5	18	81	9	131,220

[1]All entries received were for 6 and 2 meters only.
[2]*CQ* staff, not eligible for awards.
[3]50-144 and 220 mc. All others 50 and 144 only.

W4BBB/4, winner in the 50 mc, multi-operator category, had it made atop a 2,500 foot peak in Tennessee's Cumberland Gap National Park. They QSO'ed 69 counties in 24 hours.



WA2ELM, operator at K2OIQ/2 descending Slide Mountain in New York during the contest. That "super highway" kept TV complaints to a minimum.

DX DX DX DX DX DX DX DX

URBAN LE JEUNE, JR., W2DEC
BOX 35, HAZLET, NEW JERSEY

Bolivia

THE United States exchanged notes with Bolivia on October 23, 1961 concerning the adoption of third party traffic between these two countries.

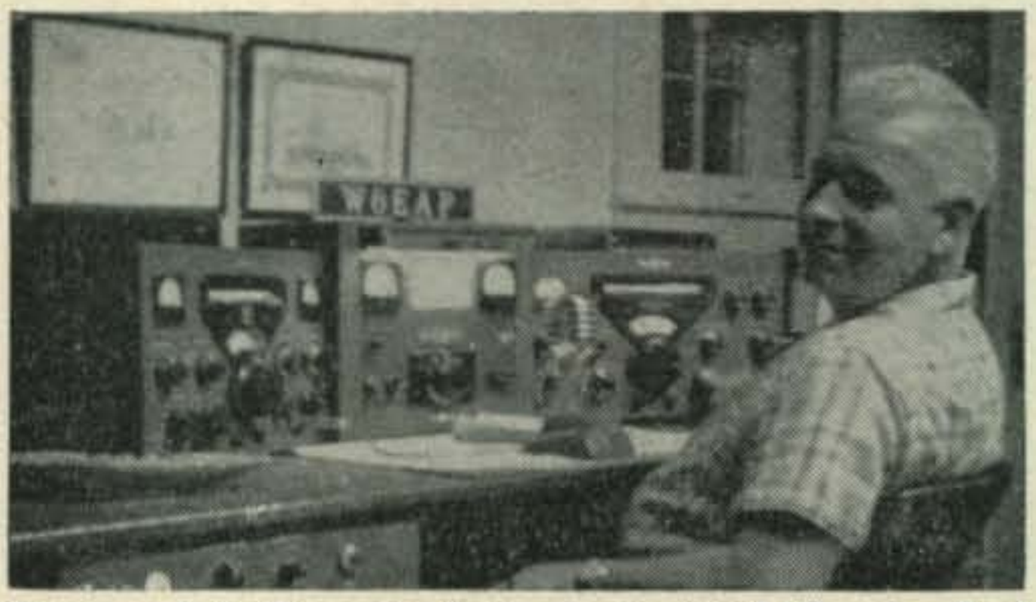
Effective November 22, 1961 third party traffic was considered legal with Bolivia.

San Marino

DL4KJ, who recently operated as W6HZN/M1, sends along the following account of the trip:

"This expedition was intended to be much more elaborate. However, due to licensing delays and TDY orders for DL5CP who was to accompany me it turned out to be a hurry-up, last minute rush operation.

The following certificates were issued between the period from September 12th, 1961 and October 11th, 1961:-



This neat Collins rig belongs to W8EAP who last month became the first W to be awarded WAZ on 2 way s.s.b.

WAZ

1601	W4NYF	Fred Schmidt
1602	W6VVR	John W. Fogg
1603	W9OVF	Harry G. Butler
1604	K7GCM	David R. Brush
1605	W4IUO	James T. Butt
1606	W9YT	Badger Amateur Radio Society
1607	W9NZZ	Stan Surber

CW WPX

200	VE3IR	R. S. Rennie
201	W1DGT	Elmore J. Fitz
202	K8CVQ	Steve Solo
203	UA6UI	E M. Keickehman
204	W6BYB	John S. Mayes
205	SM5CXF	Bo Hellstrom
206	W4BJ	Raymond Farwell
207	WØQGI	Lloyd N. Harvey
208	W1CV	E. J. Martineau
209	W3NCF	M. Scott Hunter
210	VK3CX	Alan G. Brown
211	WØMLY	George R. McKercher
212	W6YC	Eugene B. DeTurck
213	W3CGS	Harry W. Stark
214	W2ZXL	George B. Flenner
215	YO3FD	Titi

PHONE WPX

33	K3COW	Raymond E. Murphy
34	W5PQA	H. W. Merideth
35	W1FAB	Kenneth D. Walker
36	GM3BCL	A. G. Henderson
37	VE3BQP	William A. Wragg
38	W8JIN	Jim Ringland
39	TG9AD	Robert W Engel
40	WØMLY	George McKercher
41	K8CFU	A. C. Doty, Jr.

SSB WPX

75	PJ2AF	Lloyd D. McBurney
76	W8WT	Lester A. Jeffery
77	K8CFU	A. C. Doty, Jr.
78	KL7MF	Harold D. DeVoe
79	W3CGS	Harry W. Stark
80	TG9AD	Robert W. Engel

MIXED WPX

1	W3CGS	Harry W. Stark
2	W1EIO	H. K. Goodwin
3	W2DEC	Urban LeJeune

Chuck, KG1GD, seems fairly comfortable although the temperature outside was 20° below zero when the picture was taken. Chuck is K4MMO back home. (Tnx K2UKQ)

"Equipment used was a Heathkit MT-1 transmitter, HRO-5 receiver and 14 mc dipole. All contacts were on c.w. and for most part, we went begging as band conditions were extremely poor. Final score was only 74 stations worked in 25 countries with all continents worked, except Asia. Also, only one W-station was worked, WA2ELS. Only two pileups occurred and for a very short period of time. I believe most all stations that called-in were worked during these periods.

"My thanks to Mr. Guiseppe Gozi, proprietor of the Hotel Titano in San Marino where the operation was conducted and to Dr. Fedele Daniele, Chief of Police in San Marino. Mr. Gozi was most helpful and gracious and without his help, things would have been extremely difficult.

Cards may be sent to either of the following addresses; DL4-QSL Bureau, c/o DL4VJ Base Mars Station, APO 130, N. Y., N. Y. George P. Cobb, DL4KJ, Hq EUR, GEEIA REG. APO 332, New York, N. Y.

The 5N2 Award

1. The 5N2 award is issued for contacts with five Nigerian amateurs since 1st January 1961 using at least two bands (*e.g.* 3 stations on 14 mc and a further 2 on 21 mc).

2. Stations may be worked on fone, c.w. or both.

3. QSL cards need not be sent, but a check list showing call-sign, date, time, band and report is required.

4. The award is also issued to short-wave listeners, who must enclose the five QSL cards with their applications.

5. Applications, accompanied by five IRC's or a British Postal Order for 2/6d, should be sent to: Dr. M. Dransfield, 5N2JKO, Regional Research Station, Samaru, Zaria, Nigeria.

CPC (Canadian Provincial Capitals) Award

Requires proof of contact with each capital city of the Dominion of Canada. All contacts must be post-war except Newfoundland (VO1) which must be made after March 31, 1949.

Province	Capital City	Call Area
Newfoundland	St. John's	VO1
Prince Edward Island	Charlottetown	VE1
Nova Scotia	Halifax	VE1
New Brunswick	Fredericton	VE1
Quebec	Quebec City	VE2
Ontario	Toronto	VE3
Manitoba	Winnipeg	VE4
Saskatchewan	Regina	VE5
Alberta	Edmonton	VE6
British Columbia	Victoria	VE7

Classes: Awards issued for all classes; c.w., a.m., s.s.b.

Special seal endorsation if all one band or all one mode. Also available to SWL's.

Confirmations or certified list signed by a R.C. Officer or two amateurs, to be sent to H. L. Benson, VE3HB, Box 52, Oakville, Ontario, Canada along with a fee of $1.00 or ten IRC plus $.25 or stamps for each additional seal.

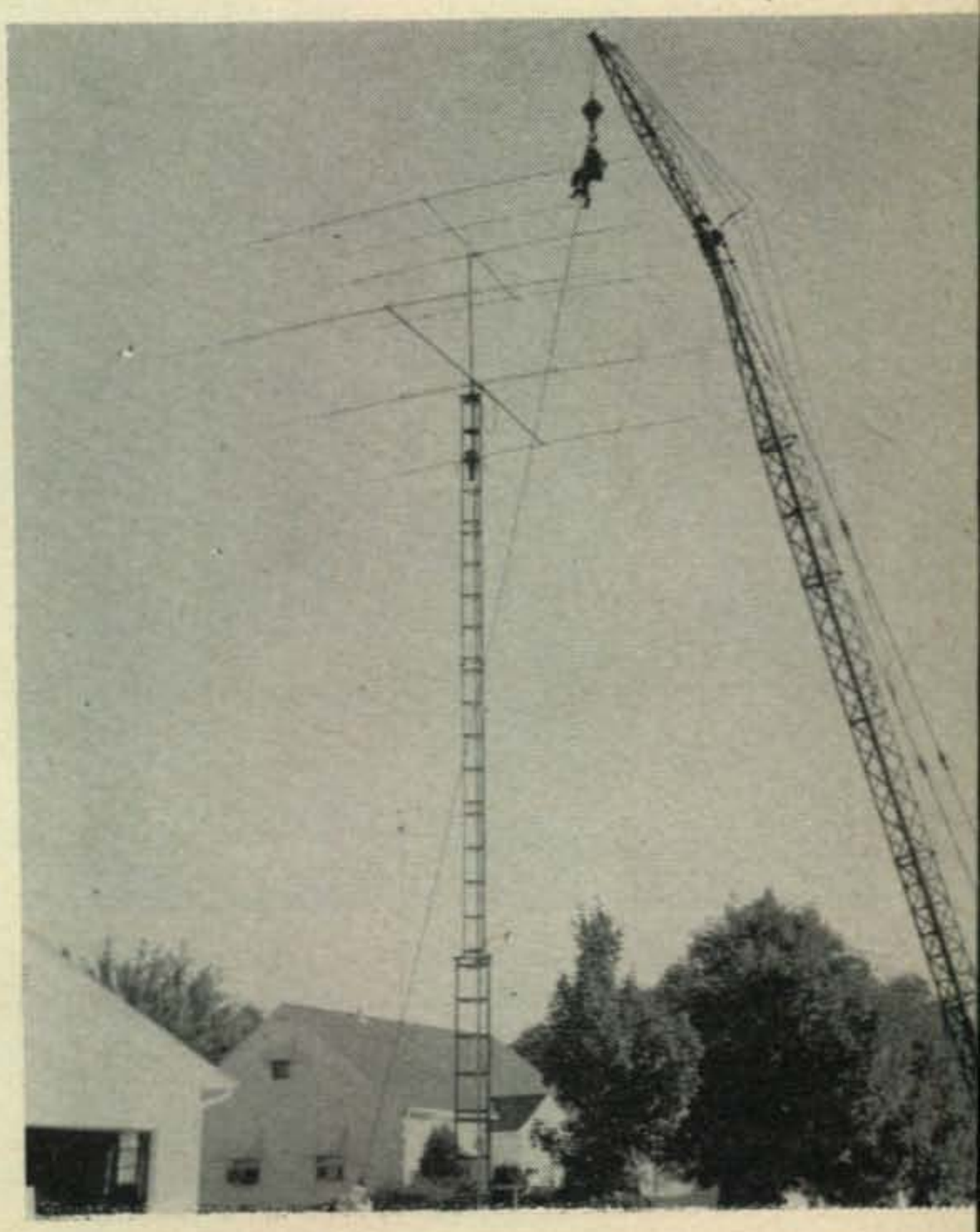
All Alaskan Counties Award (AACA)

Certificates will be issued in classes with, or subject to, endorsements as follows:

Class I, c.w.; class II, a.m.; class III, s.s.b.; class IV, RTTY; class V, Mixed Mode; suffix A, One Band; suffix B, Mixed Bands.

For example, certification for s.s.b. QSO on

This is the way they work on antennae out in WØland. The fellow in the Bosun's chair is 75 feet up adjusting WØCVU's TH-4 Hy-Gain. Below that at the 60 foot level is an optimum spaced Telrex.



Old timer, ON4OJ, at the operating position. George has had a ticket since 1927. His past calls include G7, EB7, EB4DG, and ON4DX. (Tnx K1QGC)

20 meter band only, would be class IIIA.

Requirements: Five contacts in Alaska as follows: One QSO confirmed in each of the four judicial divisions of Alaska which are broken out as SE, NW, South and Central, plus one QSO with any member of the Wildwood Station Amateur Radio Club, for a total of five contacts. (Alaska has no counties as such at the present time but should the county or borough system be adopted at some future date, these requirements will be changed commensurate with the number of counties or boroughs.) Contacts must be after Aug. 15, 1961. Minimum acceptable reports are Q4/S5 or RST 459, either station. Apply to Secretary, Wildwood Station Amateur Radio Club, Bldg T-308 Wildwood Station, Alaska, Application is to be a list certified by two licensed amateurs, a radio club official or Notary Public, furnishing data taken from QSLs in GMT only. Application will be accompanied by return postage for class of mail service desired by applicant, for the country in which he is located.

This impressive looking station is one of the best known SP stations, SP8CK. Edward keeps his station very active on all bands both CW and fone. (Tnx VE3CBY)

Canada—The St. Lawrence Seaway Award

Awarded by: The Ontario DX Association.

Requirements: Ten contacts with VE stations located along the route of the St. Lawrence Seaway.

Of these ten contacts, four must be with the following four areas, one from each. Port Arthur or Fort William; Greater Toronto; Greater Montreal; Greater Quebec City. The remaining six may be any VE municipality situated along the route of the Seaway. Suggestions: Kingston, Cornwall, Prescott, Brockville, Gananoque, Whitby, Oshawa, Napanee, Hamilton, Niagara Falls, Windsor, Sarnia, Goderich, Manitoulin Island, Saulte Ste. Marie, Nipigon, etc. Seals will be available for 20, 40 or 50 contacts.

Band, mode: Any band, any mode, mixed or otherwise.

QSLs: No QSL's need to be submitted for either the "Canadian" or the "Seaway" Awards. Instead, submit a list showing the date, time, band and definite location of station contacted, and signed either by one official of a Radio Club or by two other licensed amateurs. Cost: $1.00 or equivalent (8 IRC).

This picture was taken at a recent picnic of the North Jersey DX Ass'n and W2BXA is just saying "You worked that station 17 times on one mode." W2BXA, W2VCZ, K2JGG, and W2JT. (Tnx W2AIW)

Canada: The Canadian Award

Awarded by: The Ontario DX Association.

Requirements: Five contacts with each of the 8 VE call areas. (40 contacts), five contacts with VO1/VO2 (any combination of 5), or one contact with a VEØ maritime mobile station. Of the 5 VE8 stations, one must be in the Yukon Territory and one must be located on one of the off-short islands of the North West Territories.

Band, mode: Any amateur band. Any mode, mixed or otherwise.

Date: Any contacts after World War II, 1945.

QSLs: Not required, unless specifically called for. Use the same procedure as that of the St. Lawrence Seaway Award. Cost: $1.00 or equivalent (8 IRC).

Applications for either of the aforementioned go to: The Ontario DX Association, Secretary, William A. Wragg, VE3BQP, 127 Castlewood Road, Toronto, 12, Ontario, Canada.

Here and There

AC5 Bhutan: AC5PN has returned from a three-month trip and is again active.

HM Korea: HM4AQ is now active on s.s.b. Look for "Sun" daily about 1100-1600 GMT around 14330 kc. QSL via W8BF.

JY Jordan: OD5CL has permission to operate from Jordan. He is based on one pipeline station at Turaif which is 220 miles from Beirut. He hopes to be active weekends.

TA Turkey: TA2AR, in a letter to PAØWWP, says that he is the only legal TA station at present. Latest news on TA ham status is that within a short time a law will be passed making it possible for TA hams to obtain a license. About 20 new hams will be active in about a month. (Tnx WGDXC)

TF8 Upper Volta: 9G1DP will operate s.s.b. from Upper Volta on December 24 and 25, 1961 with the call, 9G1DP/TF8. Frequencies will be 14340 and 21340. (Tnx WGDXC)

TR8 Gabon: TR8AA and TR8AB have been active. TR8AA on 14018 kc around 1930 GMT.

UA1 Franz Joseph Land: The Russian portable (the one used at UA3FE/UAØ in Zone 23) will be operated from Franz Joseph Land during the last two weeks of December and the first two weeks of January 1962.

VKØ Heard Island: VKØVK reports the possibility of activity from Heard Island in January of 1962. (Tnx WGDXC)

VR1 Gilbert Island: VR1A is very active now on 20/40 meters on both c.w. and fone. VR1B is active on 14307 kc s.s.b. in the mornings U.S. time and VR1G is active on 14188 kc around 1100-1200 GMT.

VR4 Solomon Island: VR4CV "Alan" is very active on c.w. He has been heard almost daily at 0600-0800 GMT on 14050 kc. His QTH is Box 49, Honiara.

Looking out of the shack window at W6HZN/M1. Poor conditions prevented George from working more than 74 stations during his short stay in San Marino. QSL info can be found in the text.

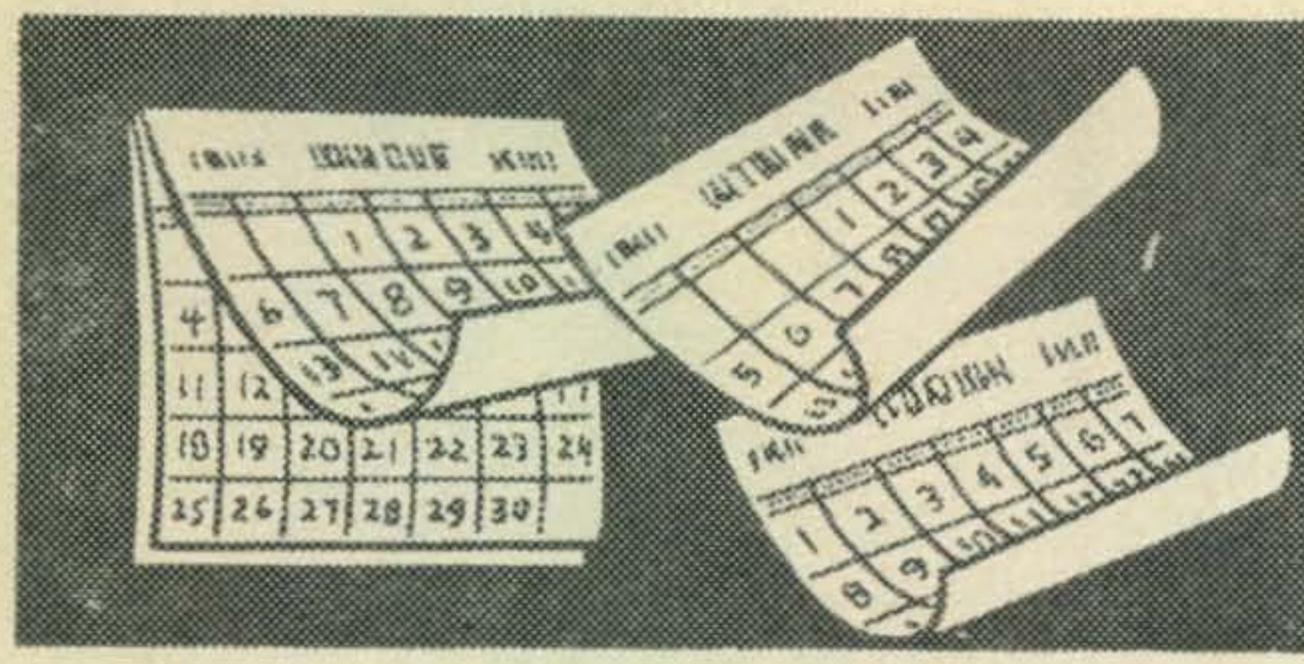
YVØ Aves Island: It is expected that, through the cooperation of the Venezuelan Navy and the Radio Club of Venezuela, YVØAA will be operating a DXpedition beginning January 7th, 1962. Look for them on 40, 20 and 15, c.w., s.s.b. and a.m. Operations are expected to last seven days.

3W8 Vietnam: Ex-YK1AT is now in Vietnam and trying for a ticket, but it doesn't look too good.

This is also the NJDXA picnic and this should prove once and for all that we don't really have horns. (We just sound that way) W2FZY, K2GMO, and K2QHL. (Tnx W2AIW)

QTH's

DL5DU Ray Porter, U.S. Army Area Support, Component (7990) APO 757, N.Y., N.Y.
EA6AZ Lorenzo Munar-Pons, Box 303, Palmade Malloria, Balearic Islands.
ex FI8AD ....via F9RO.
FP8BD .....via VO1FB.
HM4AQ .....via W8BF.
HR3JW ....via K3COW.
HS5OSQ .....via W5ZG.
KB6BQ USPO Box 06/50,000, Canton Is., South Pacific.
KC6CG (after May 15, 1961) via VE7ZM.
KL7CGB Box 46, Navy 230, Seattle, Washington.
KL7SFN Box 1155, Kodiak, Kodiak Island, Alaska.
KW6DG/DF new Box 206, Wake Island.
LU1ZL via W9DHQ.
PY7NC Box 285, Josa Pessoa, Brazil.
SU1MS ....see DJØFB.
SVØWG Ray Allen, USASG, JUAMAGG, APO 223, N.Y., N.Y.
SVØWO Bailey, APO 223, N.Y., N.Y.
TA2AR Erin Kumbaraci, Kizilay Sumer Sodak, No. 23/5 Ankara, Turkey.
ex-TA3MP (1950-55) via KL7DIR.
TF2WFX ...via K4IUV.
VE8CR c/o Federal Electric Corp., Winnipeg, Manitoba, Canada.
VK9AM L. L. McInnes, Nauru, Central Pacific.
VP2SQ ....via K3COW.
VP5BL/VP5 via W3AYD only.
VP8GE Mike Meade, Sarsfield St., Kilmallock, Limerick, Ireland.
VR1M .....via W1HGT.
VR2EA .....via G3JFF.
VR4CV Box 49, Honiara, Guadalcanal, Solomon Islands.
ex-VS1JW John Kaarsberg, 106 Margaret St., Toowoomba, Queensland, Australia.
ex-W2HQL now WA6-TGY, 1722 Berrywood Drive, San Jose 27, Calif.
YV1EM Box 172, Maracaibo, Venezuela
ex-ZD8SC Stan Crow, Friarnin Park Ave. Ingatestone, Essex, England.
4X4DK via WA2KNC
4X4IX ....via WA2KNC
6W8BQ ....via W9RKP
9G1DE Box 128, Dunkwa, Ghana.
9M2GR (ex VS1JV) Garrison HQ, Minden Barracks, Penang, Malaya.
ex 9M2GU John Kaarsberg, 106 Margaret St., Toowoomba, Queensland, Australia.



CONTEST CALENDAR

FRANK ANZALONE, W1WY
14 Sherwood Road, Stamford, Conn.

CALENDAR OF EVENTS

November	25—27	*CQ* WW DX C.W.
December	2—3	RSGB 21/28 Phone
December	2—3	OK DX C.W.
December	9—10	Kansas QSO Party

ANTICIPATED CALENDAR OF EVENTS

Spring 1962

*January	13—15	ARRL CD C.W.
*January	20—21	DARC WAE
*January	20—21	New Mexico Party
*January	20—22	ARRL CD Phone
*February	2—4	ARRL DX Phone
*February	9—11	QCWA QSO Party
*February	16—18	ARRL DX C.W.
*February	23—25	*CQ* 160 C.W.
February	24—25	REF C.W.
February	24—25	YL-OM Phone
*March	2—4	ARRL DX Phone
*March	10—11	BERU
March	10—11	YL-OM C.W.
*March	16—18	ARRL DX C.W.
*March	24—25	*CQ* WW DX S.S.B.
April	14—15	REF Phone
April	14—15	Helvetia 22
*April	28—29	PACC C.W.
*May	5—6	PACC Phone
May	5—6	USSR DX

CQ WW DX

ABOUT the time you fellows in the U. S. received this issue you will either be up to your neck in the c.w. "brawl" or just recuperating from a strenuous week-end.

Once again we request that you send in your logs *regardless* of your score.

Good photos of your station are also welcome, especially if you were thoughtful enough to take some action pictures during the contest period.

On the occasion of EL1C's visit home last summer. Front row, L. to R.—Andy W1GYE, Marty EL1C and a couple of refugees from the West Coast, John W6KFV/1 and Gordon K1MLI (ex-W6LER). Sneaking up in the back, W1WY, who else.

Claimed scores must reach me no later than the 15th of this month to make the February issue. And of course only those in the higher brackets will be used.

RSGB 21/28

Starts: 0700 GMT Saturday, December 2nd
Ends: 1900 GMT Sunday, December 3rd

The way the higher frequencies have been opening up of late, this could turn out to be a very interesting week end for the phone men (and YL's.) with a little bit of luck.

The October CALENDAR gave all the details. Mail your logs no later than December 18th to: The R.S.G.B. Contest Committee, New Ruskin House, Little Russell Street, London W.C.1, England.

OK DX

Starts: 0000 GMT Sunday, December 3rd
Ends: 1200 GMT Sunday, December 3rd

[*Continued on page 86*]

*Denote dates that have been officially announced. It will be noted that the s.s.b. DX Contest has been moved down to the last week-end in March this year.

PROPAGATION

George Jacobs, W3ASK
11307 Clara St., Silver Spring, Md.

LAST MINUTE FORECAST

The forecast indices for the month of December, shown in the Propagation Charts following the predicted times of openings, are expected to be related to day-to-day propagation conditions in the following manner:

Forecast Indices	Above Normal Dec 6-7, 28-29	Normal Dec 1-5, 8-14, 19, 25-27, 30-31	Below Normal Dec 15-16 20-21, 24	Disturbed Dec 17-18, 22-23
(1)	C	D-E	E	E
(2)	B	C-D	E	E
(3)	A	B-C	D-E	E
(4)	A	A	B-C	C-D

Where:

A—Excellent opening with strong steady signals.

B—Good opening, moderately strong signals, with some fading and noise.

C—Fair opening, signals fluctuating between moderately strong and weak, with moderate fading and noise.

D—Poor opening, signals generally weak, with considerable fading and a high noise level.

E—Opening very poor, or not possible.

General Conditions

THIS month's column contains DX Propagation Charts for December and January.

During December, daytime maximum usable frequencies are generally higher on circuits to most areas of the world than during any other month of the year. This is expected to result in 10 meter openings to many regions of the world during the daytime hours. The number of 10 meter openings this winter season, however, will be considerably fewer than during past winter seasons when sunspot activity was considerably more intense. The 15 meter band is also predicted to open to most areas of the world during the daylight hours, and on some circuits the band should remain open through the early evening hours. Good DX propagation conditions to one area of the world or another is forecast for the 20 meter band from shortly before sunrise until after sunset.

During December and the winter months there is a sharp *decrease* in both the static level and the intensity of ionospheric absorption. This, together with the rapid decline in solar activity, should result in a considerable improvement in DX propagation conditions on the lower frequency bands. The 40 meter band is forecast to open for DX during the early afternoon hours, and is expected to remain open to one area of the world or another through the hours of darkness, until shortly after sunrise. Eighty meters should open during the hours of darkness, with exceptionally strong signals on circuits to many DX areas. Some DX openings are also predicted for 160 meters during the hours of darkness.

A major meteor shower, the *Geminids,* is scheduled to take place December 10-13. During last year's Geminids shower, several record-breaking 2 meter openings took place in Europe, over distances in excess of 1200 miles, as a result of meteoric scatter propagation.

160 Meter Flash

The following information was received from Stu Perry, W1BB:

"The 1961/1962 160 meter DX season promises to be a dandy! Indicative of the improving conditions, W/VE 1.8 mc signals have been heard quite a number of times in England this summer, which is very unusual. Apparently propagation conditions are getting better, and we are in for a very interesting and exciting season on Top-Band.

"The Annual Transatlantic and World-Wide Top-Band 160 meter DX Tests will be held as usual, Sunday mornings, December 3 and 17, January 7 and 21, and February 4 and 18, from 0500 to 0730 GMT. During these test periods, special efforts will be made to contact European, Asian, African and other 160 meter DXers, throughout the world, for general DX-ing and particularly to also make observations and contribute data to a study of propagation conditions on this band as a warm-up for an expected International Quiet Sun Year (see September's PROPAGATION Column in *CQ*) program, being planned for 1964/1965 when 160 meter conditions are expected to peak. This annual 1.8 mc activity, since 1932 has been planned as a *Test* and not a contest. It is an unusual operating activity without competition.

DECEMBER 1961 & JANUARY 1962

TIME ZONE: EST

EASTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80* Meters
Western & Central Europe	8 A - 9 A (1) 9 A - 12N (2) 12N - 2 P (1)	7 A - 8 A (1) 8 A - 11A (3) 11A - 12N (4) 12N - 1 P (3) 1 P - 2 P (2) 2 P - 4 P (1)	6 A - 7 A (1) 7 A - 8 A (2) 8 A - 11A (1) 11A - 12N (2) 12N - 2 P (4) 2 P - 4 P (2) 4 P - 7 P (1)	3 P - 5 P (1) 5 P - 6 P (2) 6 P - 11P (4) 11P - 12M(3) 12M - 3 A(2) 3 A - 5 A(1) 6 P - 8 P (1)* 8 P - 12M(3)* 12M - 2 A(2)* 2 A - 4 A(1)*
Eastern Europe & Eastern USSR	8 A - 10A (1)	7 A - 8 A (1) 8 A - 10A (2) 10A - 12N (1)	7 A - 2 P (1)	5 P - 7 P (1) 7 P - 12M(2) 12M - 3 A(1) 7 P - 2 A(1)*
Southern Europe & North Africa	7 A - 9 A (1) 9 A - 11A (2) 11A - 1 P (1)	6 A - 7 A (1) 7 A - 8 A (2) 8 A - 11A (3) 11A - 12N (4) 12N - 1 P (3) 1 P - 2 P (2) 2 P - 4 P (1)	6 A - 7 A (1) 7 A - 8 A (2) 8 A - 12N (1) 12N - 1 P (2) 1 P - 2 P (4) 2 P - 3 P (3) 3 P - 6 P (2) 6 P - 9 P (1)	4 P - 6 P (1) 6 P - 7 P (2) 7 P - 8 P (3) 8 P - 11P (4) 11P - 1 A(2) 1 A - 4 A(1) 5 P - 7 P (1)* 7 P - 9 P (2)* 9 P - 11P (3)* 11P - 12M(2)* 12M - 2 A(1)*
South Africa	6 A - 9 A (1) 9 A - 11A (2) 11A - 1 P (3) 1 P - 2 P (2) 2 P - 4 P (1)	6 A - 10A (1) 10A - 12N (2) 12N - 3 P (3) 3 P - 5 P (2) 5 P - 7 P (1)	12N - 2 P (1) 2 P - 3 P (2) 3 P - 6 P (3) 6 P - 7 P (2) 7 P - 10P (1)	6 P - 10P (1) 7 P - 9 P (1)*
Eastern Mediterranean	8 A - 11A (1)	7 A - 8 A (1) 8 A - 11A (2) 11A - 1 P (1)	7 A - 10A (1) 10A - 1 P (2) 1 P - 4 P (1) 4 P - 6 P (2) 6 P - 7 P (1)	7 P - 11P (1) 8 P - 10P (1)*
Central Asia	NIL	8 A - 10A (1)	7 A - 10A (1) 7 P - 9 P (1)	7 P - 10P (1) 6 A - 8 A (1)
Southeast Asia	NIL	10A - 1 P (1) 6 P - 8 P (1)	7 A - 9 A (2) 9 A - 11A (1) 6 P - 9 P (1)	6 A - 8 A (1)
Far East	NIL	6 P - 8 P (1)	7 A - 9 A (2) 9 A - 11A (1) 6 P - 9 P (1)	5 A - 8 A (1)
Pacific Islands & New Zealand	12N - 3 P (1) 3 P - 6 P (2) 6 P - 8 P (1)	7 A - 9 A (1) 12N - 5 P (1) 5 P - 8 P (2) 8 P - 10P (1)	6 P - 8 P (1) 8 P - 10P (2) 10P - 6 A(1) 6 A - 7 A(2) 7 A - 9 A(3) 9 A - 11A(2) 11A - 1 P (1)	2 A - 5 A (1) 5 A - 7 A (3) 7 A - 8 A (2) 8 A - 9 A (1) 4 A - 5 A (1)* 5 A - 7 A (2)* 7 A - 8 A (1)*
Australia	10A - 12N (1) 4 P - 5 P (1) 5 P - 7 P (2) 7 P - 8 P (1)	9 A - 12N (1) 4 P - 6 P (1) 6 P - 8 P (2) 8 P - 10P (1)	6 A - 7 A (1) 7 A - 9 A (3) 9 A - 11A (2) 11A - 3 P (1) 8 P - 12M(1)	4 A - 6 A (1) 6 A - 8 A (2) 8 A - 9 A (1) 6 A - 8 A (1)*
South America	6 A - 8 A (1) 8 A - 12N (2) 12N - 4 P (3) 4 P - 5 P (2) 5 P - 7 P (1)	6 A - 7 A (1) 7 A - 10A (3) 10A - 2 P (2) 2 P - 3 P (3) 3 P - 5 P (4) 5 P - 6 P (3) 6 P - 7 P (2) 7 P - 9 P (1)	5 A - 9 A (2) 9 A - 2 P (1) 2 P - 4 P (2) 4 P - 6 P (3) 6 P - 8 P (4) 8 P - 10P (3) 10P - 2 A (2) 2 A - 5 A (1)	6 P - 7 P (1) 7 P - 8 P (2) 8 P - 3 A(3) 3 A - 5 A(1) 7 P - 8 P (1)* 8 P - 3 A(2)* 3 A - 4 A(1)*
McMurdo Sound, Antarctica	NIL	6 A - 7 A (1) 7 A - 9 A (2) 9 A - 5 P (1) 5 P - 7 P (2) 7 P - 9 P (1)	5 P - 8 P (1) 8 P - 10P (2) 10P - 1 A(3) 1 A - 3 A(2) 3 A - 7 A(1) 7 A - 9 A(2) 9 A - 11A(1)	11P - 5 A (1)

TIME ZONES: CST & MST

CENTRAL USA TO:

	10 Meters	15 Meters	20 Meters	40/80* Meters
Western & Central Europe	8 A - 11A (1)	7 A - 8 A (1) 8 A - 9 A (2) 9 A - 11A (3) 11A - 12N (2) 12N - 2 P (1)	7 A - 11A (1) 11A - 1 P (2) 1 P - 5 P (1)	3 P - 5 P (1) 5 P - 11P (2) 11P - 3 A(1) 6 P - 1 A(1)*
Eastern Europe & European USSR	8 A - 11A (1)	7 A - 12N (1)	7 A - 8 A (1) 8 A - 10A (2) 10A - 1 P (1)	6 P - 1 A (1) 8 P - 12M(1)*
Southern Europe & North Africa	8 A - 9 A (1) 9 A - 11A (2) 11A - 12N (1)	7 A - 8 A (1) 8 A - 10A (2) 10A - 11A (3) 11A - 12N (2) 12N - 2 P (1)	7 A - 10A (1) 10A - 11A (2) 11A - 12N (3) 12N - 2 P (2) 2 P - 8 P (1)	3 P - 5 P (1) 5 P - 6 P (2) 6 P - 11P (3) 11P - 1 A(2) 1 A - 2 A(1) 5 P - 7 P (1)* 7 P - 10P (2)* 10P - 1 A(1)*
Central Africa	8 A - 10A (1) 10A - 11A (2) 11A - 1 P (3) 1 P - 2 P (2) 2 P - 4 P (1)	7 A - 10A (1) 10A - 12N (2) 12N - 2 P (3) 2 P - 4 P (4) 4 P - 5 P (3) 5 P - 6 P (2) 6 P - 7 P (1)	12N - 2 P (1) 2 P - 4 P (2) 4 P - 6 P (3) 6 P - 7 P (2) 7 P - 12M(1)	6 P - 11P (1) 8 P - 10P (1)*
Eastern Mediterranean	NIL	7 A - 11A (1)	7 A - 9 A (1) 9 A - 11A (2) 11A - 5 P (1)	6 P - 10P (1)
Central Asia	NIL	7 A - 10A (1) 7 P - 9 P (1)	7 A - 10A (1) 7 P - 9 P (1)	6 A - 8 A (1) 7 P - 9 P (1)
Southeast Asia	NIL	10A - 1 P (1) 5 P - 7 P (1)	7 A - 9 A (2) 9 A - 12N (1) 6 P - 8 P (1)	6 A - 8 A (1)
Far East	5 P - 7 P (1)	4 P - 5 P (1) 5 P - 7 P (2) 7 P - 8 P (1)	6 A - 7 A (1) 7 A - 9 A (2) 9 A - 11A (1) 4 P - 7 P (1) 7 P - 8 P (2) 8 P - 9 P (1)	3 A - 9 A (1)
Pacific Islands & New Zealand	10A - 1 P (1) 1 P - 5 P (2) 5 P - 7 P (1)	7 A - 10A (1) 10A - 2 P (2) 2 P - 4 P (1) 4 P - 5 P (2) 5 P - 7 P (3) 7 P - 8 P (2) 8 P - 9 P (1)	5 P - 7 P (1) 7 P - 10P (2) 10P - 7 A(1) 7 A - 9 A(3) 9 A - 11A(2) 11A - 1 P(1)	11P - 1 A (1) 1 A - 6 A (3) 6 A - 7 A (2) 7 A - 9 A (1) 12M - 1 A (1)* 1 A - 6 A (2)* 6 A - 7 A (1)*
Australia	9 A - 11A (1) 3 P - 4 P (1) 4 P - 6 P (2) 6 P - 7 P (1)	7 A - 8 A (1) 8 A - 11A (2) 11A - 3 P (1) 3 P - 6 P (2) 6 P - 9 P (1)	6 A - 8 A (1) 8 A - 10A (2) 10A - 3 P (1) 7 P - 11P (1)	3 A - 5 A (1) 5 A - 7 A (3) 7 A - 8 A (2) 8 A - 9 A (1) 4 A - 5 A (1)* 5 A - 7 A (2)* 7 A - 8 A (1)*
South America	6 A - 8 A (1) 8 A - 10A (2) 10A - 2 P (3) 2 P - 4 P (4) 4 P - 5 P (3) 5 P - 6 P (2) 6 P - 7 P (1)	6 A - 7 A (1) 7 A - 10A (3) 10A - 1 P (2) 1 P - 3 P (3) 3 P - 5 P (4) 5 P - 6 P (3) 6 P - 7 P (2) 7 P - 8 P (1)	2 P - 4 P (2) 4 P - 5 P (3) 5 P - 7 P (4) 7 P - 10P (3) 10P - 2 A(2) 2 A - 5 A(1) 5 A - 8 A(2) 8 A - 2 P (1)	6 P - 7 P (1) 7 P - 8 P (2) 8 P - 3 A(3) 3 A - 5 A(1) 7 P - 8 P (1)* 8 P - 3 A(2)* 3 A - 4 A(1)*
McMurdo Sound, Antarctica	NIL	6 A - 7 A (1) 7 A - 9 A (2) 9 A - 4 P (1) 4 P - 6 P (2) 6 P - 8 P (1)	4 P - 8 P (1) 8 P - 9 P (2) 9 P - 12M(3) 12M - 2 A(2) 2 A - 7 A(1) 7 A - 8 A(2) 8 A - 10A(1)	12M - 6 A (1)

TIME ZONE: PST

WESTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80* Meters
Western & Central Europe	7 A - 9 A (1)	6 A - 7 A (1) 7 A - 9 A (2) 9 A - 11A (1)	2 A - 7 A (1) 7 A - 10A (2) 10A - 2 P (1)	4 P - 11P (1) 6 P - 9 P (1)*
Eastern Europe & Eastern USSR	NIL	7 A - 9 A (1)	6 A - 8 A (1) 8 A - 10A (2) 10A - 1 P (1)	5 P - 11P (1)
Southern Europe & North Africa	7 A - 10A (1)	6 A - 7 A (1) 7 A - 9 A (2) 9 A - 11A (1)	6 A - 7 A (1) 7 A - 9 A (2) 9 A - 11A (3) 11A - 12N(2) 12N - 2 P (1)	4 P - 6 P (1) 6 P - 9 P (2) 9 P - 12M(1) 6 P - 10P (1)*

TIME ZONE: PST, Con't.

WESTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80* Meters
South Africa	6 A - 8 A (1) 8 A - 10A (2) 10A - 1 P (1)	6 A - 8 A (1) 8 A - 10A (2) 10A - 12N (3) 12N - 2 P (2) 2 P - 5 P (1)	11A - 1 P (1) 1 P - 3 P (2) 3 P - 5 P (3) 5 P - 6 P (2) 6 P - 8 P (1)	6 P - 9 P (1) 7 P - 8 P (1)*
Eastern Mediterranean	NIL	7 A - 9 A (1)	6 A - 7 A (1) 7 A - 9 A (2) 9 A - 11A (1)	6 P - 9 P (1)
Central Asia	NIL	9 A - 11A (1) 4 P - 7 P (1)	9 A - 11A (1) 5 P - 8 P (1)	5 A - 7 A (1)
Southeast Asia	3 P - 6 P (1)	9 A - 11A (1) 3 P - 4 P (1) 4 P - 6 P (2) 6 P - 7 P (1)	8 A - 9 A (1) 9 A - 11A (2) 11A - 12N (1) 6 P - 9 P (1)	3 A - 5 A (2) 5 A - 9 A (1) 4 A - 6 A (1)*
Far East	2 P - 5 P (1)	1 P - 3 P (1) 3 P - 5 P (3) 5 P - 6 P (2) 6 P - 7 P (1)	8 A - 10A (1) 1 P - 2 P (1) 2 P - 5 P (2) 5 P - 6 P (3) 6 P - 7 P (2) 7 P - 8 P (1)	10P - 12M (1) 12M - 6 A (3) 6 A - 8 A (2) 8 A - 10A (1) 12M - 2 A (1)* 2 A - 6 A (2)* 6 A - 8 A (1)*
Pacific Islands	9 A - 10A (1) 10A - 12N (2) 12N - 4 P (1) 4 P - 6 P (2) 6 P - 7 P (1)	9 A - 12N (3) 12N - 4 P (2) 4 P - 6 P (4) 6 P - 7 P (2) 7 P - 9 P (1)	7 A - 8 A (1) 8 A - 10A (2) 10A - 5 P (1) 5 P - 7 P (2) 7 P - 8 P (3) 8 P - 9 P (2) 9 P - 2 A (1)	9 P - 10P (1) 10P - 11P (2) 11P - 5 A (3) 5 A - 7 A (2) 7 A - 9 A (1) 10P - 11P (1)* 11P - 5 A (2)* 5 A - 7 A (1)*
Australia	11A - 2 P (1) 2 P - 5 P (2) 5 P - 7 P (1)	8 A - 12N (2) 12N - 4 P (1) 4 P - 6 P (2) 6 P - 8 P (1)	7 A - 8 A (1) 8 A - 10A (2) 10A - 12N (1) 5 P - 7 P (1) 7 P - 9 P (2) 9 P - 2 A (1)	2 A - 5 A (1) 5 A - 7 A (3) 7 A - 9 A (1) 4 A - 5 A (1)* 5 A - 6 A (2)* 6 A - 8 A (1)*
South America	7 A - 9 A (1) 9 A - 12N (2) 12N - 3 P (3) 3 P - 4 P (2) 4 P - 5 P (1)	6 A - 7 A (1) 7 A - 12N (2) 12N - 2 P (3) 2 P - 4 P (4) 4 P - 5 P (3) 5 P - 6 P (2) 6 P - 7 P (1)	2 P - 4 P (2) 4 P - 5 P (3) 5 P - 7 P (4) 7 P - 9 P (3) 9 P - 2 A (2) 2 A - 5 A (1) 5 A - 7 A (2) 7 A - 2 P (1)	6 P - 8 P (1) 8 P - 12M (3) 12M - 1 A (2) 1 A - 3 A (1) 7 P - 8 P (1)* 8 P - 10P (2)* 10P - 2 A (1)*
McMurdo Sound, Antarctica	NIL	6 A - 7 A (1) 7 A - 9 A (2) 9 A - 4 P (1) 4 P - 7 P (2) 7 P - 8 P (1)	5 P - 7 P (1) 7 P - 8 P (2) 8 P - 12M (3) 12M - 2 A (2) 2 A - 6 A (1) 6 A - 8 A (2) 8 A - 9 A (1)	12M - 5 A (1)

FORECAST INDICES

Circuits shown in the Propagation Charts are forecast to open:

(1) Less than 7 days during each month.

(2) Between 8 and 13 days during each month.

(3) Between 14 and 22 days during each month.

(4) For more than 22 days during each month.

The reception quality expected during openings (signal strength and fading levels), as well as the specific days that each circuit is likely to open, are shown in the "Last Minute Forecast" appearing elsewhere in this column.

*Indicates predicted 80 meter openings. The 160 meter band is likely to open during those times when 80 meter openings are rated (2) or better.

A - A. M. P - P. M. N - Noon M - Midnight

The CQ DX Propagation Charts are based upon a CW effective radiated power of 150 watts at radiation angles lower than thirty degrees. The Eastern USA Chart can be used in the 1, 2, 3, 4 and 8 amateur call districts; the Central USA Chart in the 5, 9 and 0 districts, and the Western USA Chart in the 6 and 7 districts. The Charts are valid through January 31, 1962. Propagation forecasts contained in these Charts are derived from basic ionospheric data published by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

W/VE stations will call "CQ DX TEST" the first five minutes of each hour, and each alternate five minutes thereafter. Listening is conducted during the second five minute period and each alternate period after that, unless working or hearing DX. DX stations will use the opposite periods for transmitting and listening. When DX is coming through, QSO regardless of the time periods. Most W/VE stations east of the Mississippi River will operate in the 1800- 1825 kc segment of the band, while a few may operate near 2000 kc. DX stations should watch the latter frequency carefully for unusual and choice USA contacts. W/VE stations should send their reports for the Tests to W1BB, 36 Pleasant Street, Winthrop, Mass., for tabulation. Test participants in the U.K. should report to G6QB, L. H. Thomas, DX Editor, *Short Wave Magazine*, 186 Winchelsea Road, Hastings, Sussex, England. Other DX can send reports to either W1BB or G6QB.

"W1BB will award special certificates to all DX stations working him on 160 meters, and to DX SWLs who send seven verified reports of W1BB's signals.

"Working DX on 160 is challenging, extremely interesting, and can produce valuable propagation information. Conditions such as static, BC harmonics, QRM, Loran, QSB, noise, low power, etc., all require extreme patience, perseverance, top-notch station, and above all, an A-1 operating ability. There are many *firsts* yet to be made on 160 meters, and many unusual conditions to observe and cope with. On 160, one can renew the thrill of early radio amateur pioneer days when hams were relegated to "200 meters down". It was on this band that Paul Godley made the *first* Atlantic crossing via amateur radio. In addition, you will make many friends among the finest and most sincerely devoted hams you would ever care to meet; those "Top-Band" boys.

"Join in the fun, get those long wire antennas up high and strong for the winter months. Check your receivers and transmitters for best performance. Mark your calendar for the Test periods, and store up a little extra rest for those wee small hours when 160 is at its best."

Sunspot Cycle

The Zurich Solar Observatory reported a monthly mean sunspot number of 64 for September 1961. This results in a 12 month running smoothed sunspot number, upon which the solar cycle is based, of 68 for March 1961. The present sunspot cycle continues to decline at a steady rate. A smoothed sunspot number of 52 is predicted by *CQ* for December 1961. Next month's column will contain an updated plot of the present sunspot cycle, and a revised forecast for solar activity expected for 1962.

The Sunspot Story

Looking for a last minute Christmas gift—then why not buy a few copies of *The Sunspot Story, Cycle 19; The Declining Years,* to give to your radio amateur or SWL friends? There are just a few hundred copies left of this popular and timely article which *CQ* has had reprinted and bound into booklet form. The 28 page booklet contains the entire Jacobs-Leinwoll report on ionospheric propagation conditions in general, sunspot behavior and its influence on the various amateur bands, a sunspot cycle forecast for the remainder of the present cycle, and a band-by-band propagation

[*Continued on page 94*]

sideband sideband sideband

SIDEBAND

IRV and DOROTHY STRAUBER,
K2HEA/K2MGE
12 ELM STREET, LYNBROOK, NEW YORK

SSB DX HONOR ROLL

TI2HP	254	K6ZXW	201
VQ4ERR	249	W3MAC	201
W8EAP	246	W5KFT	201
W8PQQ	242	W1OOS	200
W6UOU	241	WØCVU	200
PY4TK	234	W3LMA	193
HB9TL	227	W1LLF	189
W3NKM	226	K2JFV	185
W2ZX	225	WØUUV	185
WØQVZ	225	W3KT	179
K2MGE	221	W2YBO	177
VK3AHO	220	W2VCZ	175
W6PXH	219	WA6EYP	175
W6RKP	219	W2HXG	175
W6BAF	215	K1IXG	166
W6WNE	213	K6MLS	165
W5AFX	211	G2BVN	163
MP4BBW	208	K2HEA	162
K4TJL	207	W3CGS	157
K8RTW	206	G8KS	155
ON4DM	205	DL1IN	155
W4OPM	202	UR2AR	154
W2FXN	201	W1ORV	152
W5IYU	201	PJ2AA	152
G3AWZ	201	G6LX	151

CQ SSB STICKERS AND CERTIFICATES

Worked 50
HS1B
W8QNW
W3OCU
K4VQP
K9BLX
WA2FQG
WA6MAZ
WA2EOQ
G3AWZ
UC2AA
K7GCM
K3BNS
KA2RJ

Worked 75
K3COW
KØTJW
DL1PM
K9WUR
K5AWR
G3WW
G3AWZ
UC2AA

Worked 100
K8LSG
K4AJ
LA3SG
EA8CT
K6QDD
OE3ME
DL4NQ
HZ1AB
GW3AHN
G3AWZ
W6USG
SM5UF
OH2HN

Worked 125
G3NUG
G3KHE
K4AJ
WA6EYP
W1UOP
G3AWZ
OZ7FG
WA6HOH
XE1CV

Worked 150
K4PUS
G3NUG
W3CGS
K4JEY
G6LX
G3DO
G2BVN
K4AJ
WA6EYP
W1UOP
G3AWZ
PJ2AA

Worked 175
K2JFV
WØUUV
W1LLF
W3LMA
W2YBO
WA6EYP
W2HXG
G3AWZ

Worked 200
MP4BBW
WØCVU
K6ZXW
W3MAC
G3AWZ
W5KFT
K8RTW

Worked 225
W2ZX
VQ4ERR
WØQVZ

Worked 250
TI2HP

An Open Letter to K5 - - -

WE haven't spoken directly yet since you're still on a.m. but we were listening to you bemoan the fact, the other night, that the sidebanders are using "too many frequencies." Your argument was that "since s.s.b. signals are narrow, why do they need so many frequencies?"

We think you ought to know some of the background of s.s.b. in order to understand the answer. Sideband has been on the increase ever since the first amateur s.s.b. stations opened up about 12 years ago; the rate of increase has been geometric and meteoric!! From a few kc on 75 and 20 meters, the sideband portions of the phone bands have been expanded by an increasing number of sideband stations until a recent ARRL poll shows that they comprise 66⅔% of 20 meter phone and about 50% of 75 and 15 meter phone. Keeping these percentages in mind, take a look at the frequencies being used on these bands. You will admit that s.s.b. uses about 50% of 20 meter phone frequencies, about 25% of the 15 meter phone band and it's anybody's guess about 75 meters since there is so much intermingling of a.m. and s.s.b. Logically it follows that s.s.b. is not using as much of the phone band in each case as the percentages indicate it should; in other words, we are not using "so many," but relatively fewer frequencies for the number of stations presently occupied in enjoying ham radio as they never did before.

If anything points up one of the superior aspects of s.s.b., that is the ability of the narrow s.s.b. signals to perform well in spite of the overcrowding. It is this ability of the narrow s.s.b. signals that has prevented s.s.b. from bursting its boundaries long ago and taking over more of the phone bands.

We could go on at length about s.s.b., but we'll leave the rest of it for another time. We would like to suggest that you try what many former a.m. operators have done and this is to join some of the s.s.b. roundtables. If you accurately "zero beat" the frequency, no one will know that you are on a.m. until it's too late and you will find the change refreshing!!

A long time favorite is Alfred, DJ4WN, shown with his pets; Whiskey and Nancy, named for the phonetics used in his call. Alfred's fine signal emanates from Heidelberg and as a well-traveled ham, Alfred is personally known and admired throughout the world.

Tunting? Just like c.w., but take it slow.

Come on in, you can't be first, but don't you be last!!

Whip Switching Mobile

If you are fortunate enough to own a KWM-2, you probably are not enjoying one of the minor features included at no extra charge with each unit. That is the switching capability which enables you to automatically select any one of several antennas automatically. A look at the manual will reveal that there is a socket at the rear of the unit which provides the proper connections for the relays needed to select the proper antenna. The bandswitch on the front of the unit provides the control and as you switch from band to band, you can control the proper relay. It can provide a convenient method of antenna control in your shack and a real convenience if you are a multi-band mobile.

For the past several months we have been making use of this facility and thought we'd pass it along for whatever it's worth. With 20 meters "so-so" in the early hours when we must make our way through traffic to the big city, we have been putting in some time on 40 meters from the mobile which is a real fine band for the low powered mobile at that time of day. However, having to make a physical change of whips, even with quick-on connectors, can be rough especially on a highway or in traffic. So we took the easy way out and mounted both the 40 *and* 20 meter whips on the car with a 6 volt d.c. relay to switch between the two whips.

The cable harness in the back of the rack is wired for the relays and the 6 volts d.c. is supplied by the 6.3 volt jack on the KWM-2 itself. You need not worry about battery drain as the relay is energized only when the M-2 is turned on.

The convenience of automatic antenna selection really pays off when the weather is bad; let it rain—let it snow—you're in the driver's seat!!

Eric, K5OGP, is one of Albuquerque's most ardent sidebanders. Although he complains about the difficulty of working DX from New Mexico, Eric manages to consistently send in more and more confirmations.

Here is Russ, DL4BS, of Darmstadt, Germany, who was the first DL4 to receive CQ's WAZ award.

Getting The Right Start On Sideband

To continue last month's discussion of 20 meter DX operation, we have several important points which we would like to make. Very often, when a station is heard working a rare new one, the tendency is for other stations to call in and ask for assistance in making the contact. This applies to all sidebanders whether here in the States or out of the country. Most stations are only too willing to cooperate in this matter of passing on a call but bear one thing in mind—don't ask for help in making a contact and don't call the rare DX station unless you can hear him sufficiently well to make the contact on your own. As several stations have pointed out to us, nothing is more futile or time-wasting than asking rare station "X" to listen for station "Y" when "Y" is not even hearing "X." This is really one of the most ridiculous aspects of chasing DX. And just to prove the point, some stations have deliberately come on the band, calling a ficticious call or a rare DX friend whom they knew for a fact was not on the air. To their amazement, they were soon joined on the frequency by a host of others, also calling the non-existent station!

Common sense should be employed when a large group is trying to work a certain station. Time is of the essence, band conditions are erratic, and each station feels that his making the contact is just as urgent as does the next one. The *only* information that is required is the exchange of calls and the exchange of reports. Do not waste time with your name, your location, your rig, or your weather!

The gabbers are bad enough but there is probably nothing more infuriating in a pile up than to have someone muscle his way in, not to work a new country as so many others are trying to do, but to show off that he has already worked the station before and therefore must choose a crucial moment to thank him for the confirmation! Let's be reasonable; before too long, the rare station will have satisfied most of the demands for his contact, the pressure will be off, and there will be ample time for ragchews and "thanks for your QSL, OM."

Speaking of QSLs, it should be borne in mind that the sending of confirmations is a

The Isle of Man boasts of several fine sideband operators, among them, Tom, GD3ENK. Tom is quite active on 20 meters and always a pleasure to contact.

major expense of working DX. The easier and less expensive it is made for the station from whom you wish a card, the more successful you will be. To be almost certain of receiving a confirmation, send your card (correctly made out as to date and time in GMT); include a self-addressed envelope plus IRCs, cash, or stamps of the country (these easily obtained from W2SAW's excellent stamp service, and personalize your contact by writing a brief note of thanks and enclosing a photograph of yourself or the shack or some other item of interest like a map of your area. If, after a reasonable period, you get no response, you might assume that the station is out of QSL cards and you can try another tack. Send him a card printed or typed with space for the necessary QSL information, his call, and his signature, and, of course, sufficient return postage. If this doesn't work, then you've run afoul of one of those unique hams who does not subscribe to the popular theory that "a QSL is the final courtesy of a QSO" and you've just got to keep on trying until you break down his resistance.

There are many practices in working sideband DX, some of them admirable and others to be shunned like the plague! One of the more frequent and effective is called "tailending" which means that, as there is a changeover of transmissions, you slip in your call quickly and immediately following the identification given by one or the other of the stations. In other words, as W2XXX turns the transmission back to XW8XX, you quickly state your call (just once) before XW8XX has a chance to reply. If you are heard, the rare station will acknowledge and usually stand by for you when he has finished his present contact. But be sporting. If there is a long list waiting, take your turn and don't keep calling and calling while a QSO is in progress. That this has been done (and, unfortunately, often with the desired result of being recognized) is a difficult situation for everyone. Naturally, it encourages other stations to interfere with a contact, antagonizes everyone else on the frequency, and gives the offender an advantage which he does not deserve. The handling of this matter distinguishes a good DX station from a poor one. If the DX station refuses to allow "contact hogs" to disrupt the proceedings, the practice is soon discontinued. If he does not, even the best DX operators forget their scruples and employ whatever means are indicated to make the contact. You must use your own common sense and examine your own conscience!

Well, we never did get to discussing sideband operation on other bands in this column but check us next month.

Deep Freeze 62 Aeronautical Mobile Award

Deep Freeze 62 Aeronautical Mobile Award, to be issued for contacts with any three of the listed stations operating mobile or aeronautical mobile during September thru December 1961 in support of Operation Deep Freeze. The route extends from Greenville S.C., via California, Hawaii, Canton Is., Fiji Is. and Christchurch N.Z. into the Antarctic.

Operation will be on SSB and CW, mixed contacts are permissable. The frequencies to watch are 14320 and 21420 s.s.b., 14020 and 21020 c.w. The stations to look for are: K1PZI Chuck; W1DBN Eloy; K4CKJ Mac; W4BCX Cal; W4SAL Ted; W4SJU Mac; W4RBF Gene; W4WQP Ted; W4YEI Jim; and W8ESY Harmon.

Send log data only, with your QSL's to the three stations worked to:

Eloy Marez W1DBN/4
38 Foxhall Rd
Greenville, S.C.

There is no charge to DX stations. US applicants can include, on a voluntary basis, enough stamps to cover whichever type of mail service they desire.

Sideband Around The World

HS5OSQ and XW8AS are both operated by Clay who makes frequent trips to Laos to share s.s.b. honors with Phanh, XW8AL . . . The boys from Aden put on an excellent s.s.b. and c.w. show from the Kamaran Islands in October with VS9APH, VS9AAC, VS9AGA, G3NAC, and G3GJQ sharing the honors . . . The first regular station on s.s.b. from Liechtenstein is HE9LAA. There had been several DXpeditions to the tiny country but it's nice to know that we may expect consistent activity from there from here on in . . . Steve, K2CJN, renewed many friendships during his recent trip to Europe as did Willard, W3DQ, and his charming wife, Seedy, who enjoyed visiting her relatives in Sweden. We caught up with the Wilsons at the shacks of Goran, SM6SA and what a signal that man puts out! . . . We hope that Bob, VE1NH, is recuperating rapidly from the attack that put him into a Cape Bretton Island hospital in September. Bob is a special Canadian favorite of the W/K sideband gang

. . . Rumor has it that Peter, ZD3P, was headed for Bahrein Island while Colin, AP2CR/GW3-JET, might next be heard from Malaya . . .

If we understood correctly, Ian, ZL4JF, is now back on Campbell Island, this time with an s.s.b. rig and a 75S-1. Oh, for better conditions to the Pacific! . . . Here's good news about yet another DXpedition, this time to Aves Island where the call will be YVØAA. YV5AFF who passed along the information, will be one of the operators and she told us that there will be at least two operators for each mode, s.s.b., c.w., and a.m. Their planned frequencies will be 14.270, .281, .294, .304, and .314 . . . Sorry to disappoint you all, but Dan, YO3ZA, in Bucharest, Roumania, is on double sideband and therefore his QSLs do not count for the *CQ* sideband awards . . . A particularly outstanding contact was held with Nick, HB9VP, who is a sophomore at the University of Zurich, following a year's schooling at St. Paul's Academy in Minnesota. We had a lively discussion about the differences in European and American students and learned a great deal, all very interesting . . . Joe, OZ7JV, gets as much signal out of 50 watts as most of us get from 1 kw. Just goes to prove that a good location and a good antenna makes the big difference . . . One night, while CQing on a very quiet 20 meter band, we were startled to receive a call from VP5BL — the original VP5BL, not the DXpeditioneers — who sounded like a local. Vin seemed most happy to be on sideband and we have no doubt that he will be one of its most popular operators.

Band Hopping

Curt, W8FYR and Lill, W8FYT, enjoyed a most pleasant week mobiling from their home in Dayton to Naples, Florida, with stops enroute to meet their many ham friends. Curt is "Mr. Cesco" and well known in the world of amateur radio . . . K6VFE is Sister Charlotte of Fresno, California; the evening we heard her booming through, she was listing contacts in rapid fire order . . . Lou, "The Baron", K4DY, is enjoying Florida more and more as he gets to know the Pompano Beach sidebanders better. With Gene, K4KXP; Les, K4HWF; and John, W4-SYR, and the fact that his 2 meter buddies are now all on sideband, "The Baron" is having the time of his life . . . Warmest congratulations and best wishes to Dave, W2PF, and Norm, W4SN, who re-entered the happy state of matrimony in early Fall . . . Phil, W2-JRE/4, bought a lovely home on a Florida island and we hope that he, Lily, and the children enjoy their new life . . .

Who will ever forget his excitement and enthusiasm when Rene, OE1RZ, made his first appearance on sideband? Here is Rene, with his charming XYL, Anita, and their little daughter, Marlina, in Rene's shack in Vienna. Since the photograph was taken the family has welcomed a new addition, Hans Christian.

Thanks to Rudy, DL3DW, whose round-the-world trip took him to many ham shacks, it's a rare treat to bring you a picture of Dr. Lee, 9M2GA and his family and their friends. Front, l. to r., XYL of 9M2GA; Rudy, DL3DW; unidentified YL; Barbara, XYL of VS1GQ. Back row, l. to r., Dr. Lee, 9M2GA; 9M2DW; VS1GQ. The youngsters in the foreground are the Jr. Ops of Dr. Lee and his XYL.

The Southwestern amateurs were all praising the efforts of Harriett, K5BJU, in handling traffic for the Hurricane Carla disaster. Of course, many hams pitched in and did their usual fine job but we understand that Harriett was outstanding. So outstanding, in fact, that the Communications Company of the Houston Sheriff's Dept., headed by Bernie, W5YVJ, made Harriett the first XYL ever to be deputized in their group. At a surprise dinner, Harriett was presented with her own badge in appreciation of her fine work. The members of the Company were mobile in one of the disaster areas for two days and provided the necessary communication for the Navy, Red Cross, etc. Our hats are off to these and all amateurs who participated in this worthy undertaking.

Meade, KL7DIR, was happy to inform us that Dick, WØMLY, received "All Alaskan Counties Award" Certificate No. 1, endorsed for Class III A — s.s.b. 20 meters. Congratulations to Dick.

As we come to the end of another year and another festive Holiday Season, let us wish you the joys of Christmastide, Peace on Earth, Good Will toward Man.

73, Irv and Dorothy

Space Communications

GEORGE JACOBS, W3ASK
11307 CLARA STREET,
SILVER SPRING, MARYLAND

UNFORTUNATELY, Project OSCAR continues to be snarled in red-tape. The hoped for mid-September launching of the amateur radio satellite did not materialize. Although Government approval for the project *has* been given, the present delay in launching seems to be caused by difficulties arising in trying to find a suitable space program with which the OSCAR payload can ride piggyback into orbit. At deadline time (late October), it appears as if OSCAR will not be launched until either mid-November or early December.

Meanwhile, the OSCAR project has been greeted with a great deal of enthusiasm both in this country and abroad. Stories about the amateur radio satellite have appeared in the technical press throughout the world, including the *Telecommunication Journal*, the official organ of the International Telecommunication Union, and even the distinguished *Times* of London recently devoted several paragraphs to OSCAR.

The Project Oscar Association, the group of radio amateurs coordinating the program, reports that hundreds of radio amateurs in almost every corner of the globe have indicated they plan to track the OSCAR payload once it is in orbit, by monitoring the HI transmissions from the satellite's beacon transmitter on 145 mc, in the internationally allocated 2 meter amateur band. Since the green light for OSCAR's launching may be given on very short notice, keep tuned to W1AW for latest information. Once in orbit, tracking and other technical data will be broadcast on W1AW and on the SPACEWARN broadcasts of the COSPAR (see transmission schedule appearing elsewhere in this column). News concerning Project OSCAR will also be featured on the weekly Radio Amateur Notebook programs of the Voice of America.

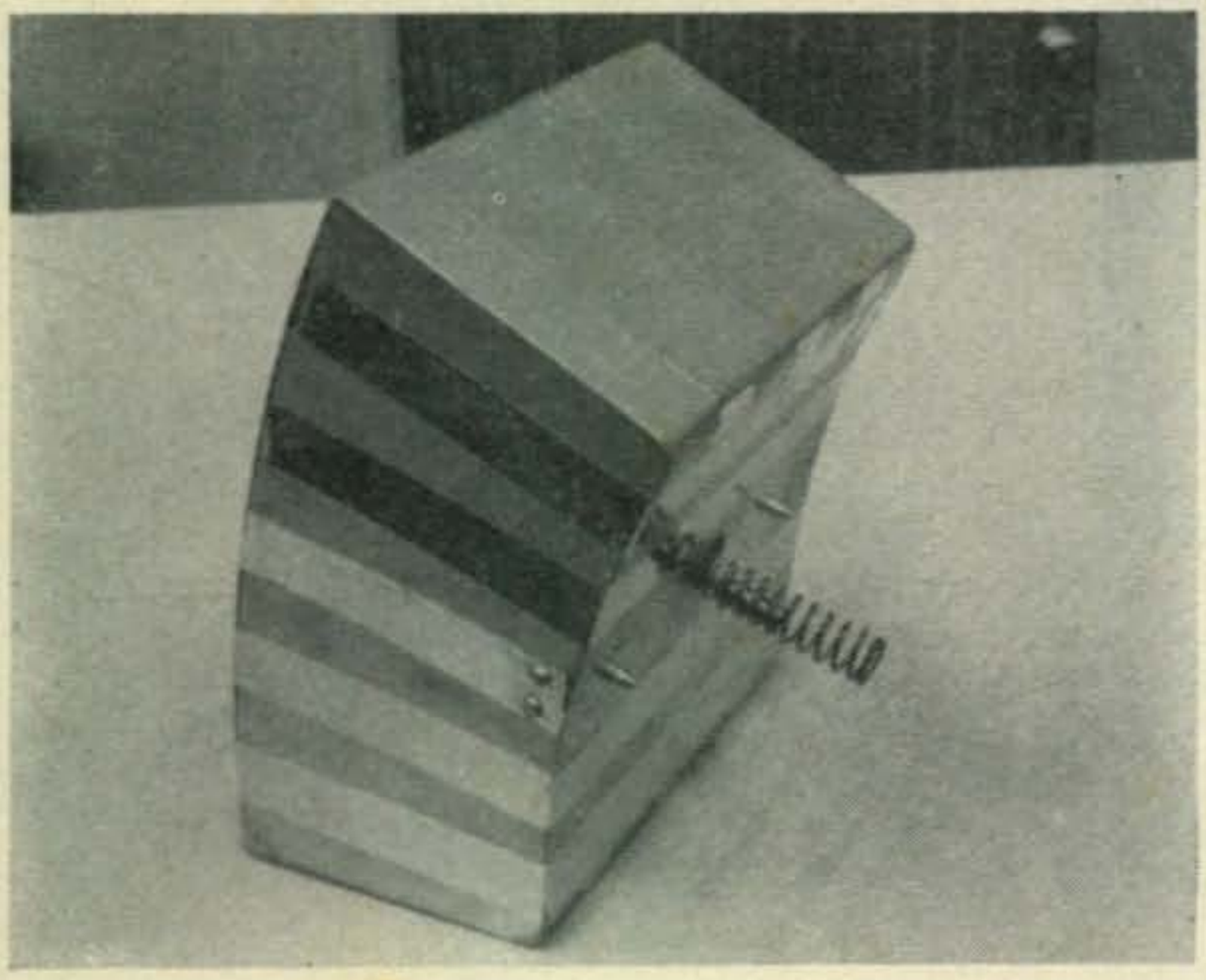
The main purpose of the OSCAR project is to demonstrate that today's radio amateur is capable of producing results of a useful scientific nature. To be fully successful, this program demands the participation of radio amateurs in all corners of the world. Complete information concerning participation in the OSCAR program appears on pages 77-79 in October's *CQ**. Information and sample signal report forms can also be received directly from the Project Oscar Association, P.O. Box 183, Sunnyvale, California, or from the American Radio Relay League, West Hartford 7, Conn.

COSPAR Spacewarn Broadcasts

The Committee On Space Research of the Council of International Scientific Unions (COSPAR) is an international scientific body responsible for the coordination of rocket and satellite projects on a world-wide basis. The U.S. National Academy of Sciences participates in the work of the COSPAR on the behalf of the United States.

Through the cooperation of the Voice of America, special space news broadcasts prepared by the COSPAR are transmitted on shortwave six days a week (Monday through Sat-

*A correction should be made in these instructions concerning the accuracy of timings. All time entries must be accurate to within plus or minus *one second* instead of the "ten seconds" or the "few seconds" mentioned in the instructions.



Here's one of the first close-up photos to be published showing the Project OSCAR payload as it was being prepared for a fall launching. The gold-plated rectangular bird contains a 100 milliwatt beacon transmitter which will operate on 145 mc in the 2 meter amateur band. The exterior is covered with a special aluminum foil which will act as a thermal control medium in space.

urday) from 10:30 to 10:35 PM Eastern Standard Time. These broadcasts contain the latest information (including orbital data and radio frequencies) on new satellite launchings, and up-to-the minute revised statistics on satellites already in orbit.

While intended mainly for tracking stations and scientific organizations in Central and South America, the broadcasts should be received well in many other areas of the world, especially if a good communications receiver is used.

The programs are in English, and are called SPACEWARN broadcasts. They should prove of interest to anyone desiring latest launching and orbital information concerning Project OSCAR (once it is in orbit), as well as other earth satellites. The following schedule for the SPACEWARN broadcasts will be in effect from November 6, 1961 through March 3, 1962, Monday through Saturday, 10:30-10:35 PM EST:

WLWO	15290 kc
WBOU	11830 kc
WDSI	11790 kc
WLWO	9525 kc

Space Frequency Info

According to reports received from satellite-monitoring radio amateurs, and from public information released by the National Aeronautics and Space Administration, transmitters on the following twelve satellites were still in operation during late October.

Name	*Period* (Minutes)	*Frequency* (Mc)	*Modulation*
Vanguard I	134	108.022	Continuous carrier.
Explorer VII	101	19.9904	A.m. carrier, with 4 f.m. sub-carriers.
Tiros I*	99	107.997	Frequency Modulation.
Transit II-A	102	108.06, 162 & 216	Continuous carrier, exceptionally high frequency stability.
Courier 1B	107	107.971	Frequency Modulation.
Tiros II	98	108.0 & 108.03	Frequency Modulation.
Explorer XI	108	108.058	Phase Modulation.
Tiros III	100	108.0 & 108.03	Amplitude Modulation.
Transit IV-A	107	52, 162, 216 & 324	Continuous carrier, exceptionally high frequency stability.
Injun**	104	136.5	Amplitude Modulation.
Greb III**	104	108.09	Tones, Amplitude Modulated.
Explorer XII	1593	136.02	Wideband Phase Modulation.

TSX Communication Satellite[1]

As reported in last month's column, the National Aeronautics and Space Administration plans to orbit no fewer than 5, and possibly as many as 10, experimental communication satellites during 1962. These will range in types from low altitude relays (Projects TSX and RELAY), to a high altitude stationary satellite (Project SYNCOM, which was discussed in detail in last month's column), and will also include at least one passive reflector (Project ECHO II). This month, the TSX project will be discussed in detail, with next month's column being devoted to Project RELAY.

Signing of a contract with the American Telephone & Telegraph Co. for development and testing of an experimental low altitude active communication satellite system was announced recently by the National Aeronautics and Space Administration. This marks the first action in the field of space communications which involves joint responsibility between private industry and government.

Under the terms of the agreement, AT&T will design and build *four* identical communication satellites, two of which will be launched by NASA during 1962, and the other two will be held in reserve for backup purposes. AT&T's satellites, designated TSX, will be designed and built entirely at the firm's expense, and AT&T will also reimburse the space agency for the costs of the facilities and services which NASA will furnish in connection with the project. These will include Thor-Delta launch vehicles, launching and tracking facilities, range and launch crew services, and telemetry and spacecraft acquisition information received by the government's Minitrack tracking network.

Plans call for two launchings from the Cape Canaveral, Florida missile range during the coming year, one in April and one in October. Backup shots may also be fired in June and December. Reimbursable costs to the government will amount to approximately $6,000,000 per launch.

According to information released by NASA, the TSX satellites will be spherically-shaped and will weigh about 125 pounds each. Each satellite will be placed into an elliptical orbit which will carry it on a path between 600 and 3,000 miles above the earth's surface. Inclination to the equator will be 45 degrees.

Signals will be beamed from ground transmitting stations to the TSX active communication satellite on a frequency of 6390 mc. A single transponder and a 3 watt traveling wave tube aboard the satellite will relay signals to ground receiving stations on a frequency of 4170 mc. A frequency of 4080 mc will be used for tracking purposes. The relay equipment within the satellite will have an information bandwith of 8 mc and will be capable of handling wideband transmissions, including television. Power for the satellite-borne electronic equipment will be supplied by both solar cells and nickel-cadmium storage batteries. A frequency in the 133-137 mc band will be used for Telemetery and general "housekeeping."

*The transmitter on Tiros I was designed to be shut off from the ground. Efforts to silence it, however, have so far been unsuccessful.

**Injun and Greb did not separate from each other as planned, and are now orbiting together.

[1]At press time, it was announced that the Project has been changed from TSX to Project TELSTAR.

AT&T ground facilities at Rumford, Maine and Holmdel, New Jersey will beam and receive signals from the TSX satellites using specially designed self-tracking 60 foot horn antennas. Ground transmitting stations will have a power of 3 kilowatts. NASA has reported that agreements have been made with Great Britain and France for participation in the TSX experiments. Both countries are developing large facilities for use in the project, Britain with an 85 foot dish antenna and France with a 60 foot horn. Wideband communication experiments between the U.S. and England and France—television, two-way telephone, radio and telegraphy—are expected to be carried out early in the project. Other countries plan to join in the experiments later, with Germany, Brazil, Argentina and Italy already expressing serious interest in the TSX satellites.

In addition to the communication relay equipment, aboard each TSX satellite will be scientific instruments which will measure radiation damage to solar cells and other solid state components as it passes through the lower Van Allen belt. The Van Allen belts are two doughnut-shaped belts of high energy charged particles trapped in the earth's magnetic field. The lower belt, about 1,000 miles thick, rings the earth and is centered at an altitude of about 2,000 miles above the equator. The higher belt, which is considerably beyond the highest point on the TSX satellite's orbit, varies in altitude between 9,000 and 12,000 miles. The destructive effects of Van Allen belt radiation will be one of the most important factors in determining the life period of a communications satellite.

Although only one of the many commercial communication interests in America is participating in the TSX project, NASA has announced that AT&T will be required to report to the space agency all results of the communications experiments and all significant information developed during evaluation of the experiments which may directly bear on other communication satellite programs. All experimental data and project results will be made available by NASA to all communication interests in this country, and to the world scientific community.

Project West Ford

Last June, a new and unique concept for global microwave communication announced by the Massachusetts Institute of Technology, was discussed in detail in this column. Given the name "orbital scatter" by MIT scientists, the new technique was based upon the suggestion that a belt comprised of millions of small metallic dipole antennas be placed in orbit several thousand miles above the earth to act as an artificial reflector of microwave radio signals. These radio signals, now more or less limited to line-of-sight transmission, would be transmitted to the belt, which in turn would reflect them back to earth over distances of several thousands of miles, in much the same manner as high frequency radio waves are presently reflected by the ionosphere. (See figure 1).

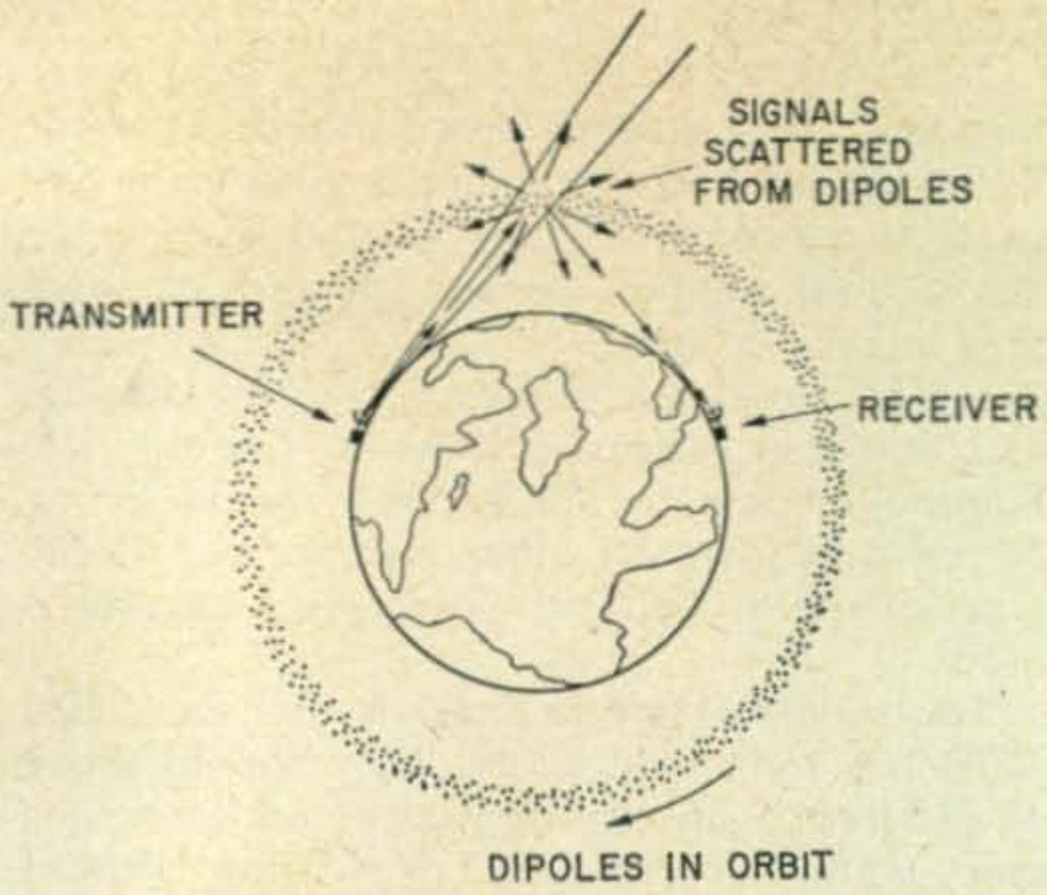


Fig. 1—Tuned microwave dipoles, placed in orbit this past October as part of Project West Ford, are now forming a ring around the earth at an altitude of 2100 miles, which may be capable of reflecting high-power microwave signals nearly half-way around the world. *(MIT Photo).*

The official announcement that the United States was planning to carry out an orbital scatter experiment, under the name of Project West Ford, caused a storm in scientific circles. While many radio engineers and scientists saw the experiment as the possible beginning of a radically new communication technique which could have far reaching significance, many astronomers and some radio scientists in this country and abroad, bitterly opposed it. They expressed fear that ringing the earth with belts of metallic material might shield reception of weak, but scientifically important radio signals in the microwave range, believed to be emanating from the sun, other planets and the universe in general. Concern was also expressed that high-power telescopic observations of the stars might also be impaired, and communication with high flying satellites and space craft might be endangered. A Soviet scientist suggested that the belt might present a collision hazard with future manned space ships.

In this controversial atmosphere, the entire question of Project West Ford's future was given to a special panel of President Kennedy's Science Advisory Committee for resolution. The panel, consisting of a number of distinguished American scientists, was convened by Presidential Science Advisor Jerome B. Wiesner. The panel's study concluded that the project had been planned in such a way that no harmful effects to either astronomy or space travel could be expected. In authorizing the West Ford experiment, however, the panel noted that no future launches of orbiting dipoles would be planned until the results of the West Ford experiments have been analyzed and evaluated by radio scientists and astronomers throughout the world.

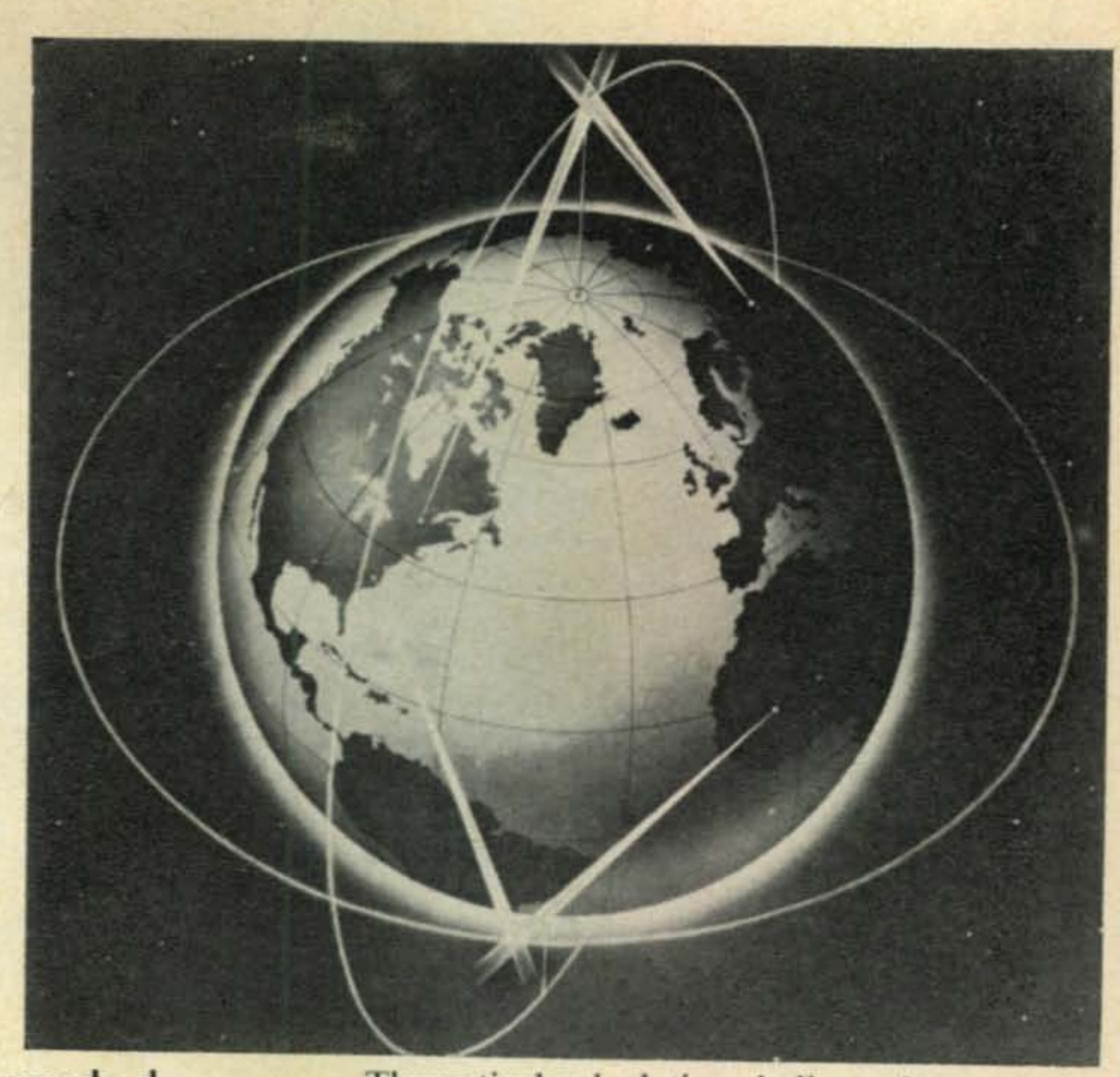


Fig. 2—The tuned microwave dipoles released from the Project West Ford launch, are now forming a scatter belt in space in a north-south polar orbit. An east-west belt along the equator, planned for a possible future launch, could make is possible to relay microwave signals between practically any two points on earth. *(MIT Photo).*

Project West Ford Launched

The Project West Ford experiment began with the successful launching of the MIDAS IV satellite on October 21. The MIDAS, developed to detect missile firings any place in the world, has no connection with the radio experiment, beyond serving as a convenient carrier for the 6 by 20 inch cyclindrical canister riding piggyback in the tail section of the 30 foot long satellite. Within the canister was a total of 350,000,000 tiny copper wires, each one 7/10 of an inch long and one third as thick as a human hair.

The wires, which behave as tuned dipole antennas at microwave radio frequencies, are being ejected into space at the rate of about 250,000 an hour, along a polar orbit at an altitude of approximately 2100 miles.

If all goes according to plan, the belt of microwave dipole antennas, capable of reflecting radio frequencies greater than 300 megacycles, will lengthen at a rate of about 1200 miles a day. It is estimated that it will entirely ring the world by late November, and by Christmas time the copper hairs should be spaced out almost a quarter of a mile apart, in a belt 5 miles wide and 25 miles deep. The ring will pass through both poles, at an altitude of about 2100 miles. (see figure 2).

It is planned to reflect high power microwave radio signals almost halfway around the world by means of the dipole ring. The first experiments testing the feasibility of this technique are scheduled to take place between stations located near San Francisco and Boston. Both stations will use high power transmitters on frequencies near 8,000 megacycles, parabolic antennas at least 60 feet in diameter, and low-noise Maser receivers.

Theoretical calculations indicate that even the highest power microwave installations used by radio amateurs will be on the order of a 100 decibels below the minimum power level required for successful reflection from the space belt. However, radio amateurs are known for doing the impossible, and a try on the 1296 mc band might bring interesting results.

Since the metallic space belt is a passive reflector, it is available for use by any country in the world. The bands useful life is estimated at two to three years. The further development of this system of microwave communication will have to await the outcome of both the long distance transmission experiments and the analysis and evaluation of its effects upon radio and optical astronomy, and other space programs.

It is requested that any long distance microwave radio amateur communications believed to have taken place as a result of reflection from the space belt be reported to the Editor of this column.

Last-Minute Bulletin

It has just been reported that an extremely large, unidentified, nearly spherical payload, led by eight smaller objects, has been sighted on a peculiar polar orbit, having a perigee at chimney-top level. Monitoring of the radio spectrum disclosed odd-sounding transmissions over a wide range of frequencies believed to be emanating from the larger object. The signals appear to be amplitude modulated by a husky, jovial voice proclaiming, "Peace On Earth, Goodwill to Men—Merry Christmas to all, and to all a good night."

73, George, W3ASK

The USA-CA Program

BY CLIF EVANS*, K6BX

APPLICATION for USA-CA-500 continue pouring in with new areas being represented daily. As we go to press (60 day dead line), only two DXers' applications have arrived. These were from VE3BKL and PJ2AF; however, normal mail delay times will dictate arrival of first overseas applications. In any and all events, DXers will get equal opportunity for low numbers, and all applicants are requested to be patient until opportunity has been afforded all with equal and fair opportunity in the first rush for low numbers.

Because some jokers would attempt to find it complicated to identify contacts within certain counties, and county identity of certain cities and towns, we feel impelled to explain the simple and foolproof USA-CA Rules governing county identity just once more for the record.

The County Identity Rule stating that P.O.D. ‡26 would be the official guide, leaves nothing to either imagination, doubt or disagreement. P.O.D. ‡26, which is re-published annually, lists each and every city, town or municipality in the U. S. which has a Post Office, and identifies the county within which each such municipality is located. Likewise, USA-CA Rule C.4 states that in the case of Cities, Parks or Reservations not within counties proper, applicants may claim any one adjacent county for credit. Certainly such simple rules leave no room for misunderstanding or manipulation.

A few letters received from persons who would imply numerous exceptions indicate the rules are so simple that some actually seek to interpret into the rules something that is not basically present. If one would take time to study U. S. Geography and political subdivisions, the common sense and simplicity of USA-CA Rules governing county identity becomes very apparent. In order to stop off a flow of letters attempting to point out exceptions to the Rules, we will discuss the basis in determining USA-CA's simple Rules concerning identification of counties.

If you are one of those who believes in "Seeing America First", then possibly you know that there are 177 National Parks and several hundred State Parks in the U. S. The National Parks alone encompass over 23 million acres of which only a bit over 600 thousand are not Federally owned even though within Park boundaries proper. The vast majority of such Park acreage is not within counties as such but borders upon hundreds of counties. With some fast arithmetic you will realize that National Parks alone comprise almost 35 thousand square miles of U. S. acreage which, to illustrate its scope, is more than the combined area of the state of Vermont, Connecticut, Massachusetts, Rhode Island, Delaware and New Jersey. Other states which have less area than combined National Parks include New Hampshire, Maryland, Maine and West Virginia.

From the foregoing it should be obvious that without the simple rule of claiming any one county adjacent to area of contact, we would get into complicated restrictions and decisions without any relation to the matter at hand which is simply to give credit for a county contact based on geographical position or nearest proximity to a politically defined county.

We have quite a few "Independent Cities" within the U. S. which are self-governing but not within counties proper. Virginia leads all states with over thirty Independent Cities. Among the larger Independent Cities are Baltimore, Md., Norfolk, Va., Richmond, Va., and St. Louis, Mo. Let's take a look at P.O.D. ‡26 for Baltimore's Post Offices.

We find that the dozens of Branch Post Offices served by Baltimore include areas located in the three counties of Howard, Baltimore and Anne Arundel, so it is obvious that P.O.D. ‡26 provides the necessary county identification in this otherwise complicated situation as it does in all others involving municipalities.

Contrary to the belief of many, cities, both Independent and otherwise do not necessarily lie within just one county politically or otherwise. For example, while Atlanta, Ga., is the county seat of Fulton County, it also lies partly in De Kalb County. Then there is mighty New York City which lies within the five counties of Bronx, Kings (Brooklyn), New York (Manhattan), Queens and Richmond (Staten Island). However, again, in such complicated cases the P.O.D. ‡26 gives all necessary answers.

There is another class of city called "Coextensive with County" Cities. Examples are Denver, Colo., which is Coextensive with Denver County, and San Francisco which is Coextensive with San Francisco County. Politically it means that both city and county are governed by the same officials. In the case of San Francisco, in P.O.D. ‡26, you will find that the San Francisco Airport Branch Post Office physically is in San Mateo County.

It is only natural that as time and political facts change, new counties will be created

*United States of America Counties Award Custodian, Box 385, Bonita, California

either in changing status of Independent Cities or conversion of National Park and/or Reservations to state control where they may become new counties. Even while the USA-CA Record Book was in print an Indian Reservation was created into a new county. It should be most obvious to all that the political fact of county existence, now or in the future, is not limited to what may be printed in the Record Book on any particular date, and that common sense dictates that as new counties are created in the political structure of the U. S., it remains only natural and basic that applicants are free to add such counties to existing lists for credit purposes as appropriate. Again, USA-CA's simple and foolproof Rules, orientated around P.O.D #26, provides for such future changes.

Speaking of county changes, we can expect Alaska and possibly Hawaii to come up with some major changes in the not too distant future.

We are well aware that it will be difficult for many DX stations to possess a copy of P.O.D. #26; however, this does not present an unsurmountable problem as there are several simple solutions at hand. First, U. S. hams can start putting the name of their county on QSL cards or giving such identity during the contact. Likewise, DXers can start asking for county identity during contacts. DXers, in the case of old contacts, can ask their new U.S. contacts for specific county identifications which should add additional purpose to the QSO and generate a mutual feeling of fellow-ham help.

For those who want more detailed maps than provided by the 8½"×11" USA-CA Record Books, the American Map Company sells what they call Set No. 400 Series of State Maps, looseleaf, 17"×22", for $19.50. This map Atlas, with a separate map for each state, breaks down the indexed counties showing all municipalities with 250 or more population. The writer uses such an Atlas and can highly recommend it both for USA-CA and professional and/or business reference purposes.

There is some misunderstanding on methods in which the USA-CA Record Books can be handled through U. S. Mails. In the original form the Record Books are sent to you by *CQ*, they can be mailed either as bound books or as printed matter; however, once you have written specific data in the books, they cannot legally be sent through the Mails by other than First Class handling. In the case of U.S. hams sending such books to K6BX by Registered Mail, such is just a waste of money as no security or other factors are envolved.

Worked All Illinois Counties

The Peoria Area Amateur Radio Club has honored Cliff Corne, K9EAB, for being the first to work all Illinois 102 counties.

In addition to Illinois' K9EAB has confirmed all counties for Connecticut, Delaware, New Jersey, New York and Alaska and needs only one or two confirmations to add several others to the growing list.

Cliff also was one of the first U.S. hams to apply for USA-CA-500 and now has over 800 confirmed counties toward USA-CA-1000.

First YL to win the Illinois all county award was Hazel Cain, K9QGR, with No. 4.

Four Corners DXpedition

CHC Chapter #1, Albuquerque, reports that their DXpedition to Four Corners in September-October netted over 350 contacts with operations mostly on cw. The group considers the excursion so successful and such fun was had by all that other similar trips are planned for the future, in which case more advance notice will be given.

The stone monument in the 'wilderness' marks the famous Four Corners and is the only place in the U.S. where four states are joined together. It is a favorite excursion mecca for hams as contacts from Four Corners represents four different counties for the USA-CA and other awards. *(Photo by CHC Chap. 1.)*

As you know, Four Corners is the famous stone landmark in the 'wilderness' in which four states have mutual corners and at which location it is considered that counties of four states are being worked simultaneously. To add to the spirit of this odd condition, the CHC groups strung up a 400 foot long-wire antenna looping across the four states. If anyone has missed out on a QSL for the latest operations, write either W5UYF, W5LEF or W5CK.

There appears to be some misunderstanding about various excursions to Four Corners and what contacts count for the 5 ∅ 7 Award sponsored by the Totah Amateur Radio Club of Farmington, N.M. For this award, only contacts with Totah members count.

New Mexico County QSO Party

In the November issue we told you about the forming of the CHC Chapter #1, Albuquerque and their sponsoring of the Worked New Mexico Counties Award. Well, this live-wire

QSL card used by CHC Chapter #1 Albuquerque, to confirm Four Corners contacts representing four counties in four different states was good for San Juan County, N.M.; San Juan County, Utah; Apache County, Ariz., and Montezuma County, Colo.

organization will now sponsor the Third New Mexico QSO Party, January 20-22, to give all hamdom opportunity to work for the county award, the Sandia Base Friendship Award, and of course give New Mexico credit for WAS. QSO Party details are:

1. **Time:** 36 hour period from 1500 GMT Saturday, January 20, to 0300 GMT Monday, January 22.

2. **Limitations:** No time limits or power restrictions. All bands may be used and credit with same station on different bands will be given. Special award certificates also issued for multi-operator groups.

3. **Scoring:** New Mexico Stations: One point per contact and multiply total by number of different states, U.S. Possessions, Canadian Provinces and Foreign countries worked during the contest period. All other stations; Three points per New Mexico station and multiply total by the number of counties in New Mexico worked during contest period.

4. **Logs, scores and reports:** New Mexico stations send number of QSO RST or RS and name of county. All others send number of QSO, RST or RS and State, Possessions, Province or Country as appropriate. Copies of logs with scores must be postmarked not later than February 20, 1962 and should be sent to CHC Chapter #1, Albuquerque, c/o John C. Kanode, K5UYF, 408½ Cornell Drive, SE, Albuquerque, N.M.

5. **Frequencies to monitor:** 3600, 3835, 7050, 7250, 14080, 14250, 21050, 21300, 28100, 28600, 29000 Kcs and 50.28 Mcs.

Awards Coverage

While our column primarily is to give news coverage within the tremendous scope of the USA-CA Program, we also will endeavor to bring you other awards news of interest to all hamdom. This action is to support the hundreds of Clubs and organizations now lacking outlet for announcing new awards sponsored for hamdom public relations purposes. In particular we will attempt to give news coverage of state-level awards programs of historical significance and which are geared to the worked-counties approach. Naturally we promise nothing as space always is at a premium; however, be assured we do care, so send along whatever is considered of pertinent news value to all hamdom.

Also, in most instances, pictures tell more than words possibly could, so shoot them along on a basis of nothing attempted, nothing gained.

Nigerian Award

Nigerian amateurs have sponsored an award celebrating their emergence as a soverign nation. To get this award, contact five Nigerian stations after January 1, 1961 using at least two bands on phone, c.w. or mixed. Send list certified by two other licensed amateurs or radio club official stating QLSs were sighted, together with full log data and 5 IRC to Dr. M. Dransfield, 5N2JKO, Regional Research Station, Samaru, Zaria, Nigeria.

Two New Canadian Awards

The Ontario DX Association, Toronto, Canada now sponsors "The Canadian Award" and "The St. Lawrence Seaway Award" as follows:

The Canadian Award requires following contacts: Five with each of the eight VE Call Areas; Five with VO1/VO2 in any combination; and one contact with a VEØ maritime mobile station. Of the five VE8 stations, one must be in the Yukon Territory and one must be located on one of the off-shore islands of the North West Territories. Contacts must be on any band or mode or mixed after WW II.

To get either of the awards, send certified list signed by two other licensed amateurs or a radio club official that cards were sighted, plus full log data and $1 or 8 IRC to the Ontario DX Association, Secretary, Wm. A. Wragg, VE3BQP, 127 Castlewood Rd., Toronto 12, Ontario, Canada.

To win the St. Lawrence Seaway Award, make ten contacts with VE stations located along the Seaway. Of these ten contacts, four must be with the following four areas: Port Arthur or Fort William, Greater Toronto, Greater Montreal, and Greater Quebec City. The remaining six contacts may be any VE municipality situated along the Seaway route which includes Kingston, Cornwall, Prescott, Brookville, Gananoque, Whitby, Oshawa, Napanee, Hamilton, Niagara Falls, Windsor, Sarnia, Goderich, Manitoulin Island, Sault Ste. Marie, etc.

Seals are available for 20, 40 or 50 contacts. Contacts may be made after July 1959 and on any band or mode or mixed.

There you are Mates, see you next month with more USA-CA news coverage. Happy county hunting es 73, Old Man K6BX

Novice

DONALD L. STONER, W6TNS
P.O. BOX 137, ONTARIO, CALIF.

DIRECT current amplifiers are used to amplify very low frequency or d.c. voltages. A simple d.c. amplifier consists of a single tube with a grid resistor across the input terminals and with the load in the plate circuit, as shown in fig. 1. The load may be some sort of mechanical device, such as a relay or a meter, or the output voltage may be used to control the gain of an amplifier.

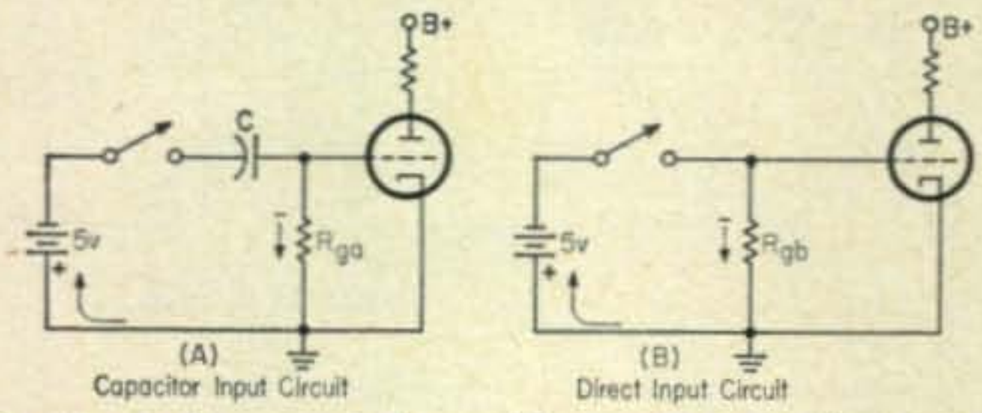


Fig. 1—A d.c. coupled amplifier cannot employ interstage coupling capacitors, as explained in the text.

The d.c. voltage that is to be amplified must be applied directly to the grid of the amplifier tube. For this reason, only direct coupling can be used in the amplifier input circuit. Input coupling is shown in fig. 1, where a comparison is given between a capacitor input circuit and a direct input amplifier.

When the switch in the capacitor input circuit is closed, the direct current battery voltage charges capacitor "C". The electrons moving in the direction indicated cause a voltage equal to the battery voltage to appear momentarily across resistor "R". This voltage in turn appears on the grid of the tube. However, as the capacitor continues to charge, and up to the point where its charge is equal to the battery voltage, the voltage across resistor "R" decreases until it reaches ground potential. During this time, the grid voltage changes from zero to negative 5 volts, then back to zero. These variations appear in the output of the amplifier as a changing voltage. However, they are only momentary because there are no further changes in the circuit values. If the switch remains closed, the applied d.c. voltage is constant and just as soon as the capacitor is fully charged, the output of the amplifier will return to its original level. Therefore, this circuit is incapable of amplifying a direct current signal.

In the direct input circuit (B), however, when you close the switch, the battery voltage is applied directly to the grid. Unlike the capacitor input circuit, the voltage on the grid remains constant as long as the switch remains closed. Prior to the closing of the switch, a fixed value of current flows in the plate circuit. This results in a fixed voltage drop across the load resistor. When the d.c. voltage is applied to the input terminals, this voltage is not blocked by a capacitor but is impressed directly upon the grid of the tube. It makes the grid more negative than before and permits less plate current to flow. Accordingly, there is a smaller voltage drop across the load resistor. Since this voltage change is greater than the voltage applied to the grid, the input voltage is said to have been amplified. Therefore, this circuit is used as a d.c. amplifier.

One of the most common uses of a d.c. amplifier is a vacuum tube voltmeter. Notice the circuit of such a unit shown in fig. 2. The

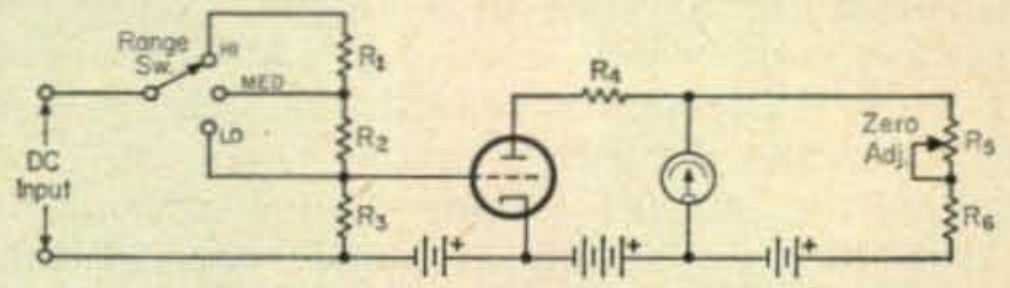


Fig. 2—A common application for the d.c. amplifier. The meter can be used to measure voltage without applying any appreciable load on the circuit under test.

voltage to be measured is applied to the voltage divider, made up of R_1, R_2 and R_3. The ratio of voltage division can be varied by a range switch in such a way that several ranges of voltage can be measured. Resistor R_4 is used to prevent damage to the meter if too high a voltage is applied. In the plate circuit, the additional battery and the variable resistor are used to balance the normal plate current of the circuit. The variable resistor can be adjusted to that meter M reads zero when no signal is applied. Whenever a d.c. voltage is applied to the input, the tube amplifies it and causes a current to flow through the meter. Since the meter reading is proportional to the voltage applied, one can read the amount of voltage on the calibrated scale of the meter.

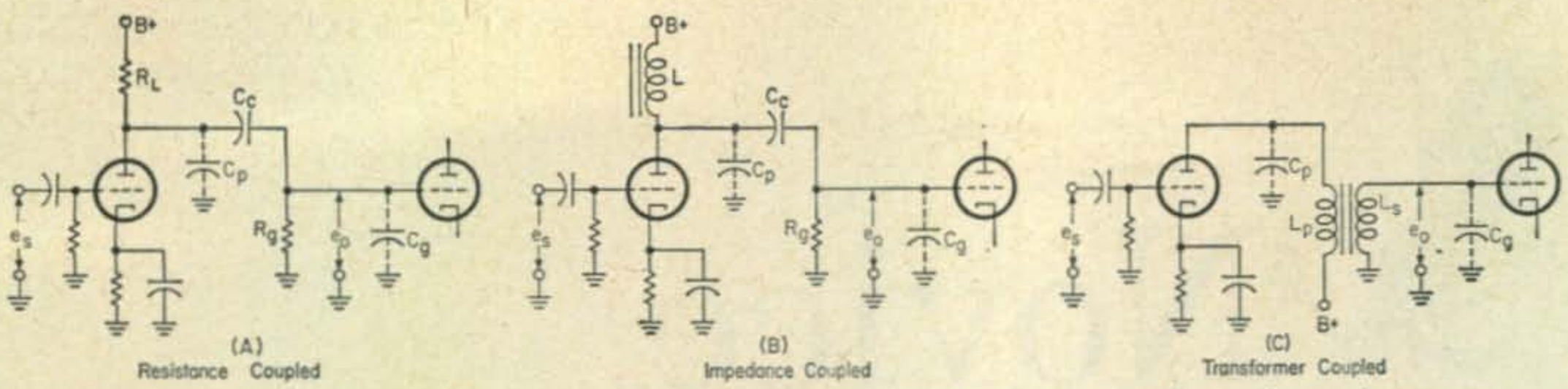


Fig. 3—Many different schemes are used to couple cascade stages together. These three are commonly found in electronic equipment

Audio Amplifiers

Amplifiers designed for frequencies within the audio spectrum (approximately 15 to 15,000 cycles) are called audio frequency amplifiers.

To obtain sufficient gain, it is usually necessary to use one or more stages of audio amplification—that is, to use the output of one tube to control the grid of one following, then to use the amplified output of the second tube to control the grid of the following tube and so on. When two or more amplifiers are connected in this manner, they are said to be connected in cascade.

When one stage of audio amplification (a tube and its circuit connections) is coupled to the next, the plate of the amplifier tube cannot be connected directly to the grid of the following stage as with d.c. amplifiers, but must be coupled through a special circuit. The coupling circuit transfers the varying voltage between the stages and at the same time supplies the d.c. potentials and currents necessary for the operation of the tubes. The main types of audio stage coupling are resistance-capacitance, impedance and transformer coupling.

The illustration fig. 3 shows simple circuits of triode audio amplifiers, each employing one of these three types of coupling. Since the method most widely used for coupling audio stages is the resistance-capacitance method, it is the only one discussed here.

Referring to the circuit of the resistance-capacitance (or simply resistance coupled amplifier, as it is commonly called), notice that cathode bias is used. This is the most commonly used type of bias that you will encounter in resistance coupled circuits. The capacitor C_c, which is called the coupling capacitor, is for the purpose of providing an a.c. path to the grid of the next stage. The resistor R_L is called the coupling resistor. Its resistance is high so that as much voltage as possible can be transferred to the grid of the following tube.

The coupling between the two stages illustrated takes place in the following manner. When a signal is applied to the grid of the first stage, voltage variations are produced in the plate circuit of this tube. The variations are impressed on the grid of the second tube through the coupling capacitor and the grid resistor R_g of the second tube.

The coupling capacitor serves two functions. As stated before, it provides a low impedance path for the a.c. to the grid of the following tube. In addition, it keeps the plate voltage of the first tube from reaching the grid of the second tube.

Frequency Response

The most important property of a resistance coupled amplifier is the manner in which its amplification varies with frequency. The frequency response curve (fig. 4) represents the response of a typical amplifier over a wide range of frequencies. The low frequency calloff is due to the large reactance that the coupling capacitor offers at these frequencies. The poor response at high frequencies is due to losses from the tube and stray wire capacitance in the amplifier circuit.

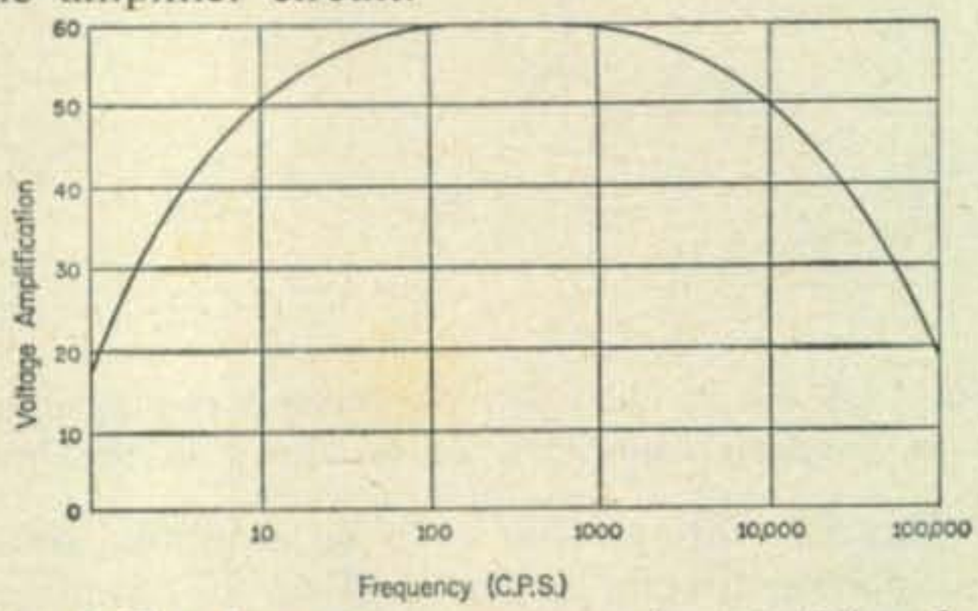


Fig. 4—The frequency response characteristic of a resistance coupled amplifier .

Low Frequency Compensation

As previously mentioned, amplifiers must amplify frequencies at the low end of the audio band as well as the high end. According to the frequency response chart, fig. 5, amplification of low frequencies shows an improvement when the coupling capacitor C_c is made large. A large capacitor has less electrical resistance (reactance) to low alternating current frequencies than a small capacitor and low reactance means a smaller voltage drop. Since the coup-

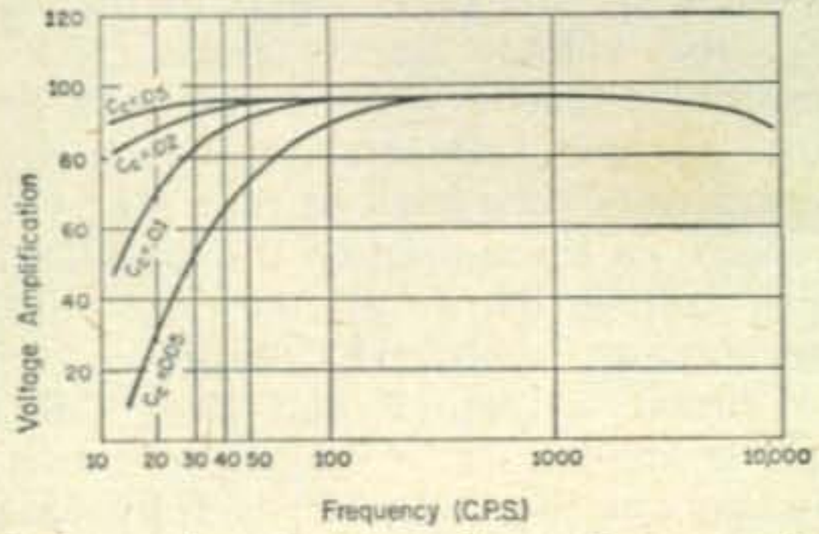


Fig. 5—Increasing the size of coupling capacitors (to reduce reactance) will increase the low frequency response.

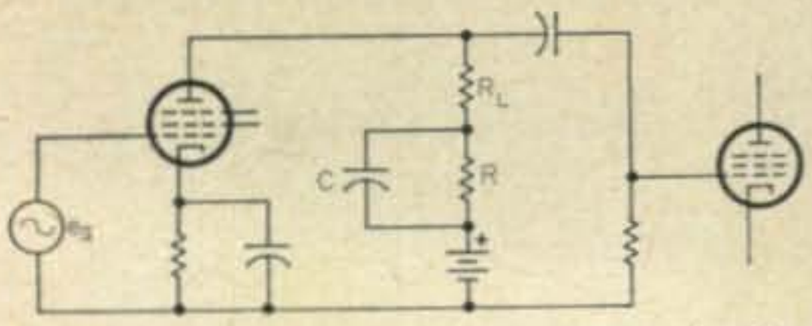


Fig. 6—The low frequency response can be increased by the addition of an *R-C* compensating network, commonly called a bass-boost circuit.

ling and the grid resistor form a voltage divider in the input circuit, more voltage appears across the grid resistor when the capacitor has a small reactance. Therefore greater amplification takes place in the tube.

A second and somewhat more satisfactory means for improving low frequency amplification is by using a low frequency compensating circuit (fig. 6). A low frequency compensating circuit improves response by virtue of the components *C* and *R* in series with the load resistor. Since *C* is comparatively large, it offers practically zero reactance to middle and high frequencies and, therefore, does not affect these frequencies. At low frequencies, however, its reactance increases and in parallel with *R*, produces a reactance which (when added to R_L) increases the total load impedance. Earlier you saw how the output voltage of an amplifier may be increased by increasing the load resistance. Therefore since the compensating circuit produces a larger load impedance, it follows that the gain of the stage is higher at the low frequencies. This "boost" tends to flatten the amplifier response at the low frequency end.

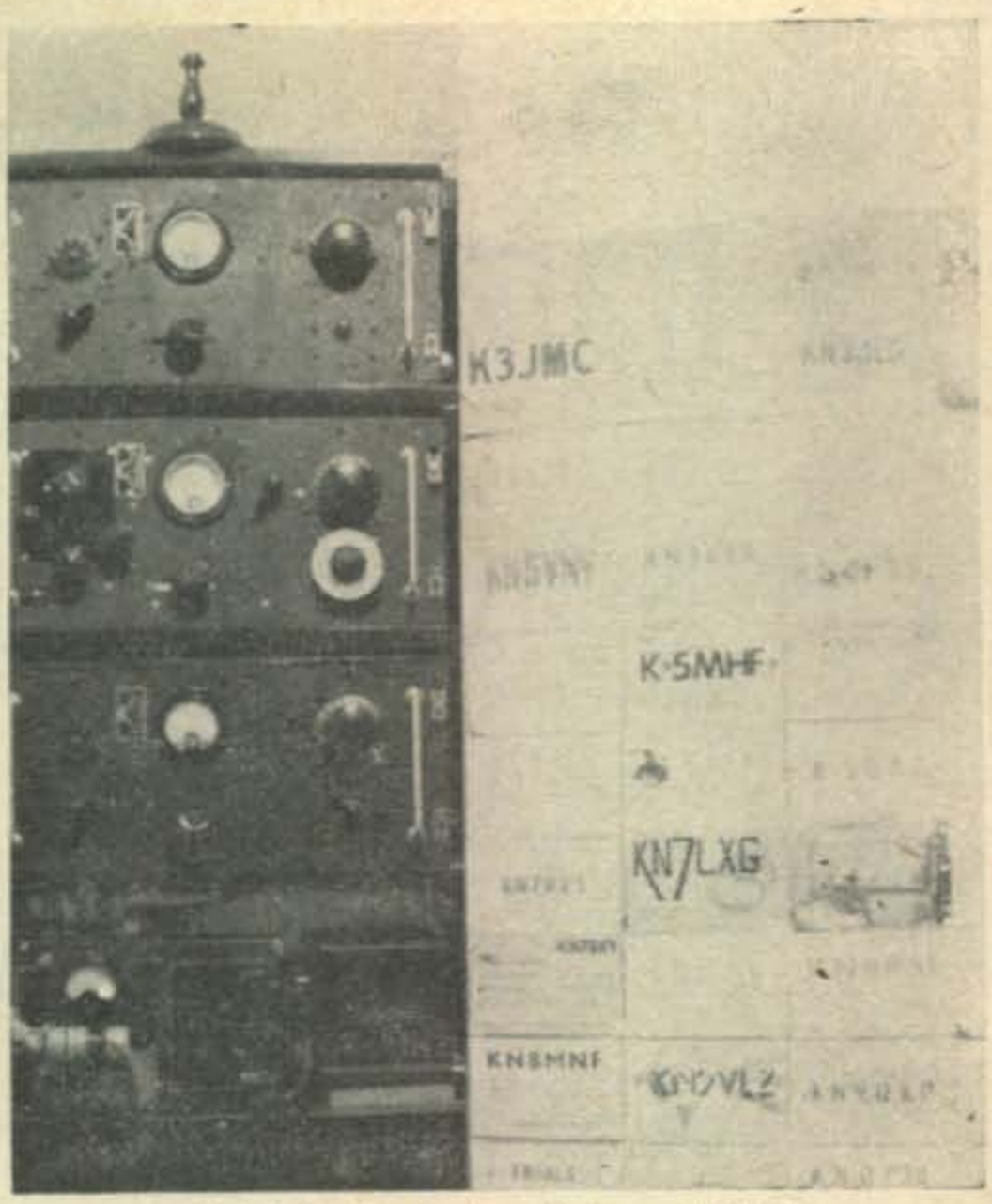
A third method of improving low frequency amplifier response is a combination of the two just mentioned. It consists of adjusting the coupling capacitor size and adding a capacitive reactance in the plate load in such a manner as to obtain a correct proportion between the two. In other words, the voltage drop across C_c is compensated for by the "boost" circuit in series with the plate load.

Negative Feedback

Frequency response can also be improved by negative feedback. This involves feeding a small part of the output voltage back into the input in opposite phase or polarity and proportionately reducing gain. Thus, when the output of an amplifier decreases at high frequencies, less voltage is fed back to its input and when the output voltage increases more signal is fed back to the input. When the feedback is large, the gain is proportionately decreased and when the feedback is small, the gain increases. In this way, at high frequencies, when the gain of an amplifier is decreased, less out-of-phase voltage is fed back to the input which increases the stage gain to compensate for the high frequency loss. This is known as degenerative feedback.

VK3XB

Thought you would like to see the rig of VK3XB who recently earned his WAS by work-



Multiple final rig of Ivor, VK2XB.

ing only Novice stations over a period of several years. The transmitter uses three old "TU" units which have been rebuilt to house separate rigs on each band and run 85 watts apiece. Can you find your call in Ivor's photograph?

Who's DX?

James Briles, USN, Navy No. 585, FPO, N.Y., N.Y., writes from bonnie ole Scotland to say he has been eavesdropping on 80 meter Novices and has heard the following stations; Aug. 17, 1961, 0215 to 0300 GMT: KN1QHT, QZA, RAA, SBW, WV2SSF, TZY, KN3OZL, WN4ANI, BBX, BZZ. Also the following general class stations were heard; K1JQH, REL, K4SAG and VE1AGH. Congrats fellows that's a long haul for 80! Jim's letter continues to say he will be happy to SWL-QSL the above stations. By all means, let's have more reports, Jim.

Noteworthy Novice

This month, our Noteworthy Novice is Jim. E. Ligon, Jr., WN4CVR, 2185 Hawthorne St., Sarasota, Fla. who has been licensed since Sept. 61. Jim, who is 9, was born in Paris, France, while his parents were stationed there with the Army. His father is a retired Army Colonel, W4KOC, ex-K2AQN, F7BB, 3A2AQ. Jim has other interests besides ham radio. He plays football on the Sarasota Pawnee team in addition to many other school Interests. Good luck, Jim, and keep up the FB work!

Help Wanted

WØ—Don Adams, 12430 So. 33rd St., Omaha 47, Nebr. PH 291-5668.

The column is a little long, so the letters department will be saved for next month, For now, 73, de Don, W6TNS

ham clinic

CHARLES J. SCHAUERS, W4VZO
c/o CQ, 300 WEST 43rd ST.,
NEW YORK 36, N. Y.

A LARGE number of hams who own CB equipment designed for operation in the 27 mc band, have written to HAM CLINIC requesting information relative to converting it for 10 meter operation. So this month we will cover the subject as thoroughly as we can in the space alloted to us.

First of all, please keep in mind that the Citizens Band (Class-D Service, 27 mcs) begins at 26.965 mc and ends at 27.255; the latter frequency being shared with other services.

The hop to the 28.5 mc 10 meter band phone edge is 1.535 mc from the lowest CB frequency, and 1.245 mc from the top CB frequency. You can readily see that in order to get into the 10 meter band (phone portion) that there will be no great changes in frequency determining components in the CB set. Furthermore, if the *Q* of tuned circuits in both the receiver and transmitter are relatively low, there may be no need for pruning coils or decreasing tuning capacitance.

Oscillator Conversion

FCC regulations provide that the frequency stability and tolerance of the crystal controlled CB equipment be .005% or higher. If you construct your own CB equipment from a kit the manufacturer must certify in writing that it has been designed, manufactured and furnished in accordance with FCC regulations. You can adjust your receiver to your heart's content, but unless you have a first or second class radiotelephone license you are not permitted to adjust a CB transmitter if your adjustments will affect modulation percentage, harmonic radiation, frequency stability and/or tolerance.

If you convert your CB transmitter for ham operation which involves altering tuning components, you cannot legally use the set again on CB frequencies, unless the set has been checked and certified by a technician having the license called for by the FCC; remember this!

All frequency determining components in CB equipment kits are pre-wired, aligned and sealed. If you do not have the proper license you cannot (without violating FCC regulations) touch sealed components.

If you merely unplug a CB crystal and plug in a crystal which will enable you to operate on 10 meters without any other modifications, you may go back to CB operation by plugging in the CB crystal.

In the six CB sets we checked, it is possible to shift up to 28.5 to 28.6 mcs by merely changing the crystal. Of course, you will not have maximum output without adjusting buffer-amplifier stages, but you can still get out.

Not many CB transmitters utilize fundamental crystals; most use third overtone units. (For more information on this, do read *CB Horizons,* a magazine by CB'ers published at Modesto, California. Their Post Office Box is 3150. Ask for the September 1961 issue which contains a nice article on CB crystal frequencies by Tom Knietel, the managing editor.)

The first step in converting the oscillator for 10 meter ham band operation is to determine whether or not the crystal used is ⅓, ½ or the same as the operating frequency. If your receiver is crystal controlled too, you will have to determine whether or not the crystal is above or below the i.f. In some transceiver units, the receiving crystal may go as high as 20635 kc.

When you have determined the transmitter oscillator crystal frequency, install a crystal which will enable operation in the phone portion of the 10 meter band. If possible, disable all stages but the oscillator by removing plate voltage. Next, apply power to the oscillator stage, and with a grid dip meter set at DIODE position check the oscillator output. Some adjustment of the first tuned output circuit will more than likely be needed. If the output is low *after* adjusting capacitance or inductance (via a slug tuned coil), grid dip the tuned circuit to make certain that it hits the frequency you are after. In most cases, it must be tuned to the output frequency (27-28 mc). If the crystal frequency is doubled, you will have to shoot for the crystal frequency, *i.e.,* 14300 for 28,600 kc output.

When you have adjusted the oscillator for correct output, proceed to the buffer and check and adjust for proper output. In some cases, it is possible to insert a few micro-microfarads of series capacitance in the tuned circuit to make it come up to the frequency you desire.

If the transmitter oscillator incorporates feedback circuitry (in the form of capacitance) for CB frequency operation, this may have to be reduced for higher frequency operation. Generally however, you will not have to worry about the reduction if your frequency excursion is not over 1.7 mc.

Getting the receiver oscillator to function will not usually be a problem if you have

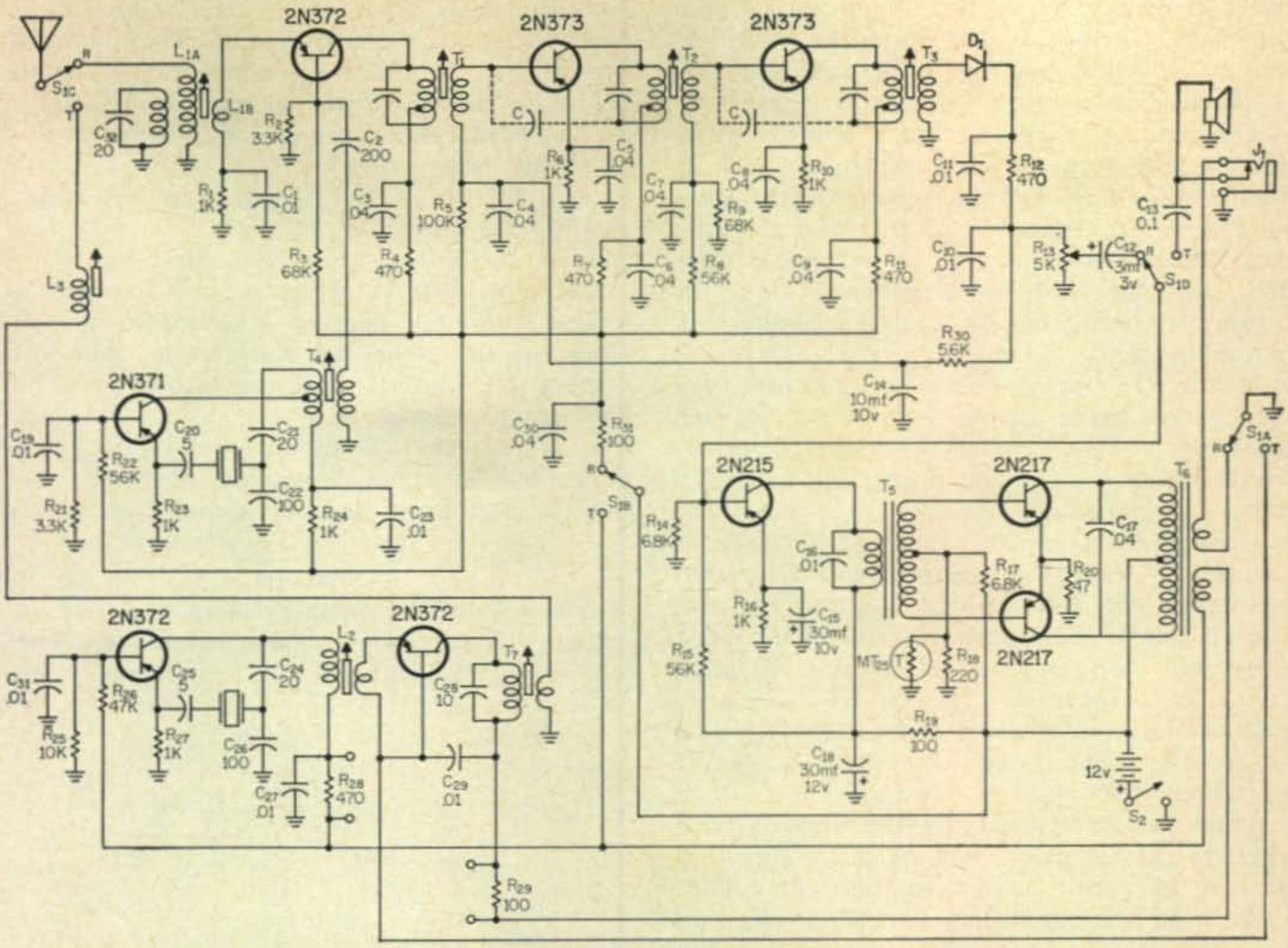


Fig. 1—Schematic of the Lafayette HE-29A Citizens Band transceiver. The conversion of this unit to 10 meter operation is described in the text.

chosen the proper conversion crystal. In any event, if it fails to work the first time by reducing inductance, try about 10 mmf series capacitance at one end of the coil, and re-adjust.

Final Amplifier

If your set uses a pi network output, merely short out two turns of the coil (to start). You will find that you will have little trouble loading up the set. If a pi network is not used, remove two turns (to start); then using a grid dip meter, cut the coil for the 10 meter frequency desired.

Receiver

Either a superhetehodyne or super-regenerative receiver is used in CB transceivers. If you have chosen the proper oscillator crystal, alignment of the superhet is conventional. In the regen receiver you will have to modify the r.f. input circuit either by cutting down the amount of parallel capacitance (as in the case of the Heathkit GW-30 transistorized rig), or by cutting the coil.

If you have a superhet receiver, the front-end (r.f. amplifier, if there is one) can be made to hit 10 meters by adding series capacitance to the coil. A small trimmer may be used and adjusted to frequency.

To properly realign your superhet you will need a good signal generator and an output meter or a scope. Alignment will not be covered here because it is conventional and usually covered in most instruction books for a specific unit.

The Lafayette HE-29-A

After purchasing two Lafayette Radio-Electronics HE-29-A CB "Walkie Talkies," I decided to convert them for 10 meter operation. The main reason I chose these two units was that Lafayette has parts in stock for them; in fact, a person could put together an HE-29-A from off-of-the-shelf parts.

The HE-29-A utilizes nine transistors and one diode. The receiver is a crystal controlled superhet and the transmitter (also crystal controlled) has a final input not exceeding 100 mw in accordance with FCC regulations. No license for operation of this set is required. However, after the set is converted for operation in the ham bands, a general or higher class amateur license is needed.

Attempts to convert the HE-29-A for 6 meter operation were partially successful. However, the results on 50 mc were not half as good as they are on 10 meters.

The procedure for conversion of the HE-29-A is similar to that used by Don Stoner in converting the Globe unit described in September 1961 *CQ*. However, for best results the following changes were made: first, battery voltage was increased to 15 volts (instead of the 12 volts normally used). This enabled better r.f. output and did perk up receiver operation. Coils L_{1A}, L_2, L_3 and transformers (coils) T_4 and T_7

were obtained. The receiver input coil L_{1A} was modified by removing 1½ turns, its secondary was not touched, but C_{32}, a 20 mmf unit was removed and replaced with a 10 mmf unit. Antenna loading coil L_3 was modified by removing one turn. A turn was removed from T_4, its secondary was not touched. Two turns were removed from T_7, the transmitter output coil. Nothing was done to its secondary. One and one half turns were removed from the transmitter oscillator coil L_2; its secondary remains the same.

If coils (r.f. transformers) are purchased for the change, make certain that unsoldering and soldering is done carefully. Although a sturdy circuit board is used, too much heat can crystalize the connections.

Third overtone crystals are used. Crystals as supplied by such manusfactuers as PR Crystals or International Crystal Mfg. Co. may be used. The HC 18 W (wire leads) or HC 18 U (pins) types may be used, as well as the HC6/U. Frequency of operation for our HE-29-A units is 28.645 mc. The transmitter crystal was picked for 28.645 mc and the receiver crystal is (28.645 mc minus 455 kc) or 28.190 mc.

After modifying the coils, the crystals were wired in (in our case), and we made sure that we had the correct crystal in the right circuit.

With the original battery pack (12 volts) we first adjusted the transmitter circuits starting with L_2, proceeding to T_7 then to L_3. We used our regular station receiver tuned to 28.645 mc with b.f.o. on when first adjusting the transmitter oscillator. Then we turned on our "S" meter for r.f. level readings. In each instance, slugs were tuned for maximum r.f. output. When adjusting the transmitter oscillator we draped a wire lead from our receiver's antenna input to near L_2 for better pickup. After the oscillator started, we moved the wire near the transmitter final tank (T_7).

Next, the receiver oscillator coil T_4 was adjusted after connecting an r.f. signal generator set for the output frequency (28.645 mc). Then the slug in L_{1B} was adjusted. Each of the i.f. slugs was then touched up for maximum signal as indicated on an output meter connected to the speaker terminals.

No trouble was experienced with oscillator starting (receiver or transmitter). See Figure 1 for the HE-29-A diagram.

When the receiver alignment was completed, the 15 volt pack was substituted for the 12 volt pack. In was noted that the receiver "S" meter kicked up 3 "S" units higher with the 15 volt pack.

The HE-29-A was heard 5 miles in and around town between units; about 9 miles from a fixed station in town and about 14 miles line of sight. Over water the unit no doubt would work well up to 20 miles.

Observation

It has come to this writer's attention that a certain club station, during field day operation, was using an all-band mobile installation parked nearby to run up contact points. They allowed members of the club to use the mobile station belonging to one of the members to use their *own* calls to contact the club field station!

If this information is true, not only was there a breach of FCC regulations but a disgusting disregard for the operating rules, as well as established radio amateur ethics.

Recommended: that hams who operate a mobile station of another *always* use the call letters of the owner of that station; this will prevent padding of operating scores and be pursuant to existing FCC regulations. Further, logs of club stations should contain the notation: "mobile contacts verified wherever possible for multi-operator operation."

Questions

Mohican Low Z Antenna Input—"Id like to use a low impedance antenna transmission line feed to my Mohican GC-1A, something for 50 or 72 ohms. Any ideas?"

Yes. Thanks to VE3TA, see fig. 2.

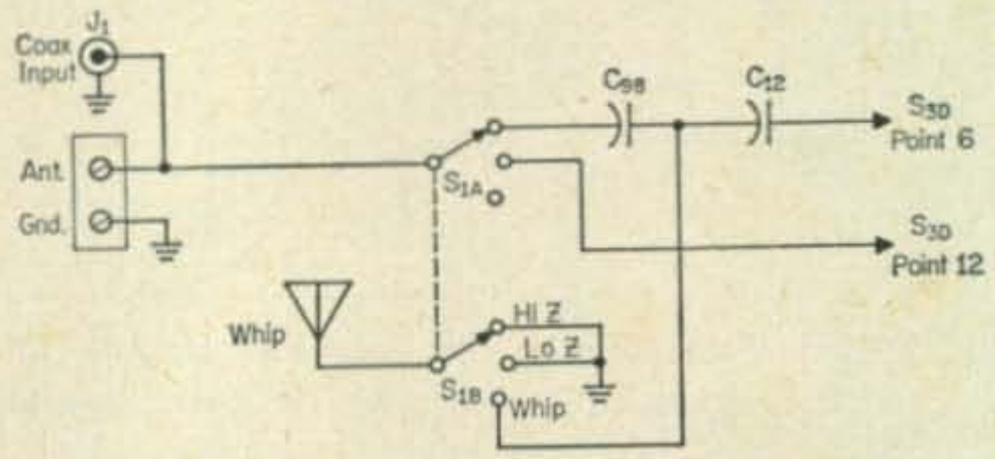


Fig. 2—Low impedance antenna input circuit for the Heath GC-1A receiver. An RCA phone jack, J_1 may be installed on the rear apron if coax input is desired. Switch S_1 is also installed on the rear apron.

KWM-2 and KWM-2A Info—"How can I obtain better transmit-receive exciter tuning coincidence in my KWW-2? Any recent info on this?"

Yes, write Collins Radio Co. Field Service Department, Cedar Rapids, Iowa, Att: Karl R. Stanley, WØYZD, for Bulletin No. 5, revised Jan. 3, 1961 relative to better tuning coincidence. Be sure to give your set's serial number. The information (all of it FB) is too lengthy to print here.

75S-1 C.W. Operation—"I have one of the earlier models of the Collins 75S-1 receiver. Can you tell me if they have come out with anything to improve c.w. operation by the addition of a filter, I got the set second-hand so am in the dark; I do not receive bulletins."

Yes. You can add the Collins type F455Q mechanical filter, part number 526936700 or you can add an optional crystal type, part number 290870700. Both installations are easy and will only take a few moments. For full info write to the address given under the KWM-2 item above. Installation of both is covered by instruction number 523001000.

KWM-2 Hum—Thanks to Ted Wilds, KZ5SW/W4GVD, here's how he eliminated erratic a.l.c. circuit action and reports of light hum or car-

rier on the air. Checking he found that he had low filament voltage for some reason. He finally cured the trouble by running a length of ¼" braid from the point in the power supply where one side of the filament winding (green) is grounded, under the three h.v. filter caps, out the grommeted hole where the main power cable exits, then taped the full length of the main power cable and terminated the end on the outside of the phono pin jack in the rear of the KWM-2. By doing this his filament voltage came up to normal and the hum disappeared. He suggests that to check to see if this extra braid between power supply and rig is needed, to attach a heavy conductor to the power supply chassis and touch the other end to the chassis of the KWM-2 (or S-line) and note if the pilot light brightens. If it does, use his installation method.

HT-37—Thousands of HT-37s are in use throughout the world and this columnist considers this set an outstanding transmitter of high quality. We realize that sets of the same make and model do not always develop the same troubles and we offer modification and maintenance items on a *general* basis. The idea in mind is to offer a solution to a trouble which might occur in *any* set.

Some modifications made to commercially manufactured equipment by hams are technically excellent and worthy of consideration. On the other hand, some modifications which do affect overall operational efficiency or the operation of a specific stage or function are not recommended.

In calling a manufacturer's attention to an item we want to make certain that he sees it; and if the idea is not practical or is frowned upon we'd like to know about it.

Hallicrafters has told us that the item relative to the HT-37 which appeared in the October ('61) column is not recommended because it would affect the keying characteristics of the set. They recommend using a good coaxial relay such as a Dow key unit.

We'd like to hear from HT-37 users who used the item submitted by W8UGD with success.

Thank you Hallicrafters for your technical assist.

Heat Dissipators—"Would you recommend a good power transistor heat dissipator to me? I, like many other hams, am planning on building a transistor power supply for my mobile rig, and I want to make certain that the transistors I use are not cooked by heat."

I suggest that you write: Augat Bros., Inc., 30 Perry Ave., Attleboro, Mass. and ask for their Bulletin No. HD-261. Their heat dissipators feature a parallel, open-fin construction assuring low thermal resistance.

C.W. Monitor—Here is a simple c.w. monitor by Norm Churchill. It is about the simplest one I have seen. The output transformer is a regular output transformer with a primary impedance of about 500 ohms, center tapped. Secondary could be for low impedance phones

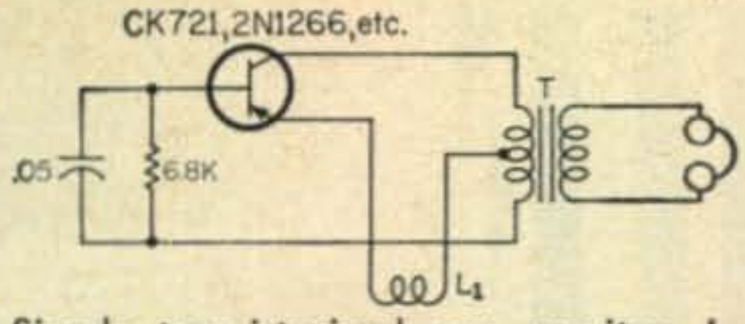


Fig. 3—Simple transistorized c.w. monitor. L_1 consists of a two turn link placed in the r.f. field of the transmitter, antenna, etc. Transformer *T* is described in the text.

or have an impedance of around 2000 ohms for hi Z phones. Coil L_1 is merely a two turn link for r.f. pickup which may be placed near antenna terminals, final tank, etc. See fig. 3 for the simple monitor. Incidentally, any good r.f. transistor will work. If you have any questions write Norm at 424 W. Wesley St., Wheaton, Ill.

Hammarlund 3 in 1—"I just received my general class ham license and my CB license. I am only interested in 10 meter local and CB operation for the present. Does anyone make a '3 in 1' unit which will enable me to invest in one unit for both CB and ham operation? In other words, a transceiver usable on both the 10 and 11 meter bands?"

Yes. Hammarlund offers their HQ-105-TR which is a 3-in-1 transceiver. The receiver covers from 540 kc to 30 mc. The transmitter covers both the 10 and 11 meter band by merely plugging in the proper crystal and retuning. By the way, I would like to emphasize a very important point here: if you do obtain this set be certain that you use the prescribed type of crystals for CB operation (from a specific manufacturer). You can use *any* manufacturer's crystals for ham operation. More off-freq. CB operation due to improper crystals is encountered than for any other reason.

Meter Sensitizer—"I have an 0-100 milliameter and would like to be able to use it to measure 0 to 5 milliamperes full scale. I understand that this can be done by using a transistor. How?

See the diagram in fig. 4. This scheme can be used with suitable switching for measuring low value grid currents as well as final plate currents. Nearly any size of ammeter (up to 1 ampere) can be used in the circuit successfully.

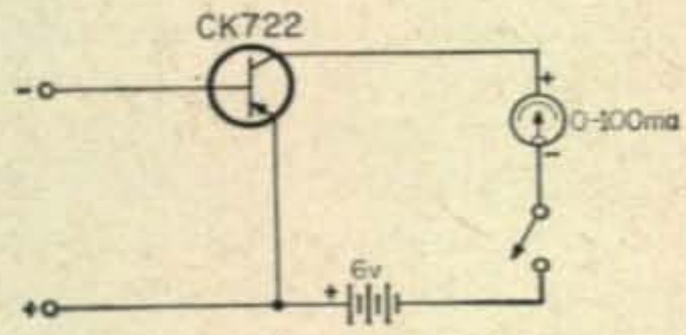


Fig. 4—Circuit of a milliameter sensitizing device enabling a high current milliameter to function as a low current unit.

Transistor (miniature) Parts—Mr. HAM CLINIC, I'd like to know where I can buy a full range of miniature parts for transistor projects I am contemplating. It seems that I always need a part that local stores do not have. Can you help me?"

Sure. Try Lafayette Radio-Electronics, 165-08

[*Continued on page 94*]

VHF

BOB BROWN, K2ZSQ
C/O CQ, 300 W. 43 ST.,
NEW YORK 36, N. Y.

50mc. 144mc. 220mc. 420mc. and above

144 mc Moonbounce – K1HMU & W6DNG

At this writing we have received further word from Ned Conklin, of New Haven, Connecticut, concerning the exchange made between his station (K1HMU) and W6DNG on 144 mc. Here's Ned's letter: "This is an interim report on the 144 mc moonbounce results for this summer. Equipment and antenna were as described in earlier letters, with the exception that the antenna polarization was changed to counterclockwise for the last week of tests with W6DNG.

"Results were approximately nil up until September 14. We had heard our own echoes, but very weak and questionable; W6DNG was weakly heard in our series of nightly tests on August 28, 30 and September 4. A telegram from W6DNG on September 13 confirmed our reception on the 4th; on his end he had heard us S2 (for about 30 seconds) on August 29, September 2 and 4.

"For some reason everthing fell into place on the night of the 14th. When we began pulsing prior to our sked time, echoes were not loud but very consistant and better than ever before. We heard DNG definitely in the first 10 minute period, and began sending S3 (1 minute duration). In the third period from him, we heard an S3, and we began to send RRRRRR in our next period. At this point the moon set on our end, and virulent cursing filled the skies. We heard nothing the next night, which was our last chance; the next day we had to take the equipment down.

"A card from W6DNG the other day confirms that this is exactly what took place; he is still listening to his tapes and promises a detailed letter soon. We came about as close as it is possible to come and not make a QSO! However, we are both going at it again next year — with better luck, we hope. The tape we made that night is unfortunately not technically perfect; either the tape was feeding with uneven tension or was just a bad tape, with the result that there is a rhythmic variation in recording level. However, the echoes show up nicely, and some of the 6DNG stuff is evident. I'm still analyzing it, and will make copies of the best parts if desired.

"For next year on our end: Frequency on 144.0000 both for stability and resetability on the other end. Antenna next year about three times the size of this one — 30 foot booms, stacked 2 high by 8 wide; two antennas coaxial on each boom, giving about 480 elements. The reciprocity principle mentioned in an earlier letter this summer is still open to question, but with all the brains down here we will solve this within a week. Details in a later bulletin.

"Of those most interested, CT3AE, VE3BZS, OH1NL, and W6DNG of course, seem to be the best prospects. Mail on this end should now go to:

Ned Conklin, K1HMU
727 Yale Station
New Haven, Connecticut."

Syracuse V.H.F. Roundup

Once again this year we had the pleasure of attending the annual Syracuse V.H.F. Roundup on October 7 at the Three Rivers Inn, north of Syracuse, New York. If you missed it this year, don't next time! The largest group of v.h.f. enthusiasts I've ever seen was there along with many well known personalities. But what really surprised me was the huge number of Canadians and Mid-Westerners who travelled so many miles to get there. The first talk of the day was by Ed Clegg, president of Clegg Laboratories, on s.s.b. W2LOY went into many

Here's Ed Tilton, W1HDQ, at Syracuse.

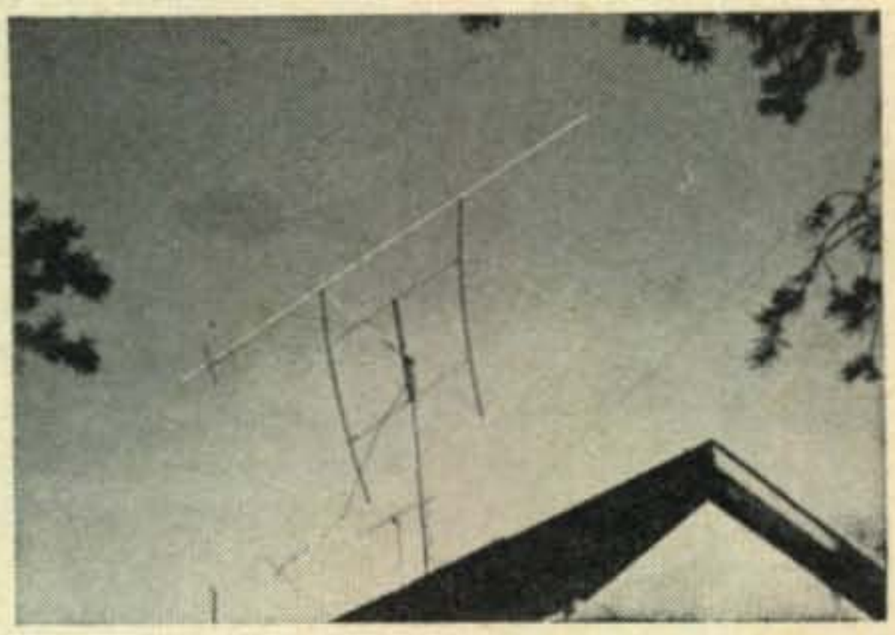
phases of s.s.b. design and prospects for the future. Then we listened to Ed Tilton, W1HDQ, speak on the two-band station for the beginner. Last, but by no means least, was Raphael Soifer, K2QBW, Director of Satellite Scatter Communications Office at M.I.T. (If you'll remember, he was one of the two that hit the front pages of every newspaper in the country back in 1960 with the first usage of a satellite for communications.) More about this later. Lots of surprises brewing at M.I.T. for serious-minded v.h.f.'ers!

We only regret that we had to leave before the banquet. Made it up and back the same day. (Took a week to recover — 600 miles both ways.) We'll be looking forward to meeting *you* next year. Be there.

Technicians

For Pete's sake let's cut out all this guff about Technicians! Never a day goes by when I don't hear about some old-timer expounding, in no uncertain terms, his views of "mail order" hams. This topic should have died off years ago, but still looms like a black cloud overhead. The Technicians seems to have achieved the lowly stature of "second-class amateur" or some other such label, some of which are not fit for print. In our New York metropolitan area it's not *too* much of a problem, but in some of my earlier travels through the Midwest and South, I was aghast to learn the status of the Technician and the v.h.f. bands in general. It has also been said that we on v.h.f. have more "lids" percentagewise than any other amateur band. *Not so!*

It is well known that many of the great advances made in the art recently (at least in the U. S.) have been made by Technicians. The v.h.f. man really has no cause to go on for a General or Extra, except possibly for the sake of prestige. One fellow I know locally is prominently regarded as an authority on v.h.f. s.s.b. and is consistantly building something new and different. I'd hate to have to mention call letters, but I could rattle off at least two dozen right now (and a lot more with a bit of thought) of hams who have really made a name for themselves in relatively short time. When I think of some of the so-called old-timers who reminisce about the good old days of 30 or 40 years ago, it makes me sick. What have they done to promote the art? If you can't say anything good about the Technicians, you still must admit that they are a "shot in the arm" to v.h.f. A recent survey showed that almost 85% of the v.h.f. populace in this country are Technicians. Take them away and you're left with the "glorious" pre-1951 empty bands. Enough said.



This is OH1NL's antenna array for 144 mc. One beam is vertical, the other horizontal.

V.H.F. Man of the Month

Top Honors this month go to Lenna Suominen, OH1NL, of Finland on the recommendation of OH1SM. Lenna has for years maintained his status as "the" v.h.f. man of the area and is on record for working as "first" the following areas on 144.14 mc: UR, OZ, LA, HB, G, OK, DL. The two meter population in Finland is about 10 total, but Lenna frequently works into Sweden, where the 144 mc activity numbers upwards of 100. His antenna is two 13 element yagis, one vertical, one horizontal, on a single mast. Power is 600 watts to a pair of 4-125A's. All our best regards go to OH1NL along with wishes for continued success in his endeavors.

Satellite Scatter Communications

Just got some more info from the Office for Satellite Scatter Communications at M.I.T., headed by K2QBW, with some excellent editorializing that could well interest *all* v.h.f. men. So, we'll just turn the column over to K2QBW for further discussion of . . .

Communications

This is, in a sense, the major reason why radio amateurs interest themselves in any form of propagation. For all the changes taking place within it, our service is still founded on the two-way QSO as the basis for its existence. We have, in the satellite ionization phenomenon, a means of reflecting signals back to earth at times when the ionosphere will not support communication over the path in question. True, the reflecting "body" is sporadic and short-lived. This makes for fast-moving, fragmentary QSO's. But, hams will go to extremes for the sake of a contact, especially if the contact hereby gained is in any way a collector's item. Why else would two otherwise

Here's our "V.H.F. Man of the Month", OH1NL, of Finland.

intelligent, experienced, practical-minded citizens spend nine months of their time and thousands of dollars to talk across half the Pacific Ocean when they could easily throw the bandswitch and do it on 20 meter s.s.b. any time they pleased? Or why, come August 11, do approximately a hundred similar individuals spend hours trying to eke out marginal contacts via meteor scatter on the low end of 144 mc when they could, with no trouble at all, work the same stations on 7 mc c.w. with S9 signals? Simple — they all feel the pioneering spirit of accomplishing something noteworthy. Communication experiments aimed at taming an exotic propagational medium; at conquering it, are amateur radio at its highest level. In the case of satellite scatter, the pioneering spirit is doubled—if not squared—because the exotic medium involved is an earth satellite, and the environment is space. You are in the thick of two great drives — the drive of radio amateurs to extend their ability to communicate, and the drive of all humanity to explore and make use of outer space for its own benefit — not its destruction.

Mailbag

Honolulu, Hawaii: From that place we'd all like to be and Lee Payne, (no call on this one) comes . . .

"V.h.f. is very slow — only about six active 6 meter boys out here. Some of the old timers, KH6CNI, Dean, and K9KVV/KH6, Ron, have returned to the mainland. Walt and Alice, formerly, K6's, are now KH6ECA and KH6-ECB, and should be very well known as they worked quite a few stations during the openings last year.

"Only DX we've had this year was VK4ZAZ, Lance, in April. Heard K6's once or twice, but more than likely I came back to the QTH about the time the band closed. Unfortunately most of the openings occur about 8:30 to 10:30 AM and most of us have to work then. Hear some c.w. and a word or two in the evening, but not enough to identify.

"A good portion of Honolulu occupies valleys — always a few hills between. At times a vertical will work fine locally; other times the same stations can't even hear the carrier. We use mostly beams; they seem to work better. Mine's an 8 element. There are a few mobiles, but even the halo's don't do the job in some of the dead spots.

"Power doesn't seem to be too important. Have a G-50 and a Hi-Bander; average power runs about 40 watts input. The low frequency rigs (all bands) run, of course, much more power.

"Several Sixer's with good antennas and using nuvistor pre-amps are popping up here and there.

"We have been trying to work the outside islands for some time, but no real luck so far. One case this year was a G-50 used on the Hawaiian Slopes of Maunakea. He heard a Sixer here, but it was not two-way. But we're still trying!"

San Jose, California: From Orv Dalton, K6UEY, comes news of the V.H.F.T.K.P. . . .

"Is there something you don't know about v.h.f.? The fellows in the Santa Clara Valley of California answered this question, and unlike the weather, are doing something about it.

"Agreeing on the old cliche' 'Two neads are better than one', we found it an easier task to exchange and combine knowledge than to grow another head — so we formed a unified V.H.F. Technical Knowledge Pool.

"On the 9th of June, 1961, a group of v.h.f.'ers assembled at the QTH of Don Farwell, WA6GYD. Attracted by the offer of free donuts and coffee, the turnout was tremendous.

"The topic of the evening was antenna efficiency receiving vs. transmitting. Apature calculation of yagi and broadside arrays were discussed.

"The idea of a 220 mc Unicom was brought up. Don Farwell with a few parts from his junk box and a little experimenting came up with a simple but FB super-regen receiver.

"Again on the 23rd of June, 1961, the little group gathered at the QTH of WA6GYD. The topic of the evening was signal attenuation of various types of transmission line, wave guide at 1.2 kmc and v.s.w.r. above 432 mc.

"Many gatherings have taken place since the small group initiated the VHF Technical Society. Common at each meeting is the sight of new members. All interested parties are invited to contact Orv Dalton, K6UEY for the specific time and location of meetings.

"One of the more prominent participants is Ken Holladay, K6HCP, whose 1200 watt p.e.p. s.s.b. signal can be heard on 50.110 every Saturday and Sunday at 0800 Daylight Pacific Time. Ken invites schedules with those interested in working tropo-scatter on 6 meters.

"Every u.h.f. amateur well knows the irritation that can be caused by the vast throngs of TV viewers. Alf Modine, K6TWF, believes if you can't beat 'em — join 'em. For the past 25 months Alf's been building his own TV station for 432 mc.

"He is using a full interlace scanning system which he found really had it's headaches. Getting sync generator stability required many hours of modification and hair pulling. The Vidacon which is the basic unit of a TV system is of high resolution quality. Using commercial standards as a guide, he has built the complete closed circuit system. With the addition of the transmitter, a video signal will be on the airways around Santa Clara Valley."

Thirty

That's it for this month fellows. How about you're sending in some technical tidbits? Like to hear from you soon!

73, Bob, K2ZSQ

RTTY

BYRON H. KRETZMAN, KØWMR
NEW YORK 36, NEW YORK
c/o CQ, 300 WEST 43RD STREET

RTTY Operating Frequencies

Nets centered on frequencies given; operation usually ± 10 kc.

80 meters	3620 kc
40 meters	7140 kc
20 meters	14,090 kc
15 meters	21,090 kc
6 meters	52.6 mc

As the year draws to a close, we sit back in our arm chair and reflect upon the progress, upon the steady upswing, of radioteletype activity this past year. There are several reasons for this. One reason, we would like to think, is that much of the aura of mysticism and apparent unfathomable complexity to the uninitiated has been dissipated by the consistent coverage of this phase of amateur radio in *CQ*. (*CQ*, by the way, is *only* amateur radio magazine with a regular RTTY Column.) We have constantly stressed the fact that RTTY is neither complex nor costly. As a working example we have described in this RTTY Column a simple three-tube converter (March and April) and followed that with brief descriptions of easy-to-build accessories; a band-pass input filter (April), an a.f.s.k. oscillator (May), and autostart (June and July).

Another reason for the increase in activity is that more and more machines, particularly Model 15's and Model 19's, have been placed in amateur hands via MARS; and, at an extremely nominal cost, by the legitimate incorporated RTTY societies across the nation. The main reason for this bonanza of good equipment is that the user companies are gradually replacing the 15 and 19 series with the newer Model 28 series. Incidentally, a goodly number of RTTYers are still using the older but very satisfactory Model 26; and, some are still using the venerable Model 12, many of which were built 40 years ago!

W A C

Now that amateur RTTY has become a world-wide operation, there seems to be a bit of misunderstanding as to how to obtain a Worked-All-Continents certificate after you have received the necessary QSL cards. A WAC certificate is *not* obtained via the ARRL. The International Amateur Radio Union issues WAC certificates to League members upon application to the ARRL. Phone and c.w. certificates are available as are special endorsements for 3.5 mc, 50 mc, and single sideband. No special endorsement for RTTY is available.

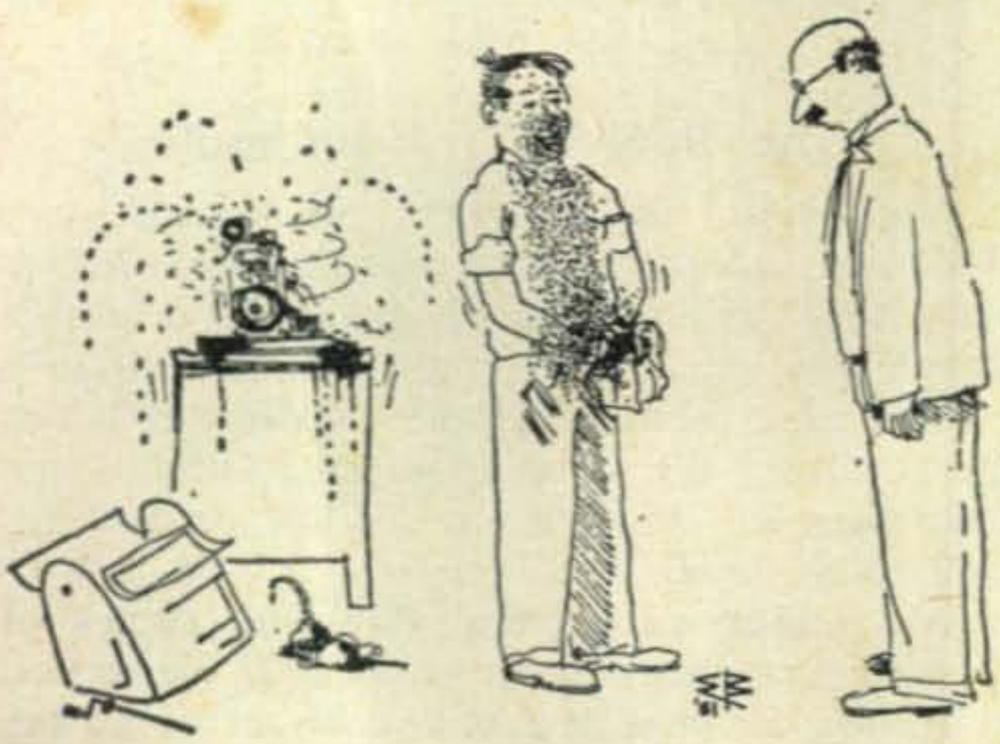
The WAC Certificate for RTTY is issued by the RTTY Society of Southern California, Inc. To qualify for this award, send conformations showing two-way RTTY QSO's with the six continental areas of the world to RTTY, Inc., attention Bud Schultz W6CG, 5226 N. Willmonte Avenue, Temple City, California. After examination by the Award Committee, the cards will be returned and you will be issued the WAC certificate if you have qualified.

Jim Hepburn VE7KX is the proud possessor of the first award. Other stations that have received this award, as of October, are: W2RUI, W7LPM, W6AEE, K6OWQ, W6CG, W2JAV, WØBP, and G3CQE.

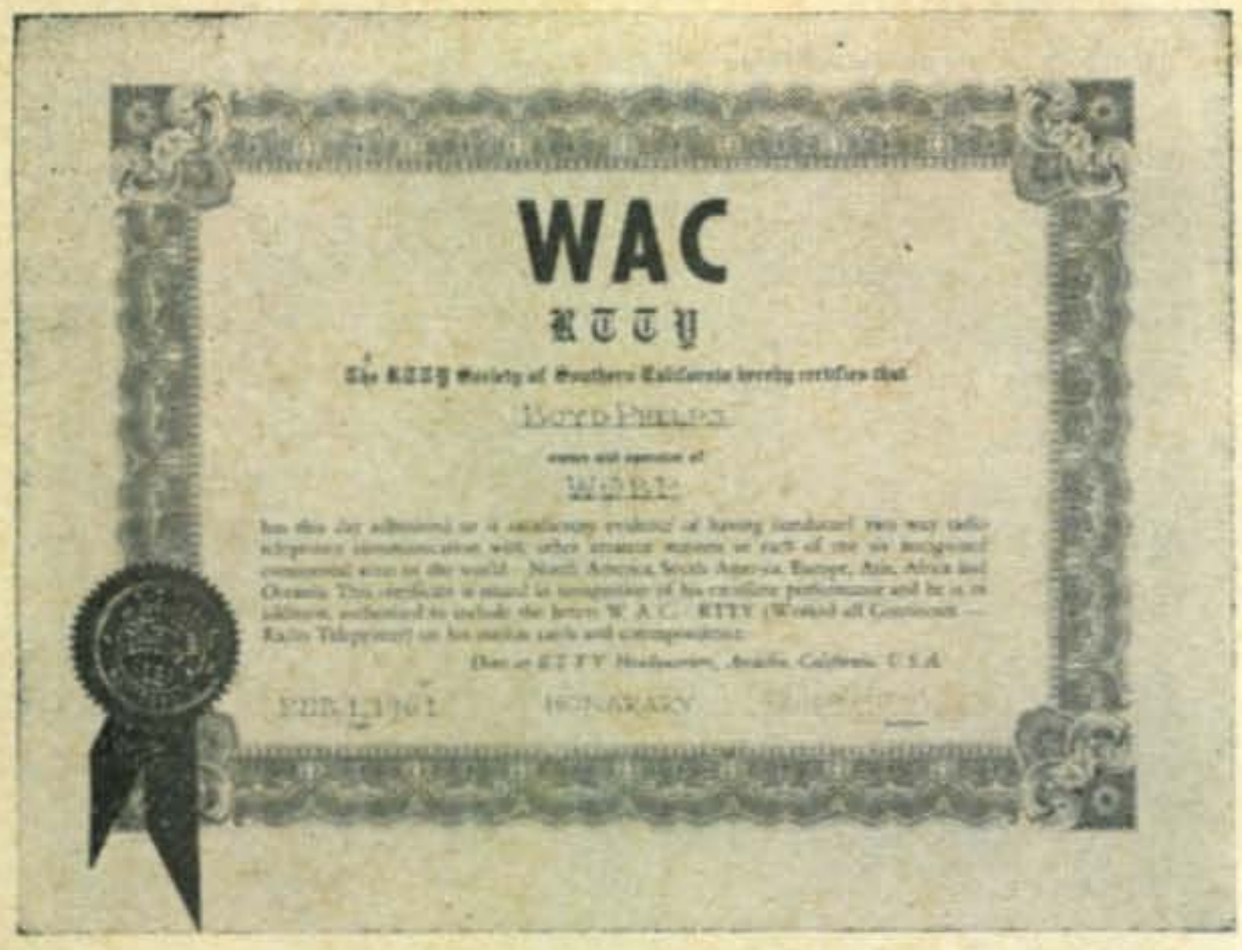
Working DX RTTY

Working an RTTY station in another country is not just a matter of tuning in and turning on the machine. It is more than likely that the foreign amateur that you are trying to copy is using a machine with a slightly different speed, the C.C.I.T. speed of 50 bauds or about 66.67 words-per-minute, or 400 operations per minute. (The 60 w.p.m. American speed is 45.45 bauds, or 368 o.p.m.) C.C.I.T., by the way, stands for the Consultative Committee on International Telegraph, an organization devoted to the development of recommended international standards for telegraphy. The standards described above have been adopted in most European countries where Creed, Lorenz, Olivetti, and Seimans & Halske machines are used. For details on these and other speed differences, refer to Chapter 2.1, Section d, in the *New RTTY Handbook*.

RTTY The Hard Way... No. 6



"Hi, Henry . . . . just oiled the ol' 26"



This WAC certificate for RTTY was issued posthumously by the RTTY Society of Southern California to the late Boyd Phelps, WØBP.

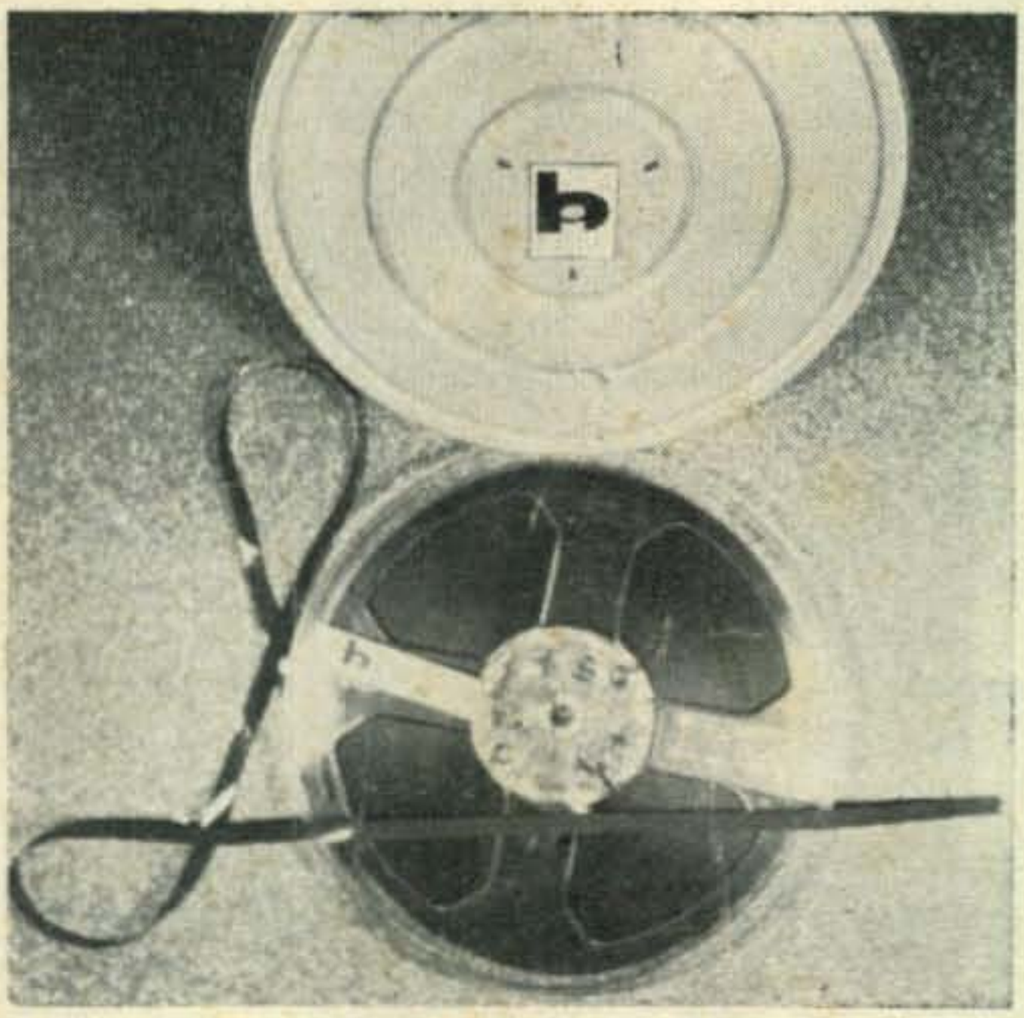
If you have a machine, such as the TG-7-( ) military field version of the Model 15, that is equipped with an a.c. series governed motor you *could* increase the motor speed *if* you happened to have the right tuning fork to set the speed to the compromise "Inter-operation" speed. A much more satisfactory solution, if you have a Model 15 with the usual 1800 r.p.m. synchronous motor, is to change gears. The late Boyd Phelps, WØBP, devised the method of using 75 w.p.m. gears (Teletype #84105 and #84106) made for a 2100 r.p.m. motor. If you do a bit of arithmetic you will see that these gears will give a speed of 64.3 w.p.m. when installed on the 1800 r.p.m. motor.

In case somebody is concerned with the legality of this way of operating RTTY, let us quote from Part 12 of the FCC Rules and Regulations, Section 12.107, paragraph (b); "The nominal transmitting speed of the radio teleprinter signal shall be adjusted as nearly as possible to the standard speed of 60 words per minute, in any event, within the range of 55 to 65 words per minute."

Test Tape

Back in the October 1960 RTTY Column we mentioned that a local RTTYer who has access to professional tape recording equipment had suggested that he would be happy to furnish test tapes of the standard audio tones plus a.f.s.k. of RY's, the Quick Brown Fox, etc. We received quite a response of post cards and letters from interested RTTYers. We must apologize for the long time that has passed. The local, after much prodding, finally reneged, but the idea has been picked up by a Minneapolis manufacturer.

RTTYers can now obtain a reel of magnetic test tape recorded on two tracks at 7½ inches per second. One eight minute track includes the standard 440 and 600 cycle tones for comparison with WWV for verifying the speed of the recorder, the standard RTTY tones of 2125 *(mark)* and 2975 *(space)* cycles for filter alignment and 2550 cycles for cross-over checks. In addition, a zero-bias test signal of square wave a.f.s.k. is run for one minute for telegraph bias checking purposes. And, of course, a liberal amount of time is alloted to the standard test phrase text, "THE QUICK BROWN FOX . . ." The tape is shipped in a metal can with instructions for $5.95, prepaid. It is available from Baud, Inc., 620 North 6th Street, Minneapolis 11, Minnesota. *(Sounds like a pretty good Christmas present, doesn't it?)*



Audio Test Tape of AFSK.

The New RTTY Handbook

Last month, in the RTTY column, we made the happy announcement that the *New RTTY Handbook* would soon be available, and that the details would be found on page 140 in a formal advertisement by the Cowan Publishing Corporation. We must apologize. The "formal advertisement" referred to got lost on the cutting room floor.

We mailed out several thousand copies of the announcement in November. If we missed you, look on page 122 of *this* issue for all the dope.

Texas

The North Texas RTTY Society has been organized to procure and pass out machines for RTTYers in northern Texas. The Board of Directors consists of nine men from that area. Bruce W. Harris W5HCS is Chairman and Al T. Corbin W5KXD is Secretary-Treasurer. As an interesting note, like the midwest group (MARTS, Inc.), they require proof of working converters, etc., before they pass out a machine. This, naturally, puts machines into the hands of those who *really* will get them on the air. As of July they have turned loose about 165 machines. They also handle parts, to hams only, incidentally.

Across North America

K2EEN of Kenmore, New York, has a Model 26 and a transistorized TU. W8ZCD/2 is on 40 from Sanborn, New York. What ever became of W2PBG?.. (*Drop me a line, Bob!*)

The 4th Annual Meeting of the Florida RTTY Society, Inc., will be held on Sunday January 21, 1962 at 10 AM in the Daytona Plaza Hotel, Daytona Beach. Reservations are $3 per person and should be sent to Box 6047, Daytona Beach, Florida, before January 15th. The Florida Net operates on 7137 kc Sundays at 1 PM, by the by.

W4OOV of Alexandria, Virginia, has his TG-7-B and Twin City TU on 40 and 80 and expects to go on 6 and 2 meters soon with a.f.s.k. K4UBR of Fort Walton, Florida, is looking for a way to a.f.s.k. the crystal of a BC-610 at K4FEJ, Eglin Air Force MARS Station. K4YTR of Dadeville, Alabama, has a Model 19. W4HMN of London and W4KZF of Erlanger, Kentucky, are on 80.

W5DCM of Amarillo, Texas, is building a W2JAV TU to go with his Model 15. W5TOC Dallas Texas was worked on 80. Alex uses an ARC-5 at 75 watts and a 55-foot vertical antenna.

WA6LAI of Los Angeles has a TT-30/AGA-1 machine, an AN/FRR-3A receiver bay, and an AN/FGC-1X terminal unit. W6TPJ of Rosemead, California, pokes a good signal into the midwest on 20. W7GDQ of Omak, Washington, is building a fork oscillator. W7PBV of Boulder City, Nevada, wants to f.s.k. his Globe 300 on crystal. W7LPM in Seattle, Washington, is using tape gear to good advantage on 20, with narrow shift dual identification.

W8UAR, K8SOE, and W4KZF are organizing a Southern Ohio Radio Teleprinter Society. W8DLT of Pleasant Ridge (near Detroit), Michigan, is known as "The Source" to the Michigan gang. The Michigan RTTY Society, Inc., is a legally incorporated non-profit organization, by the way.

K9PPD of Topeka, Kansas, has a Model 15. W9FAA is on 80 from Cassville, Wisconsin, with his KWS-1 and Models 14 and 15. W9ZGC and K9BRL still represent South Bend, Indiana, on 80 and 2 meters. W9GYQ is on 40 from Appleton, Wisconsin.

KØOPZ is on 80 from Norfolk, Nebraska. WØPHD is on 80 from Warren, Minnesota. WØAIS of Pomeroy, Iowa, uses narrow shift for dual identification on 80 with 350 watts to a pair of 813's KØBCL and his son KØLIX of Red Wing, Minnesota, are on 80, as is KØJLG of Omaha, Nebraska, and KØEII of Clinton, Iowa. WØIJG of Lewis, Iowa, also is on 40.

VE3BNV of Waterford, Ontario, is looking for a machine. (*See October's* RTTY *Column.*) VE2RS of Montreal, Quebec, was heard on 80 at KØWMR with a walloping signal.

A report on the Chicago RTTY Meeting, October 8th, will have to wait until the January 1962 RTTY Column as it fell around deadline time for this column. Watch for it.

Teletype Art Work: "Peace on Earth. . ." by KL7DGO/Ø

KØWMR Moves to W2-Land

If an answer to your letter seems to be unusually delayed, please bear with us. At the time of writing of this column (October) we are still in Minnesota. By the time you read this we expect to have a new QTH back in the New York area. Since we don't know the address as yet, please send all letters to me at *CQ*, 300 West 43rd Street, New York 36, New York.

73, Byron, KØWMR, ex- W2JTP

YL

BY LOUISA B. SANDO, W5RZJ
4417 ELEVENTH ST., N.W.,
ALBUQUERQUE, N. M.

ALTHOUGH all W.A.Z. awards are listed in *CQ*'s DX column at the time of presentation, we've never before had a complete listing of all YL holders of W.A.Z. This is a tough one to get; congratulations to these YLs for earning this achievement award:

1. W6YZU, Naomi Turk
2. W6UHA, Maxine Willis
3. VK3YL, Austine Henry
4. W7QGF, Betty Gorton
5. KL7BHE, Sheila Goodhue (now KH6DLD)
6. K6ENL, Aleta Cash
7. ZS1RM, Margery Snyman
8. W9QLH, Blanche Edwards
9. KH6BTX, Gladys Sickle
10. KH6AUJ, Dotty James
11. OE2YL, Inge Ehrman
12. K5BGT, Chic Tilley
13. K6OWQ, Mary Schultz
14. K2UKQ, Kay Gaynor

WPX Award

CQ's even harder to get WPX award, for confirmed contacts with 300 different prefixes, has been earned by one YL for each category: on SSB, K2MGE, Dot Strauber; on c.w., K2UKQ, Kay Gaynor; on phone, W5JCY, Bertha Watson.

VK3YL, Austine Henry, was the third YL and the first VK ham to earn the Worked All Zones award. (She also was the first YL to achieve WAC-YL.) As of May '62 Austine will have held her ham license for 32 years! She still loves DXing and is active on 14 mc.

W5JCY

W5JCY, Bertha (see photo), the first YL to complete WPX on phone, figured if she could get one as hard as that she could get more and became really certificate conscious. She has made CHC, YLCC-450, DXCC-phone/c.w. 198, DXCC-phone 196 (207 worked), DX-YL 129, WAS, WAS-YL, WAC, WAC-YL, WBE, Worked UN, Diploma Paraguay, WAYL (So. Africa), and she has many many club certificates. DUF 1, 2 and 3 are completed and she's working on a number of others.

W5JCY, Bertha Watson, was the first YL to earn the WPX award on phone.

Bertha is 1961 president of TYLRUN and NCS of its two sections, 3880 and 7235 kc. She also is NCS once a week for the Sooner-Nooner traffic net on 7235 and is treasurer of the Edmond ARS. She has been a YLRL member since '48. OM Allen is W5ERY. They run 300 watts to a homebuilt transmitter and use a Collins receiver and homebuilt tri-band cubical Quad antenna. Bertha is YL Editor for *The MONITOR*, and is vice president of her garden club. And to keep her really busy, they still have three jr. ops at home, with the fourth close by so that Bertha does much for him. Hats off to this most capable gal!

With the Clubs

In the last issue we welcomed the newest of the YL clubs — the Colorado YLs. Officers for this group are: Pres., KØEPE, Marte; V.P., KØBTV, Kay; S-T, K5OPS/Ø, Ethel; publicity, KØZSQ, Valerie; historian, KØWZN, Ann; certificate custodian, KØRGU, Tillie. Other charter members are KØSQK, Pat; KØUMS, Ginny, KØSPW Exa; WØEVT, Carol (who was the first YL to be licensed in colo.); KØRXK, Lola, and W6AAX/Ø, Clarice. The club is holding charter membership open until Dec. 31, 1961 and invites all licensed YLs living in Colorado to join. Yearly dues are $2 and should be sent to K5OPS/Ø, Ethel Chastain, 851 Victor St., Aurora, Colo.

The Colorado YLs are offering a certificate called the "sYLver DOLL-ar," to be awarded for contacts with five Colorado YLs after July 1, 1961. Send list of contacts (no QSLs) along with 50¢ to KØRGU, Tillie Curington, 2067 Brentwod St., Denver 15.

The Portland Roses elected these new officers at their Sept. meeting: Pres., W7BED, Bettie; V.P.-treas., W7GRC, Lillian; secy, W7ZKY, Dee; P/C, W7HPT, Beverly. The Portland gals are busy planning and working on the National Convention for next summer, and we hear from W7NJS, Beth, that they have a lovely afghan made for a main YL prize.

From P/C K9TEI, Christiana, we learn of these new officers for LARK of Chicago: Pres., K9TRP, Diane; V.P., K9LDK, Adeline, secy, K9SRD, Phillis; treas., K8CZQ, Pat; editor of *Pinfeathers*, K9TGK, June; Novice rep., W9SJR, Bernice; certificate custodian, W9MYC, Gladys. In January '62 LARK will celebrate its 10th anniversary and has grown from the nucleus of four YL who gathered to get the club going to now nearly fifty resident and non resident members.

WAYLARC officers, elected at the September meeting, include: Pres., W3TSC, Camille; V.P., K4EAM, Vi; secy, W4TVT, Claire; treas., K4BNG, Jane.

"A Woman at Sea"

As you may know from an earlier article in this column and the chapter "YL Marine Operators" in our book *CQ YL*, we have a great interest in women who have worked as radio operators aboard ships. Now in a Spring '61 issue of *YL BEAM*, published by the South African Women's Radio Club, we found an item with the above title, authored by ZS6GH, Diana.

"It is still quite rare in our enlightened day to find a woman radio operator on board a ship, as many countries do not allow the female sex to become operators at sea.

"Just recently a woman radio operator on a Swedish steamer was the heroine of a mid-Channel sea drama. Speaking in excellent English, she guided the Dover Lifeboat to her ship, the 2,297 ton *Britta*, which was involved in a collision with an Italian oil tanker five miles southeast of Dover. The ship's bows were badly damaged, the forward hold was flooded and the anchor was lost. A list developed, and then the call for help was sent out. Over the shortwave radio this call was heard — 'This is *Britta*, and we require lifeboat assistance.'

"The Dover lifeboat was launched and began to struggle through the fog to reach *Britta*, guided by the radio messages in precise English. 'Can you see our lights?' came the girl's voice again. 'We are showing lights, but nobody has seen them yet.'

"The Dover Harbour's tug and a Belgian tug also tried to make contact with the crippled freighter. As the lifeboat slowly approached the *Britta* she was asked for a pilot to go on board and guide the ship into Dover. Radio listeners on shore heard the woman operator say 'Now we can see the lifeboat. The engines are being stopped. The man is coming aboard.'

"Said one radio listener on shortwave, 'The girl on the *Britta* was magnificent. She remained completely unruffled in what must have been an anxious situation.'

"By 9:00 PM the steamer, which had been bound for Portugal, was guided to just outside Dover Harbour, and the Harbourmaster went out to inspect the damage before deciding whether she could be taken into harbour without any danger of sinking.

"The oil tanker, *Mirella d'Amico*, which was in the collision was undamaged and continued her voyage."

Book Supplement

Did you know that a new supplement to *CQ YL* is now available? It brings the book up to date with YLRL officers through 1962, YL club certificate information, YL WAZ, WPX and DXCC listings.

The one and only book about the YLs, *CQ YL* contains 19 chapters, over 500 photographs. Order your autographed copy, or a gift copy, now from this column editor (address at head of column), $3, postpaid.

If you have *CQ YL* and want the new 2 page supplement, drop a note to W5RZJ with your request and enclose two 4 cent stamps to cover the cost of mailing. We also have copies of the 2 page supplement (pages 36-A and 36-B) printed in 1959 if you did not get yours earlier. (YL club secretaries may order the new supplement pages for all in their clubs and have a bulk mailing.) The supplement pages are "slotted" so they will fit directly into the *CQ YL* spiral backbone.

33, W5RZJ

These YLs gathered around the ham rig during the 11th Midwest YL Convention held in Chicago last May 18-21. Using the call W9YL and gear supplied by Hallicrafters, the station was on the air throughout the convention. L. to r., seated: K9BWJ, Mary Alice; W9SJR, Bernice, convention chairman. Standing: W9YWH, Evelyn; K9IVG, Roberta; W9AYX, Jackie; W8MHE, Wanda; W9LRT, Julia; W4DEV (ex-W9FZO), Helen; W8ATB, Esther; K9UXV, Ruby. The main convention luncheon and banquet were held at famous Tam O'Shanter Country Club. Next Midwest YL Convention is scheduled for Flint, Mich.

Contest Calendar [*from page 56*]

The 5th International OK DX c.w. Contest sponsored by the CRC is a shorty. In fact, its so short that it will never gain much popularity in this country. Practically the whole contest period is during the night hours over here, leaving very little opportunity to work anything on the higher bands.

However, for those of you who have something good going on 40 and 80 following are the rules.

1. This is a world wide contest so do not concentrate on Czechoslovakians only.
2. Use all bands 3.5 thru 28 mc.
3. The usual 6-figure serial number, RST plus a progressive contact number starting with 001.
4. Each complete exchange is worth 3 points. Contacts with OK station are worth double or 6 points. Contacts between stations in the same country do not count.
5. Your multiplier is determined by the number of Continents worked on each band. (Not countries). Six per band or a maximum total of 30.
6. Two classifications, single operator and multi-operator.
7. Competition is for single band or all band. Single band entries may also include other bands, in which case the log data on other bands will serve for checking purposes.
8. Use separate log sheets for each band and following information should appear in this order: Date, time in GMT, Station worked, number sent, number received, points and multiplier.
9. Include and sign following statement: "I declare I have observed the rules of the contest as well as the regulations of the licensing authorities in my country."

Your logs go to: The C.R.C. Contest Committee, P.O. Box 69, Prague, Czechoslovakia.

PACC CONTEST RESULTS, 1961

C.W.

PAØ TOP FIVE

PAØLOU	85,484
PAØVO	53,218
PAØLV	34,560
PAØVDV	25,016
PAØVB	17,360

Entries USA

W1WY	**486**
W1JYH	408
W1FZ	396
W1EXY	84
W5WZQ	**60**
K8PYD	**60**
WØMCX	**48**

Canada

VE1AE	**210**
VE3HB	**234**
VE3BWY	180

Winners Only
Other Countries

SP8MJ	729
HB9QA	594
HA8KCU	567
DM3YIB	513
OH3PG	504
OK1KBY	459
SM5BEU	396
G3JUL	336
UR2KAE	306
YU1DVW	306
OZ8HC	231
GW3LAD	180
ON4CE	96
LA2Q	48
KP4CC	45

PAØ TOP FIVE

PAØLV	17,888
PAØHBO	10,810
PAØSNG	9,675
PAØADP	7,359
PAØHSJ	4,725

Winners Only
Other Countries

DM3KDM	1,584
EA2FE	957
OH2EW	837
HB9QA	780
I1FMC	648
SM5CHA	360
CT1JV	336
UR2KAE	336
LA5VH	234
YO9WL	224
EA6AR	174
SP2CO	135
GW3LAD	75
PZ1AX	36

PHONE

PAØ TOP FIVE

[*Continued on page 94*]

IS K6INI THE WORLD'S CHAMPION DX OPERATOR?

Judge for yourself! Read his letter and count the DX he has worked—with only 65 watts and a $16.95 Gotham V-80 Vertical Antenna.

2405 Bowditch, Berkeley 4, California
January 31, 1959

GOTHAM
1805 Purdy Avenue
Miami Beach 39, Florida
Gentlemen:

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

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

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

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

Wishing you the best for 1959, I am

Sincerely yours,
Thomas G. Gabbert, K6INI (Ex-TI2TG)

YOU COULD WORK WONDERS WITH A GOTHAM VERTICAL ANTENNA!

V-80 VERTICAL ANTENNA

FACTS

- If K6INI can do it, so can you
- Absolutely no guying needed.
- Radials not required.
- Will work with any receiver and xmitter.
- Overall height 23 feet.
- Uses one 52 ohm coax line.
- Mount it at any convenient height.
- No relays, traps, or gadgets used.
- Accepted design—in use for many years.
- Four metal mounting straps furnished.
- Special B & W loading coil
- Non-corrosive aluminum used exclusively.
- Omnidirectional radiation.
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.

FILL IN AND SEND TODAY!

Airmail Order Today — We Ship Tomorrow

GOTHAM Dept. CQ
1805-A PURDY AVE., MIAMI BEACH, FLA.

Enclosed find check or money-order for:

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

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

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

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

Name_____

Address_____

City_____ Zone_____ State_____

For further information, check number 22, on page 120

BIG TRADES • FAST SERVICE • EASY TERMS

TERRY'S $5.00 DOWN

HAMS CHRISTMAS CELEBRATION

Come on In and Try it Out—
Or Order By Mail—IMMEDIATE DELIVERY

Yes, we have the SX-115 in stock now

HALLICRAFTERS
NEW SX 115 Receiver

for SSB - AM - CW

Amateur Net $595.00

You've been reading about the SX-115 . . . now Terry, Steve and Doc want you to experience the satisfaction of operating it. Visit either store or order by mail . . . we can ship right from stock. If you have a trade-in, we can give you an unbelievable deal on the SX-115. If you want the newest and the finest Hallicrafters receiver . . . get the SX-115 . . . NOW!

FREE GIFT!

You're invited . . . let us show you the SX-115 either at our Chicago or Milwaukee stores . . . and take home a beautiful Halicrafters ball-point pen. No obligation . . . we just want to get acquainted.

$5 DOWN — up to 3 YEARS TO PAY

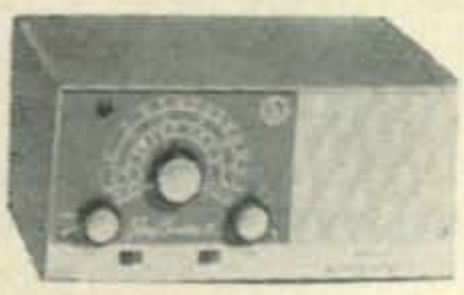
LOOK AT THESE LOW MONTHLY PAYMENTS AFTER $5 DOWN PAYMENT

Model	Ham Net	1 Year	2 Years	3 Years
SX 115	$595.00	$49.58	$24.79	$16.52

C.B.'rs MEET "SANDY"

W9BTN . . . our sales manager. If you sell, service or install C/B equipment, contact Sandy about Citizen Band equipment and antennas. He can save you money.

CHRISTMAS IDEA FOR THE JR. OP.



If you have a young prosepctive SWL or novice on your Christmas list . . . how about giveing him a Hallicrafters S-119 SWL Receiver? It's easy to put together, or you can have it fully factory-wired from stock. This is a fine start on the way to becoming a ham.

Wired and Tested $49.95

Kit Form $39.95

(Yes, we'll trade on this equipment . . . tell us what you have.)

USE HANDY ORDER COUPON — NEXT PAGE ▶

HELP US Move This Huge Hallicrafters Stock

Sure, we're among the biggest Hallicrafters dealers . . . but even we get overstocked. That's our problem right now . . . why, we're ready to make you a better trade in deal with terms you simply can't beat anywhere!

$5 DOWN — UP TO 3 YEARS TO PAY

puts any new Hallicrafters Equipment in Your Shack

LOOK AT THESE LOW MONTHLY PAYMENTS
(after $5 down payment)

	Price	Monthly Payments
S-38E Receiver	$ 59.95	$ 1.98
SX-62A Receiver	395.00	14.08
S-94 Receiver	69.95	2.35
S-95 Receiver	69.95	2.35
SX-100 Receiver	325.00	11.56
SX-101A Receiver	445.00	15.89
S-107 Receiver	94.95	3.25
S-108 Receiver	139.95	4.87
SX-110 Receiver	169.95	5.96
SX-111 Receiver	279.50	9.91
SX-115 Receiver	595.00	21.31
S-120 Receiver	69.95	2.35

	Price	Monthly Payments
SX-140 Receiver	$124.95	$ 4.33
SX-140K Receiver	104.95	3.61
SR-34AC Transceiver	395.00	14.08
R-47 Speaker	12.95	.29
R-48 Speaker	19.95	.54
HT-32B Transmitter	725.00	26.00
HT-33B Linear	995.00	35.75
HT-37 Transmitter	450.00	16.07
HT-40 Transmitter	109.95	3.79
HT-40K Transmitter	89.95	3.07
HA-4 Keyer	59.95	1.98

Model	Description	Price	Per Mo.
HA-2	2-Meter Transverter	$ 349.50	$ 9.55
HA-6	6-Meter Transverter	$ 349.50	$ 9.55
P-26	AC Supply for above	$ 99.50	$ 2.63
FPM-200	Mobile Transceiver	$1995.00	$33.06
HT-41	KW Linear	$ 395.00	$10.84
S-119	SWL Receiver	$ 49.95	$ 1.25
S-119K	Kit form for above	$39.95	$ .97

Reconditioned Hallicrafters Gear — we have it coming out of our ears!

Prices have been cut to move it fast. Buy now for Christmas delivery. Fully reconditioned and checked in our own shops.

10% DOWN UP TO 3 YEARS TO PAY

Giant Trades!

Everybody knows we trade highest. Now we're going even one better to move our big stocks. Terry, Doc and Steve will stand on their heads to give you the deal you want.

SX-24 Receiver	$ 59
S-38 Receiver	$ 24
S-38B Receiver	$ 27
S-38C Receiver	$ 29
S-38D Receiver	$ 34
S-38E Receiver	$ 39
S-40 Receiver	$ 49
S-40A Receiver	$ 59
S-40B Receiver	$ 69
SX-43 Receiver	$ 99
S-53 Receiver	$ 49
S-53A Receiver	$ 54
SX-62 Receiver	$199
SX-62A Receiver	$299
SX-71 Receiver	$119
S-85 Receiver	$ 79
SX-99 Receiver	$ 99
SX-100 Receiver	$199
SX-101 Mark II	$249
SX-101 Mark III	$279
SX-101A Receiver	$299
S-102 Receiver	$ 39
S-106 Receiver	$ 39
S-107 Receiver	$ 69
S-108 Receiver	$ 99
SX-110 Receiver	$129
CB-1 Citizens Band	$ 69
HT-30 SSB Exciter	$229
HT-31 Linar Amplifier	$179
HT-32 Exciter	$399
HT-32A Exciter	$449
HT-33 Linar	$249
HT-40 Transmitter	$ 79

AMATEUR ELECTRONIC SUPPLY

Two Stores to Serve You

PLEASE SEND MAIL ORDERS TO MILWAUKEE STORE

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MILWAUKEE, WISCONSIN
3832 Lisbon Avenue
Phone: WEst 3-3262

MANAGER, "DOC", W9HJS

CHICAGO, ILLINOIS
6430 Milwaukee Avenue
Phone: ROdney 3-1030

Amateur Electronic Supply—Mail Order Dept.
3832 W. Lisbon Ave., Milwaukee 8, Wisc.

Ship me .....
I enclose .....: I will pay the balance in

☐ 1 year ☐ 2 years ☐ 3 years ☐ C.O.D.

I want to buy ..... and want to trade
..... What's your deal?

Name .....

Address .....

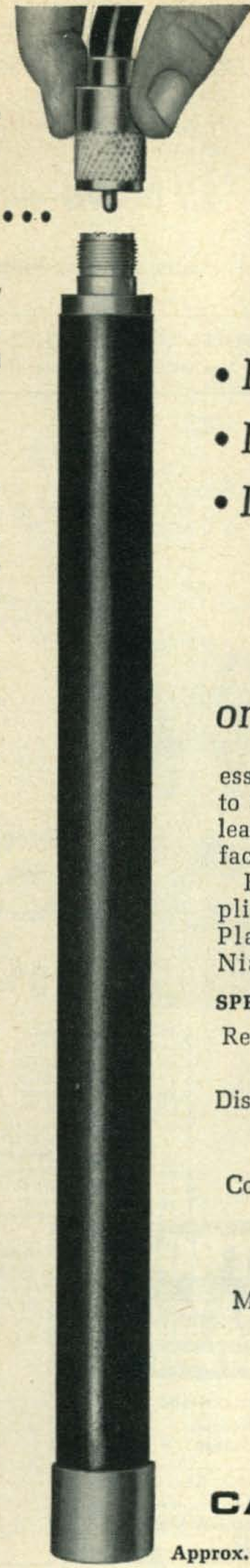
City .....State.....

☐ Send reconditioned equipment bulletin

For further information, check number 23, on page 120

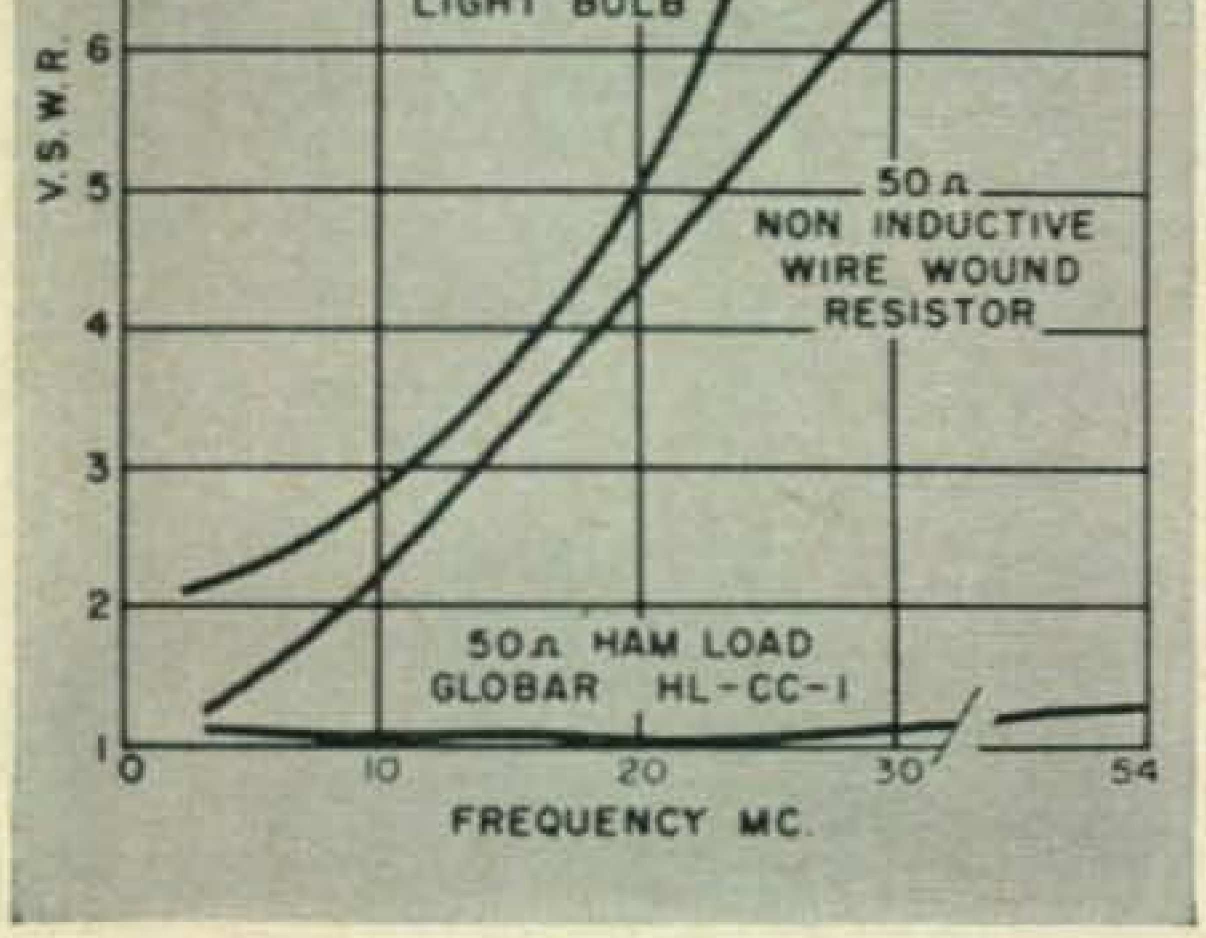
NEW...

LOW-COST, NON-INDUCTIVE "HAM LOAD"



Here's a new 50-ohm resistive dummy load that's ideal for all types of amateur service—fixed, portable or mobile. By switching the "Ham Load" into your antenna circuit, you eliminate on-the-air tuning and needless QRM. The unit also provides a dependable, non-inductive termination for testing equipment, measuring power and antenna matching.

The Carborundum "Ham Load" is supplied as a single unit with standard coax connector for easy mounting on rack or cabinet, or for designing into home-brew equipment. Although small in size, the high-temperature ceramic resistance element dissipates up to 250 watts *output* for 5 minutes! Unlike bulbs or wire-wound resistors, SWR remains essentially flat at less than 1.5:1 up to 54 Mc (with the load mounted at least 5″ from metal reflecting surfaces).



- *Reduces QRM*
- *Increases Efficiency*
- *Dissipates 250 Watts Output*

only **$23.75***

*Suggested Retail

For the name of your nearest supplier, write: Dept. QS-11, Globar Plant, Carborundum Company, Niagara Falls, New York.

SPECIFICATIONS

Resistance:	50 ohms, non-inductive
SWR:	Less than 1.5 at 54 Mc
Dissipation:	250 watts (up to 5 minutes); 150 watts continuous
Connector:	Standard coax (SO-239 type)
Size:	Approximately 13½″ long by 1″ diameter
Mounting:	Any convenient location
Caution:	Due to heating when loaded at high power, the unit should be mounted in freely circulating air.

CARBORUNDUM

Approx. one-half actual size

For further information, check number 60, on page 120

CQ HAM MART

For further information on items not shown see Pages 138, 139 of *CQ*, November Issue. Send order on coupon below.

CQ ANTHOLOGY

Most amateurs do not have a good file of back issues of CQ, So we've looked back through the years 1945-52 and assembled all in one place the articles that have made a lasting stir. The issues containing most of these articles have long ago been sold out. The price is a mere $2.00.

VHF FOR THE RADIO AMATEUR

You can't afford to be without this dynamic new handbook designed with the VHF amateur in mind. Filled from cover to cover with all new and original construction material presented so that you can understand it. Written by Frank C. Jones W6APF nationally acclaimed for his VHF pioneering. Available now for only $3.50.

CQ LICENSE GUIDE

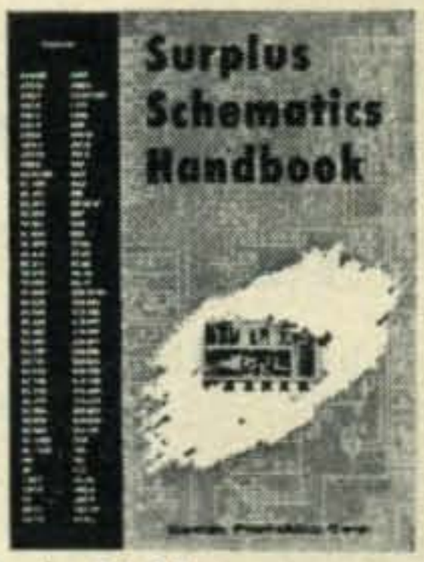
212 pages of everything the Amateur must have to get his license and progress toward the general class ticket. Plus many additional pages of vital information for the ham operator. All this for only $2.50.

SIDEBAND HANDBOOK

Written by Don Stoner, W6TNS, was almost one full year in the preparation of this terrific volume. This is not a technical book. It explains sideband showing you how to get along with it . . . how to keep your rig working right . . . how to know when it isn't . . . and lots if how to build-it stuff, gadgets, receiving adaptors, exciters, ampliers Price, only $3.00.

SURPLUS SCHEMATICS HANDBOOK

This is a book literally loaded with schematics for al the currently popular pieces of surplus gear. Most amateurs are well aware of the problems encountered in purchasing seemingly inexpensive surplus units, only to find that no schematic diagram is available. Trying to figure out the circuitry cold turkey can be many times more difficult that the most involved puzzle, and purchasing a single instruction book can run as high as $3.50. Why knock yourself out when you can have a book with complete coverage on hand in your library? All this for only $2.50.



DX ZONE MAP

Brand New! Amateur Radio World-Wide DX & Zone Map complete, accurate and up to the minute with Prefix, Zone Boundaries, Great Circle beam bearings. 4 Colors, 36 by 42 inches on heavy vellum map paper. Mailed in heavy cardboard mailing tube. Only $3.00.

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Book Division
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LIGHTED GLOBE	$24.95	☐
UNLIGHTED GLOBE	19.95	☐
ATLAS	12.50	☐
COMMAND SETS	1.50	☐
MOBILE HANDBOOK	2.95	☐
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REGULAR LOG SHEETS (100)	1.00	☐
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BINDER—YEAR WANTED	3.50	☐
VHF FOR THE RADIO AMATEUR	3.50	☐
CQ ANTHOLOGY	2.00	☐
HI-FI BOOK	2.50	☐
SIDEBAND HANDBOOK	3.00	☐
CQ LICENSE GUIDE	2.50	☐
SURPLUS SCHEMATICS HANDBOOK	2.50	☐
DX ZONE MAP	3.00	☐

SIRS: My check (money order) for $_____ is enclosed. Please send the following items to:

Name_____

Address_____

City_____ Zone_____ State_____

New York City Residents Add 3% Sales Tax

BIG TRADES • FAST SERVICE • EASY TERMS

TERRY'S $5.00 DOWN

HAMS CHRISTMAS CELEBRATION

GET COLLINS FOR CHRISTMAS

You're going to step up to Collins sooner or later . . . why not make it right now when you can get any Collins equipment for just $5 down, and take up to Three Full Years to pay? If you have a trade, so much the better for you!

WATCH FOR TERRY AT YOUR HAM CONVENTION

W9DIA makes most of the conventions . . . watch for our A.E.S. plane, equipped with a Collins KWM-2. Be sure to look us up and talk with us . . . you'll be money ahead!

Here's Steve, W9EAN, manager of our Milwaukee store, relaxing at home with his Collins Equipment. Why not match his set up in your shack on the best terms ever!

FAST DELIVERY — ALL FRESH STOCK . . .
Use Coupon on Next Page

Meet Dick K9IFF

Our storing and willing shipping manager. He sees that your shipment is well packed to reach you in perfect condition . . . and he does it!

KWM-2 OR ANY COLLINS EQUIPMENT . . . $5 DOWN UP TO 3 YEARS TO PAY

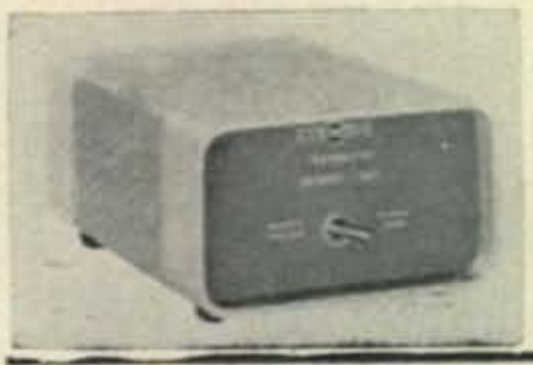
Look at these low monthly payments after $5 down payment

	Ham Net Price	Monthly Payments
30L-1 Linear Amplifier	$ 520.00	$18.59
30S-1 Linear Amplifier	1556.00	56.00
32S-1 Transmitter	666.00	24.42
75S-1 Receiver	520.00	18.59
75S-3 Receiver	620.00	22.20
51J-4 Receiver	1464.00	52.69
51S-1 Receiver	Write for quotation	
KWM-2 Tranceiver	1150.00	41.35
KL-1 Dummy Load	58.00	1.91
351D-2 Mobile Mount (KWM-2)	120.00	4.15
CC-2 Carrying Case (KWM-2, KWM-2A, 39-L, 51S-1)	85.00	2.88
MP-1 15V DC Power Supply	198.00	7.10
PM-2 Portable Power Supply	150.00	5.24
516F-2 AC Power Supply (32S/KWM-2)	115.00	3.97
312B-3 Speaker (S-Line)	32.00	.97
312B-4 Speaker Console (S-Line, KWM-2)	195.00	7.00
312B-5 PTO Console (KWM-2)	350.00	12.45
399C-1 PTO Speaker	164.00	5.74
F455K-15 Mechanical Filter (75S)	60.00	1.99
F455Q-5 Mechanical Filter (75S)	52.00	1.70
302C-3 Directional Wattmeter	130.00	4.51
189A-2 Phone Patch	67.00	2.10
440E-1 Cable (516E-1 to KWM-2)	17.00	.43
136B-2 Noise Blanker (KWM-2)	124.00	4.30

WRITE FOR COMPLETE COLLINS PRICE LIST AND CATALOG

BIG IDEA! *TELL THE XYL TO MAKE IT A COLLINS CHRISTMAS AT YOUR HOUSE!*

(XYL's—check to see if "he" has these accessories)



DL-1 DUMMY LOAD

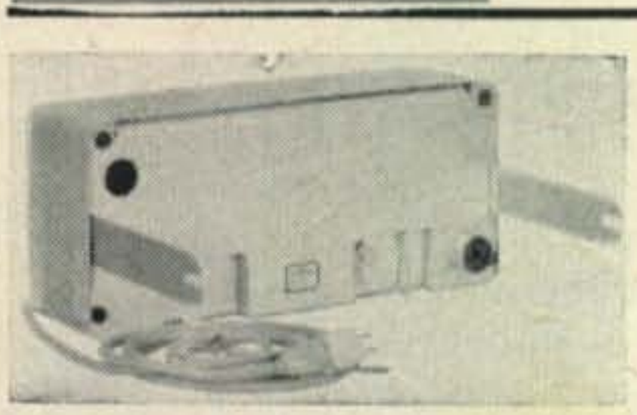
Tune up without getting on the air. Switch in or out without changing connections.

Amateur Net **$58.00**

Here are 2 things *any* ham can use

Fundamentals of SSB $5.00

Collins Log Books $1.00 each



PM-2 PORTABLE POWER SUPPLY

Lightweight portable Collins power supply.

$150.00

CC2 carrying case—for that comming vacation or business trip. $85.00

302C-3 DIRECTIONAL WATTMETER

Measures forward and reflected power. 200 and 2000 watt scales.

$130.00

COLLINS MICROPHONES

SM-1 Fixed station	$32.00
MM-1 Mobile Hand held	25.00
MM-2 Mobile Boom with Earphone	39.00
MM-3 Mobile Boom (ilustrated)	27.00

COLLINS RECONDITIONED EQUIPMENT

75A-2 Receiver	$ 299.00
75S-1 Receiver	$ 379.00
75S-1 Receiver/blanker	$ 449.00
51J-4 Receiver new display	$1,198.00
32V-1 Transmitter	$ 199.00
32V-2 Transmitter	$ 249.00
32V-3 Transmitter	$ 299.00
32S-1 Transmitter	$ 479.00
KWM-1 Transceiver	$ 475.00
AC supply for above	$ 109.00
70E8A PTO unit	$ 29.00
312B-4 Speaker Console	$ 149.00
30S-1 Linear amplifier	$1,195.00
KWM-2 Demonstrators	$ 895.00

Send for latest Reconditioned Equipment Bulletin

We're Trading High:

As one of the leading Collins distributors, we're prepared to offer you more for your present equipment in trade on any Collins gear. Get Terry's deal . . . use coupon below.

AMATEUR ELECTRONIC SUPPLY

Two Stores to Serve You

PLEASE SEND MAIL ORDERS TO MILWAUKEE STORE

MANAGER, STEVE, W9EAN

MILWAUKEE, WISCONSIN
3832 Lisbon Avenue
Phone: WEst 3-3262

MANAGER, "DOC", W9HJS

CHICAGO, ILLINOIS
6430 Milwaukee Avenue
Phone: ROdney 3-1030

Amateur Electronic Supply—Mail Order Dept.
3832 W. Lisbon Ave., Milwaukee 8, Wisc.

Ship me .....
I enclose .....: I will pay the balance in

☐ 1 year ☐ 2 years ☐ 3 years

I want to buy ..... and want to trade
..... What's your deal?

Name .....

Address .....

City .....State.....

☐ Send reconditioned equipment bulletin

For further information, check number 24, on page 120

Contest Calendar [*from page 86*]

Kansas

Starts: 1400: GMT Saturday, December 9th
Ends: 2359 GMT Sunday, December 10th

This QSO Party is a continuation of the Kansas Centennial celebration as explained in last month's CALENDAR.

Also keep in mind the Sunflower and Kansas Centennial Trophies still available for contacts made during 1961.

Your logs for the QSO Party should be in the hands of the Kansas Centennial QSO Party Committee, 414 Avenue C, Wichita, Kansas before January 31st.

Ed. Note

I didn't know about the OE Contest (a new one evidently) that took place on the week-end of October 7th c.w. and 14th phone.

In case you got involved on the above dates you can send your log to Peter Rauchegger, OE5PX, Linzerstrasse 3, Linz-Steeg, Austria.

We were happy to have the Van Zyls, Susan VQ2WZ and Chris VQ2VZ drop in at *CQ* the first week in October. They expected to be back home in time to participate in the phone section of our World-Wide DX contest. Susan, you might remember, was runner-up for world high honors in last year's contest. Good luck Susan, hope you got back home in time.

Some of our foreign readers are complaining, and with justification, that we are not announcing some of the contest dates in time. This is a sore spot with me too, but if some of these organizations don't get the information to us in time we just can't get it into print.

73 for now, Frank, W1WY

Propagation [*from page 59*]

forecast for the next five years. The report offers timely suggestions for getting the most out of each amateur band during the long period of low sunspot activity expected during the years ahead. Much of the information appearing in the Jacobs-Leinwoll report has not been published previously, and it is fast becoming a valuable reference on the subject of sunspots and radio propagation. Copies of the booklet can be obtained from the *CQ* Circulation Dept. Box 55, 300 West 44th Street, New York 36, N.Y. The price for a single copy, sent postpaid, is $1; while in quantities of 10 or more, the price is 75¢ per copy. Order your copies now to insure delivery before Christmas.

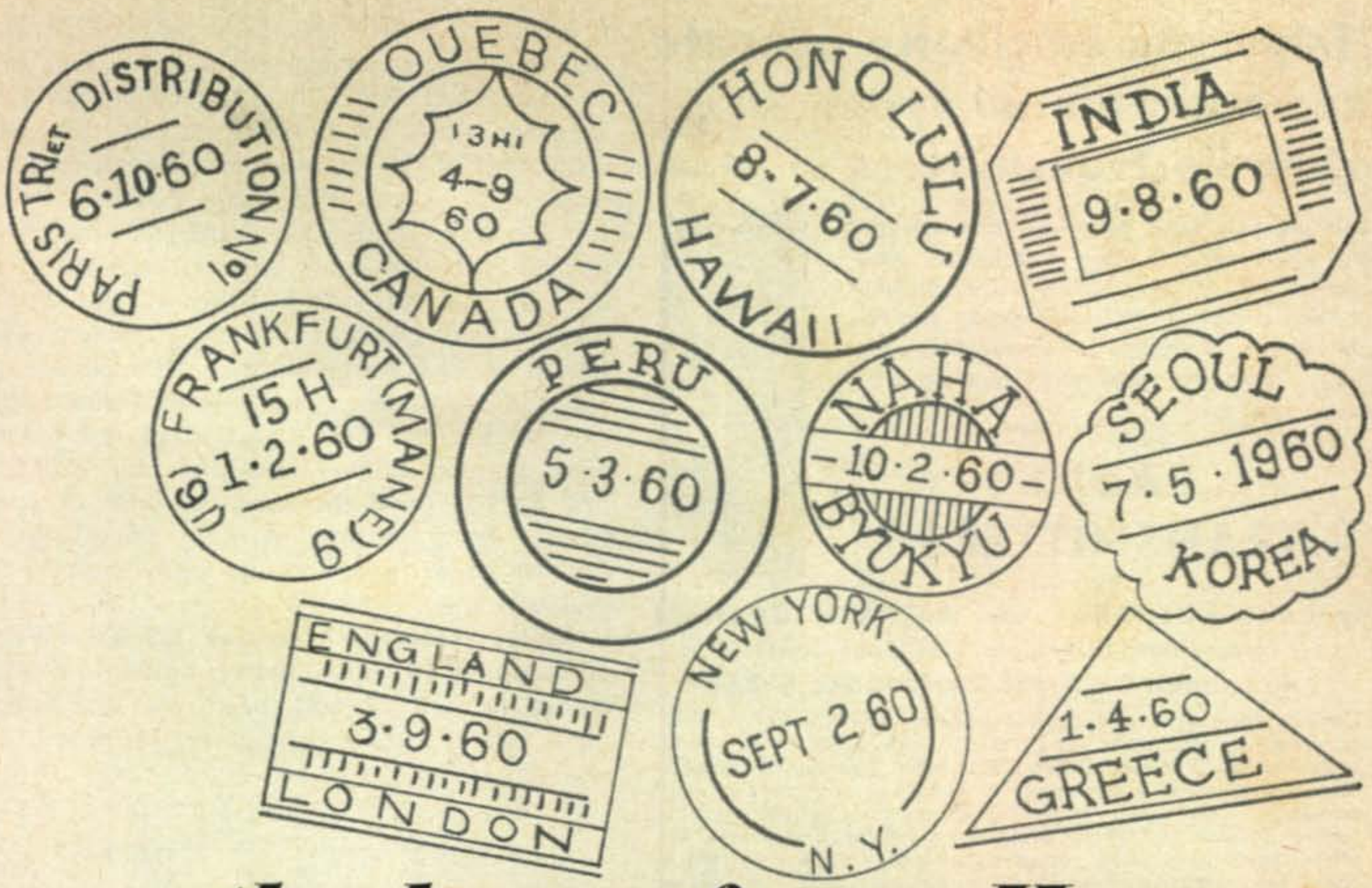
73 and Season's Greetings, George, W3ASK

Ham Clinic [*from page 77*]

Liberty Ave. Jamaica 33, N. Y. or Allied Radio, 100 N. Western Ave., Chicago 80, Illinois. Both have good stocks and the former specializes in miniature parts for transistor circuits.

V.H.F. Reflectometer—"Any recent information around on a good reflectometer for v.h.f. use?"

Yes. In the September 1961 issue of the



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For further information, check number 26, on page 120

Radio Society of Great Britain (RSGB) Bulletin, there is an article on a reflectometer for 145 mc by G3HRH. It is the finest unit I have seen for v.h.f. s.w.r. measurement. You might write the RSGB at New Ruskin House, Little Russell St., London W.C. 1, London, England for a copy. Enclose 50¢ (International Money Order) for the mag and mailing costs. Incidentally, in this same issue of the Bulletin, there is a message from the President of the RSGB (G2EC) appealing to British amateurs for funds with which to acquire a new building for the Society. The RSGB does not have the great number of members that our ARRL has, nor does it have the large amount of surplus funds. As a gesture of ham friendship, I'm sending them my check to assist them; I hope you will too.

6 Meter Antenna Matching Device—We had 500 copies of the 6 meter antenna matching device printed up and they went like hotcakes on a cold winter morning. As promised, herewith is the diagram; see fig. 5.

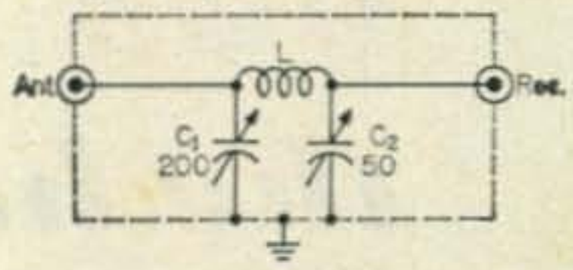

Fig. 5—An antenna matching unit for use with 50 mc receiving setups. Capacitors C_1 and C_2 should be tuned for maximum signal. Coil *L* consists of 6 t. #14e., 1½" d., 4 t.p.i.

Thirty

It is our sincere hope that you have taken out the time to write your congressman relative to the proposed change in FCC rules which will permit reciprocal licensing. Perhaps you may say you are not interested, but you *should* be! More international goodwill will result from the rules change than for any other reason I know.

This is the last column for 1961 and we close it praying for peace and wishing all HAM CLINIC readers a very Merry Christmas and a Very Happy New Year. To all overseas hams we extend our sincere greetings too with a big "72." 73 and 75, Chuck and Elfriede.

Linear Amplifier [*from page 46*]

power supply are less severe than if the p.a. tube were biased to cut-off (zero plate current). On 20 c.w., I have loaded the amplifier to 750 watts input with considerably less than 100 watts drive. S.s.b. and c.w. ratings are the same. On low level a.m. phone, output is approximately 260 watts to the antenna. (Considerably more respectable than the output of the "barefoot" B&W).

Once the driver is adjusted and the final properly tuned, power input is controlled by the excitation control on the driver. I was pleasantly surprised to find the amplifier loaded to 750 watts input on 10 and 15 meters also. Rarely is this much power needed on these

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bands but it's there if needed. Forty meters offered no problems, just lots of contacts. On 75 and 80 meters, I had to be content with dummy load output since I don't have an antenna for this band. (I did improvise the 40 meter antenna to make a dozen or so contacts on 80 c.w. and 75 phone).

I use a 500 watt light bulb for a dummy antenna and can light it to full brilliancy on any band, 10 to 80 meters, running 300 ma at 2500 volts. (You ponder the efficiency). This is not the maximum at which the amplifier will operate. It's just a convenient level at which I choose to operate. It is fairly simple to load another 100 ma and say I'm running a kilowatt but you simply couldn't tell the difference on the air.

Two copper tubing coils and a #10 wire coil for 80 cover the frequency range 10 through 80 meters. One for 10, 15 and 20; one for 40 and one for 80. The antenna is a 10 through 40 meter trap vertical. On-the-air reports on a.m. phone included many "excellent quality" "best sounding linear" reports. I even had "loudest vertical I have worked" from the east coast. DX reports of course have been excellent. For the last six months, the rig has been used on c.w. and a.m. phone. The present phase is s.s.b. operation to complete the versatility of the linear amplifier.

That's the story of my linear amplifier. It's performance is satisfactory. ■

Viking I [*from page 43*]

lip below J_{101} to facilitate mounting the bypass capacitors. The mike connector hole must be enlarged with a 5/8" punch to accommodate the p.t.t. connector. The front panel is pretty tough, so it is wise to have a couple of extra bolts for the punch on hand before you start. Use stranded wire for the connections to the movable contacts of the relay. Note that the unused half of SW_2 is used as a terminal lug so that stranded wire can be used for the relay connection. If you have r.f. pickup trouble check your ground connection. Also, bypass the mike leads inside the mike with 0.001 mf disk ceramic capacitors.

Conclusions

I would like to thank Bill Fink, K5EMT, for his assistance in designing the audio system. I would also like to make specific mention of the fact that several attempts have been made to operate the Viking I final straight through on six meters, but apparently there is no simple way of doing this. Even when sufficient drive was obtained on six, neutralization difficulties proved too great a problem. I would like to also point out that the Viking I fusing system is inadequate, and a 2-amp fuse should be placed in the primary circuit of the low-voltage transformer. This wraps up the Viking I modifications included to date. If anyone else has any modifications, I'd be glad to hear about them. ■

S. A. R. L.

The Saskatchewan Amateur Radio League welcomes all visiting radio amateurs and their families to Saskatchewan the land of wheat and holiday fun. If mobiling, the net frequency is 3780 and net meets at 1830 daily, but call in any time! If you are planning to visit our fair country let us know at the SARL, Box 801, Saskatoon, Saskatchewan, Canada . . . drive carefully and keep your fingers out of the HV . . .

Transistorized B.F.O. [*from page 39*]

hence is chassis grounded. The transistor is mounted to the terminal strip by its wire leads, with the transistor shield lead (see fig. 1) connected to the ground lug. The i.f. transformer, modified as stated above, is soldered directly to the terminal strip by two of its pins; the connection to the third pin is made with a short length of #16 bus wire for mechanical rigidity. It is suggested that, if this mounting scheme is used, a heat sink be used while soldering to prevent damage to the transistor and the tank transformer.

The PITCH CONTROL, C_1, is mounted directly to the chassis, automatically grounding its rotor. The stator connection is made with a short piece of #16 bus wire.

If desired, the battery could be soldered permanently into the circuit, instead of mounting in a spring holder. A holder was provided in the prototype for sake of convenience in testing. The Off-On switch is also optional. but was considered desirable to facilitate shutting off the b.f.o. while listening to phone signals.

Adjustment:

The only adjustment which must be made to ready the b.f.o. for use is that of setting the center frequency of the oscillator. With the PITCH CONTROL set at its mid-position, simply turn the slug on L_1 until ouput is obtained at 455 kc. This may be observed with a grid-dip meter, sensitive absorption wavemeter, calibrated oscilloscope, or by producing a beat note in a receiver. If the receiver is used, care must be taken that the signal observed is actually the i.f. frequency, and not a harmonic which falls within the tuning range of the receiver. The true i.f. frequency can be determined by rocking the tuning control of the receiver, leaving the b.f.o. Pitch Control set. The 455 kc i.f. signal will produce a beat note which will pass through zero beat on all received signals, while harmonics beating with the incoming signals will not. Fine adjustment of the slug should, of course, be made with the use of a receiver. If desired, after the adjustment has been completed, the tuning slug on the tank may be secured with a drop of Glyptal or cement.

Operation:

Operation of the b.f.o. is quite simple, but will vary with the receiver with which it is used. With the BC-611, a 4" length of wire attached to the binding post and placed in close proximity to the transceiver antenna was sufficient to provide adequate injection. A receiver with better i.f. rejection might need greater coupling, in which case a longer wire perhaps looped around the receiver antenna lead (but electrically insulated from it) can be used. This

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proved necessary with a broadcast receiver with which the b.f.o. was tried.

If a long lead is attached to the binding post, it may be found that readjustment of the slug on L_1 is necessary to bring the PITCH CONTROL within desirable limits. This is easily done, in the case of the prototype unit, by merely unsnapping the case.

Because of the characteristics mentioned in this article, the "Add-on" BFO makes a worthwhile addition to almost any phone receiver. Its operating frequency is not limited to 455 KC; most probably substitution of an i.f. transformer of some other frequency for L_1 would permit operation at any of the commonly employed i.f. frequencies. However, if this is done, it would probably be necessary to connect the transformer differently, since tapped IF transformers were available for only 455 KC at the time of this writing. In any case, a small amount of experimentation should yield a satisfactory b.f.o. for very little cost. ■

Marconi [*from page 31*]

development of the first vacuum tube for u.h.f. transmission, and the installation of the first microwave telephone system during 1933, between the Vatican and the Pope's summer residence at Castel Gandolfo; and his discovery of the effects of meteorological conditions upon v.h.f. propagation as a result of extensive transmission experiments conducted during 1930 between the Mediterranean island of Sardina, the Italian mainland, and the yacht *Elettra* — a discovery which led subsequently to the development of today's Tropospheric Scatter communication systems.

Marconi's more than forty years of pioneering efforts in the field of radio communications brought him high honors from governments throughout the world, including the 1909 Nobel prize for physics. Perhaps his greatest award, however, was the satisfaction of seeing wireless communication develop from a laboratory curiosity having "no practical value" into world-wide networks which in one form or another affect the life of every inhabitant of the globe.

Marconi's predominent interest was not for purely scientific knowledge as such, but in its practical application for useful purposes. His undaunted spirit to try the bold approach — to break if necessary, with existing techniques and beliefs — to try the "impossible", is truely symbolic of the spirit which gave rise to the birth of amateur radio during the very early days of wireless communication. It is a spirit for which there is as great a need today as there was sixty years ago, as we are again approaching a time when fundamental changes may occur in the means used for long-distance radio communications — a time when wireless waves will be used for communicating not merely across oceans and continents, but across the vast, almost unlimited distances of outer space. ■

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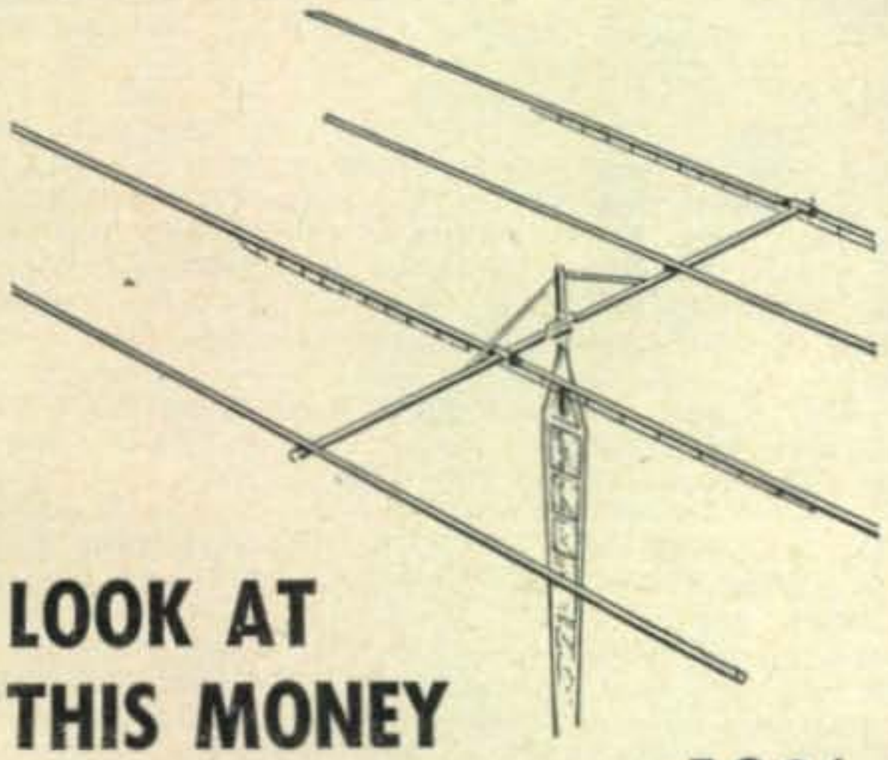

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111 11 El. 1¼ Meter Beam	13.95	1.16
313 13 El. ¾ Meter Beam	12.95	1..07
RBX-1 Rotor and Indicator	199.95	16.66
T3TDK Trap Traveler Portable Antenna	44.95	3.74

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Address .....

City ..... State .....

For further information, check number 40, on page 120

CANADIANS New National NC-300 won at Windsor Convention Sept. 30, in Windsor now. Going to college, need cash. $369 or best offer, what's yours? All letters answered. Ron Monahan, K8IOS, 1012 Nottingham, Grosse Pointe 30, Michigan.

Portable sideband station 20/75 meters custom built by W2EWL $150.00. No shipping. K2EN 31 Jervis Road, Yonkers, N. Y. YOnkers 3-7187 evenings.

Franciscans need receiver; testing equipment. Gift or nominal fee. Send C.O.D. for shipping costs. KN8AUC Our Lady of Carey Seminary, Carey, Ohio.

Highly-effective home-study review for FCC commercial phone exams. Free literature. Wallace Cook, Box 10634, Jackson 9, Miss.

DX-100 owners: Increase power by 50%. Run 240 watts AM-300 watts CW or SSB. Complete kit and instructions for adding another 6146 to final only $19.95. Similar kit for TX-1. Order or write. W4KUV-W4NZS, Best Radio Service, 610 N. Madison Avenue, Goldsboro, North Carolina.

HQ129X $100.00, 7620 CT 110/220 volt 400 mil fmr. $10.00. 110 volt 30 amp Variac New $36.00. 50 mfd at 3000 volt condenser, new $19.00. Transcon TNS $10.00. 12 Volt Dow coax relay $6.00. PE103—$7.50. 6 Volt 100 amp alternator $35.00. Trade for scope or RF generator. Merry Christmas, W9HJX, KN7PLK, XYLs and VBs. William Bexter, 3702 N. 1st Avenue, Tucson, Arizona.

MERRY XMAS and a Happy New Year from WØCVU. Congratulations to HKØTU winner of WØCVU plaque award for 200th country two way SSB.

WANTED: July 1945 issue of CQ in new condition. Cash or trade for June 1945 issue. W2WFZ, 229 North Church Street, Goshen, New York.

Band-switching, 200 watt am-cw transmitter with VF-1 and Variac controlled ½ k.w. power supply. $125.00. Matchmaster 52 ohm $20. W2ASF, 13 Sunnybrook Rd., Bronxville, N. Y.

Raytheon 3000 power amplifier. 3 kilowatts with Raytheon matching power supply! Uses 4 4X500A tubes in Push-Pull parallel. Complete with all tubes. $395 or trade for GPR 90 or equivalent receiver. K6LVD, 863 Arbol Verde, Carpinteria, California.

FREE—Electronic parts, tubes catalog—Free. New RCA, GE, etc tubes—6/10/2% discount off list. More on some types. New resistors, condensers, transformers, flybacks, yokes, etc. at fractions of original cost. New phonograph needles—70% or more off list prices and more, much more! Arcturus Electronics Corp., Dept. CQ., 502-22nd St., Union City, N. J.

A-1 reconditioned equipment. On approval. Trades. Terms. Hallicrafters S-85 $79.00, SX-99 $99.00, SX-100 $199.00, SX-111 $199.00, SX-101A $299.00, HT-32, HT-37; Hammarlund HQ-100 $129.00, HQ-129, $129.00, HQ-110 $179.00, HQ-145 $199.00, HQ-150 $199.00, HQ-160 $259.00, HQ-170 $289.00; National NC-270 $179.00, NC-183D $199.00, HRO-60 $345.00; Gonset G-50 $229.00; Central 20A $149.00, Viking II $159.00, Valiant $279.00, Thunderbolt linear $299.00, Collins 75S-1, 32S-1, 32V-1, 32V-3, 75A-4, KWM-2; Elmac, Globe, Gonset, Heath, Johnson, RME, other items. List free. Henry Radio Company, Butler, Missouri.

Get our bargain list of items in stock, completely reconditioned and low, low priced. We buy, sell and trade. H & H Electronic Supply, 506-510 Kishwaukee Street, Rockford, Illinois.

CLEANING SHACK. HRO with 170 kc to 30 mc coils and speaker, $90, SX 28, $50., Superpro w/ps, $50, NC100AX $35, SX42 w/speaker $135, Ranger $150, DX20, VFO, mike and plate modulator $65.00. R28ARC5 $12.50. 4 Barrymounts $1.00. K6LVD, 863 Arbol Verde, aCrpinteria, California.

SELL OR TRADE—Hallicrafters HT-17 Transmitter. Yagel, 366 Brooklyn Street, Sharon, Penna.

SELL: DX-40 in good condition $52.00. Mosley V-4-6 ant. 10-40 meters with 32 feet RG-8/U $18. Shure 405B mike good $9. Ron Nielsen, 207 Ridge Rd., Platine, Ill.

FOR SALE: Heath AT-1 $20.00. Heath QF-1 (new) $10.00, James Wood, Box 516, Milligan College, Tennessee.

WANTED: NC-66 state condition and price first letter. John Caspersen, Box 35, Andover, New Jersey

Amateur Radio Station K4ZRD, Jordan Lowry, Daytona Beach, Florida, will be off the air until December 17, 1961. There is a station bootlegging my call letters here in Daytona Beach, and anyone QSOing this station, please write to me. It has been impossible for us to locate this station by any means of triangulation, or any other way. Please help me from getting a ticket from the FCC for off the band operations.

CANADIANS, selling KWM-1 complete with DX adaptor, noise blanker, AC and DC power supplies all in excellent operating condition—$1,000.00—Contact Martin Rosenthal, VE3MR, 543 Yonge Street, Toronto 5, Ontario.

DX-100-B, carefully wired, little used, $150 FOB or trade for canoe. C. A. Rambow, W6RIJ/7, 1910 Monroe St., Pullman, Washington.

SALE: HQ-170 receiver very good condition, no marks or modificaions. All informaion available. $275. W5DPI, 1508 Gawain, Borger, Texas.

Teleype repair parts such as springs, gears, levers, etc. Genuine teletype parts. In bags of 5-40 units, 25¢ a bag, postpaid. K6LVD, 863 Arbol Verde, Carpinteria, California.

Late model 20A with QT1, Central Electronics VFO 10 thru 160 meters, Drake 1A, all in mint condition. Reasonably priced for quick sale. Frank Cresswell, 188 Jefferson St., Brooklyn 6, N. Y., HY 7-5812.

SELL: Viking II with push-to-talk and Johnson VFO $200.00. Communicator III (2 meter) with 6 crystals $230.00. Both for $395.00. Top condition. B. Friedman W2FNX, 11 Garfield Avenue, Clifton, N. J.

Globe Scout 680-A (wired)—$65; Hallicrafters S-107—$65; Both $110. H. Edward Pearce, Box 172, Hendrix College, Conway, Arkansas.

Navy bound must sell: Globe Scout model 65 $39, LA-1 $65, WRL VFO 755A $29, AR-3 $18, or $139 takes all. All letters answered via air mail. Peter J. Crosby WA2EYD, 108 Waverly St., Cattaraugus, N. Y.

SELL: SX-101 III A like new $275.00. Viking II with VFO excellent $175. PMR-6A with 12 volt dynamotor supply $60.00. Carl Johnson K2EDP, Notch Road, Oak Ridge, N. J.

WANTED: Eimac 250th and 6C21, new or used. Also 7.5 ampere Variac. Will sell pair 810's for $5.00 each. WØPXH, Quent Johnson, 512 Arrowwood Drive, Crestwood 26, Missouri.

---

2 inch call letters embroidered on ribbon for shirt back. $1.00. W8GSH, R. D. #1, East Palestine, Ohio. Order filled on receipt of money!

Complete SSB-AM-CW station. HQ-180, Apache, SB-10, Mike and coax relay, like new. Only $700.00 F.O.B. Levittown, Pennsylvania. Q. S. Hoshal, W3UCC, 48 Hydrangea Road, WIndsor 5-4287.

FOR SALE: Hammarlund HQ-110w/matching speaker. New condition. First reasonable offer takes it. John Huff, 252 Villa Vista, Sterling, Colorado.

FOR SALE: Gonset Communicator I 2-meter rig complete with switchbox containing ten crystals, perfect operating condition; a steal at $100. Will ship express collect on receipt of payment. G. H. Wagman, K2EWA, 62 Farms Road Circle, East Brunswick, N. J.

Heath Apache transmitter $165.00. BC-312 receiver with a.c. power supply $40.00. TCS transmitter with a.c. supply $25.00. Heath Mohican transistor receiver $65.00. Navy RAL-7 receiver $10.00. Western Electric Power Supply, 600 volts d.c. @400 ma. $15.00. Scott Navy Receiver, 110-160 mc, tunable, 110 volt a.c. supply $50.00. Heath Model O-11 oscilloscope $40.00. T. Rutherford, W6NUI, 1947 Turrell Street, Lomita, California.

HI-FI-FM receivers. Will swap for telescopes, cameras, radio equipment. W1BYX, Box #122, Rockville, Connecticut

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Hammarlund SP-600 JX-14 Ser. #. Recently factory reconditioned, manuals, all accessories and speaker. Will pay freight. Price $385.00. N. E. Leon, 4069 S Pacific Highway, Medford, Oregon.

Condensers, assorted values, 5¢ each; or trade for Vandergraff generator. Write H. Milnes, 18310 Bretton Drive, Detroit 23, Michigan.

21 GREAT REASONS WHY...

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For further information, check number 46, on page 120

GONSET 76 AC power supply $90.00 or Trade for 76 DC supply. Harry Jurow, 450 Sutter, San Francisco 8, Calif.

FOR SALE: GE battery charger, adjustable to 50 volts 10 amps, metered, like new, $36.95. S-band wavemeter, CW1-1 60/ABM, 115 volt, excellent condition, $10.95. Roller-Smith line frequency meter, 120 volts 55-65 cycles, ½% accuracy, recent factory calibration, $175. Bruce Steller, 624 Drumwood, McMinnville, Oregon.

NC-98, $80. Never used DX-40, $50. Never used VF-1 VFO, $17. Never used Calrad dynamic mike, $12. TV rotator, $15. 2-el, 15 M beam, $20. Like new Chicago 55.1 VOM, $17. Assortment of parts, $5. Enclose postage. Satisfaction or money back. Joe Morgan, K9HBS, Lovington, Illinois.

FOR SALE: Knight T-50 transmitter, excellent condition, 4 hours use, $38.00. Knight Space spanner receiver, A1 condition, $12.00. $45 00 takes both. R. Pascale, 435 Talmadge Ave., Bound Brook, New Jersey.

FOR SALE: Philmore CR-5ac, $20. 18 lbs not in good alignment condition, with cabinet. RME-99, $35, weight about 50 lbs. Heathkit grid dip meter $12, model GD-1B, 5 lbs. Surplus scope APN-4 $15. 50 lbs SCR-522 receiver $5. You pay postage. Write Robert Stanghill, Box 455, East Helena, Montana.

GONSET G-76 transceiver, matching DC power supply, PTT microphone, speaker, Webster bandspanner antenna, spare final, just 4 months old. Excellent condition with latest factory modifications. $435. Unused matching ac supply with warrantee card $125. Benjamin, K1SLZ Box 284, Lexington, Mass.

WANTED: Collins SC-101 Station control unit and F455-C08 filter for 75A3 serial above 1300. State price and condx. Palmer, K3MTW, Smethport, Pa.

WANTED: Tubes, diodes, transistors, military, commercial lab-grade test equipment, components, PRC, GRC equipment, aircraft equipment by Collins. Top prices. Write details, Bob Sanett, W6REX, V&H Radio & Electronics, 2053 Venice Blvd., Los Angeles 6, California.

Convert any television to sensitive, big-screen oscilloscope. Only minor changes required. Plans $1.95. Relco Industries, Box 10563, Houston 18, Texas.

BEGINNERS code bothering you? Now learned in one hour. New method. Quick approach towards your ham ticket. Used in Armed Services, Ham radio, scouting. Ketchum's one hour code course $1.00 postpaid. Money back guarantee. O. Ketchum, 10125 Flora Vista, Bellflower, California.

ATTENTION! For Sale: Eico 720-K transmitter. Used very little and in excellent condition. $75 or best offer. Joe Apple, 222 Willey Street, Morgantown, West Virginia.

WANTED: Best receiver $25-$30. Can buy. SX-24, RME-45, etc. OK. Sam Kofsky, 201 Eastern Parkway, Brooklyn, N. Y.

Factory wired VFO, Viking II, accessories $175. W5TIR Route 2, Box 164, Jackson, Mississippi.

Premium quality used equipment—over 1,000 units—reconditioned with trial plan and full 90 day guarantee—terms available—write for free lists and top trade-in offer on your present equipment. World Radio Laboratories, Box 919, Council Bluffs, Iowa.

R.F. amplifier with power supply. Linear grounded grid using two 4-1000A tubes. Covers 3-24 mc Pi-network output using vacuum variable capacitors. High voltage is variable from 0-6000 volts. Entire unit is mounted in two 6 foot enclosed relay racks, $675. R. White, 945 Contra Costa Drive, El Cerrito, California.

Five new 4X250B $25.00 each, Heath OP-1 scope $130, three "beautiful" 900-0-900 @500 ma potted plate transformers $17 each, TS375A/U AC-DC VTVM $185, TS382A/U precision audio oscillator $250, ZM4B/U Wheatstone resistance bridge $60. All very good, 60 cycle, shipped collect. K7KEL, 1328 Carlson Drive, Klamath Falls, Oregon.

FOR SALE: Heath Cheyenne and Commanche in excellent condition, complete with AC-1 power supply, AK-7 speaker, and Knight Crystal Calibrator, $230.00. Larry Keltner, W7FGF, Route 1, Box 47, Amity, Oregon.

SELL: Mosley 3 element 20 meter beam—$30.00. Morrow MB5 mobile converter $35.00. Shure Carbon mobile mike model 505K $10.00. NR1 radio & TV service course, $20.00. John Neugent, 139 Beaupre Avenue, Green Bay, Wisconsin.

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The best, all new, low cost ham receiver . . . performance equal to receivers several times the price. Unique crystal control first oscillator improves selectivity and image rejection. ½ microvolt sensitivity. Covers bands 80 thru 10 plus WWV. Calibration every 5 kc. WE ACCEPT TRADES on the CM-1!

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$169.95	$15.12	$8.24	$5.95

NET PRICE $169.95 (Matching Speaker **$16.95**)

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TA-33 Jr.	3 El. 300 Watt Tribander	69.50	5.79
TA-32	2 El. 1 KW Tribander	69.50	5.79
TA-36	6 El. 1 KW Tribander	129.50	10.79
TA-33	3 El. 1 KW Tribander	99.75	8.31
S-402	2 El. 40 Meter Beam	124.50	10.37
V-8	1 KW 10, 15, and 20 Meter Vertical	22.95	1.91
V-3 Jr.	300 Watt 10, 15 and 20 Meter Vertical	17.95	1.49
V-4-6	1 KW 40 to 10 Meter Vertical	27.95	2.32
D-4BC	75/80 Meter Coil for above	15.67	1.30
MA-3	10-20 Meter Trap Mobile Antenna	20.96	1.74
TM-5	10-80 Meter Autowhip Antenna	73.45	6.12
TT-31X	Tote Tenna/Case/Tuning unit/SWR	156.99	13.08
TT-31	Tote Tenna/Tuning unit	84.00	7.00
TD-2	40-80 Meter 1 KW Trap Dipole	37.54	3.12
TD-3 Jr.	10-40 Meter 300 Watt Trap Dipole	13.13	1.09
40-D	80 Meter Dipole Loading Coil	8.36	.69
75/80-D	80 Meter Dipole Loading Coil	8.36	.69
RD-5	Rec. Ant. for 10, 15, 20, 40, 80 Meters	15.75	1.31
SWL-7	Rec. Ant. for 11, 13, 16, 25, 31, 49 Meters	14.75	1.22

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What allowance will you make?

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City ..... State .....

☐ Send reconditioned equipment bulletin

For further information, check number 48, on page 120

SELL highest offer: 455 kc input, Panoramic adaptor BC-1031-A in use now. RTTY model 15 printer, ten hours use since major overhaul and lubrication, like new in original shipping case. Heathkit VOX model VX-1, KØMWM, 4504 W. 36th Street, Minneapolis 16, Minnesota.

FOR SALE: 41 foot telescopic antenna, $7; Two syslson 110 volt ac 6 x 3½ $3 each; KW power supply $30; phone patch $10. W1ZOU, Box 574, Belton, Mo.

FOR SWAP: One 4-1000A in good condition for B&W inductor Model 850A or 852. K4PIJ, 1126 Elizabeth St., Eau Gallie, Fla.

Learn code quickly and easily by my simplified system. Only $3.00. Kinsey, W2SUF, Box 61, Oneonta, New York.

FOR SALE: TVI'd BC 610 with BC 614 pre amp. Make offer. Trade my 4X150's, 4CX250's for test instruments. John Barta, 492 Anacapa St., Ventura, Calif.

Heathkit IO-10 "space saver" 3" dc oscilloscope with low capacity probe PK-1. Built by electrical engineer. Brand new condition $85. Will ship express collect. Marvin Moss, Box 3345, Univ. Station, Gainesville Florida.

WANTED: Commercial or surplus aviation and ground transmitters, receivers, test sets, 18S, 17L, 51R, 618S, GRC, PRC, ARN14, MN85, Bendix, Collins, others. Ritco, Box 156, Annandale, Virginia.

NEEDED for parts: R-388, R-390, or R-391 surplus receivers. Send description and price. Or will trade late Gonset Twins with power supplies for good operating R-390 or KWM-1. L. W. Holmes, WØMDL, 2913 Second Avenue S., Minneapolis 8, Minn.

CLEARING OUT: Hallicrafters S-82 $35, code practice oscillator $4, Simpson 240 "Hammeter" VOM (new) $25, Simpson 355 Midgetester VOM (New) $30, Switchcraft 301 mike mixer $13, Sonotone CM-10 mike (new) $14, Phono-Trix transistor tape recorder Mark II (like new) $70. W. E. Ferbrache, 824 Homestead Road, LaGrange Park, Illinois.

WANTED: Model 19 metal teletype table, model 14 non-typing reperforator. Also TM 11-2201, 2210, 2236, 2238. Must be resonably priced. W4NZY, 119 North Birchwood Avenue, Louisville 6, Kentucky.

Teletype model 14 TD, good condition, perfect operation, $75 or trade for Model 14 non-typing reperforator. Trade PE-110-B for Harvey-Wells TBS-50-C or D. Baser, 344 South Franck Avenue, Louisville 6, Kentucky.

Receiver AR-3, Q Multiplier, 80-40 meter transmitter, xtals, key $40. Misc. parts, must go, excellent. Gale O'Dell, Craigsville, W. Va.

Collins 75A-1, $215.00; 75-A-3, immaculate $315.00; Drake 1-A, $159.00; MM-2 scope, $89.00; Johnson KW Matchbox with bridge, $95.00. May trade. W8WGA.

Sale: 1500 V @ 250 ma commercially built power supply. Uses 866-A's and mounted in black panel cabinet. A steal for $25. Gerson May, W4HPE, 1301 Gamble Avenue, Jasper, Alabama.

Transmitting Tubes [*from page 37*]

circuits of the stage are adjusted to the operating frequency. The "search" oscillator is tuned back and forth across the possible parasitic frequencies. When a parasitic frequency is hit, the plate current of the tube under test will change, and there may be a show of grid current. Each significant parasitic indication should be investigated. Circuit changes or suppression devices must then be added to reduce the parasitic response by 10 decibels or more in amplitude.

Happily, the radio amateur is not interested in production test methods such as this, but the procedure provides an idea of the technique necessary for complete parasitic control in mass production transmitting equipment. Time spent in examining your amplifier for possible parasitics, and the cure of these little devils, will pay big dividends in a clean-sounding, smoothly operating piece of equipment. ■

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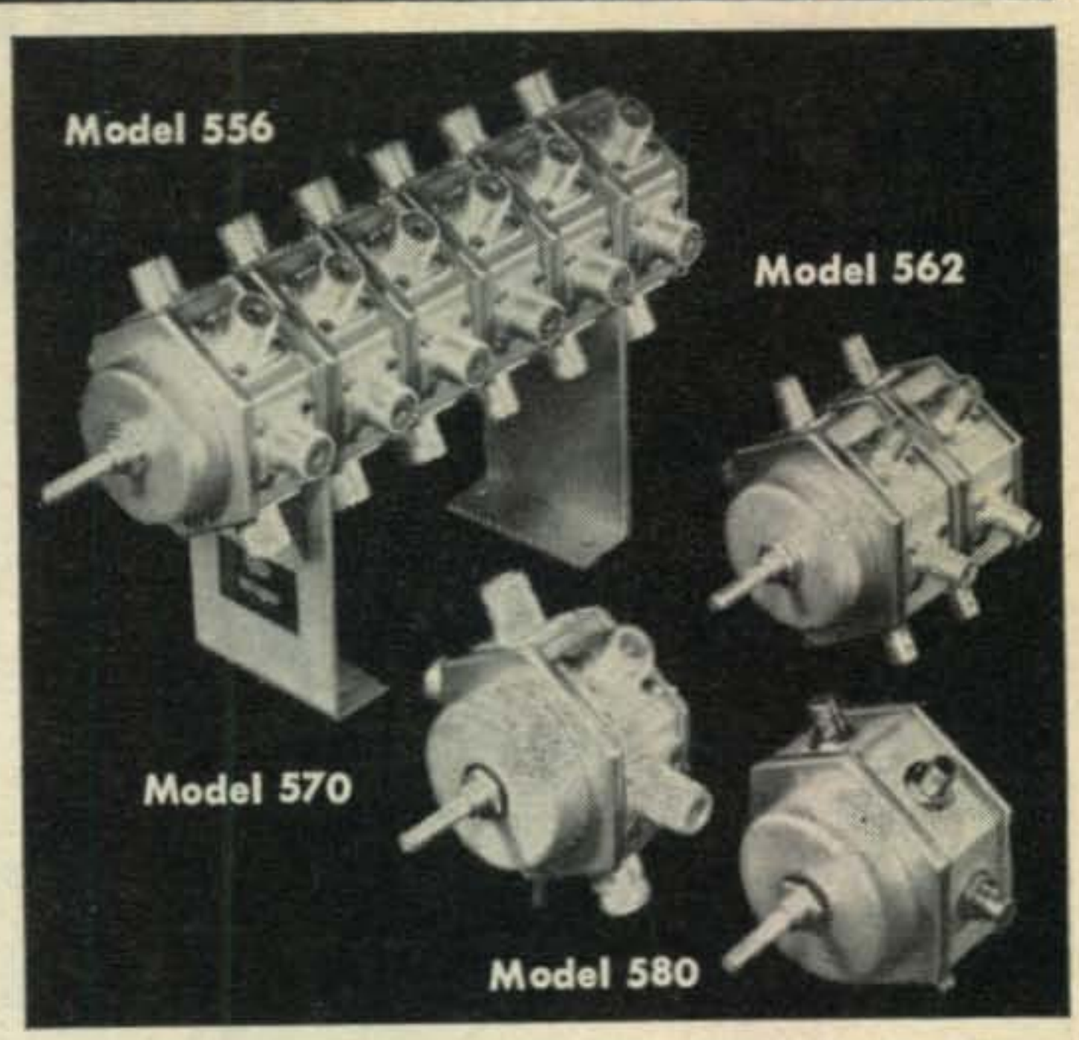
Now you can switch coaxial line circuits quickly and without error. These handy, inexpensive units are available with "UHF", "BNC", "N" and Phono type connectors for use with either 52 or 75 ohm lines. Phono connector types are specific for Hi-Fi applications. Other types are designed to handle RF Power up to 30 MC, 1 KW input.



Stock items ready for shipment are:

Model 550A—Single gang, single pole, 5 position switch with UHF connectors. Price: $8.25 each.

Model 551A—Single gang, 2 pole, 2 position special purpose switch with UHF connectors. Ideal for switching any device in or out of series connection in coax line circuits. Price: $7.95 each.

Model 560—Single gang, single pole, 5 position switch, same as Model 550A except with BNC type connectors. Price: $11.95 each.

Model 561—Single gang, 2 pole, 2 position special purpose switch, same as Model 551A except with BNC type connectors. Price: $9.95 each.

Model 570—Single gang, single pole, 5 position switch, same as Model 550A except with N type connectors. Price: $13.35 each.

Model 580—Single gang, single pole, 5 position switch, same as Model 550A except with Phono type connectors. Price: $7.35 each.

Multiple gang types, up to 6 gang for single pole—5 position switches, and as required for 2 pole—2 position switches, are made to order with any connector types listed above. Prices on request.

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For further information, check number 19, on page 120

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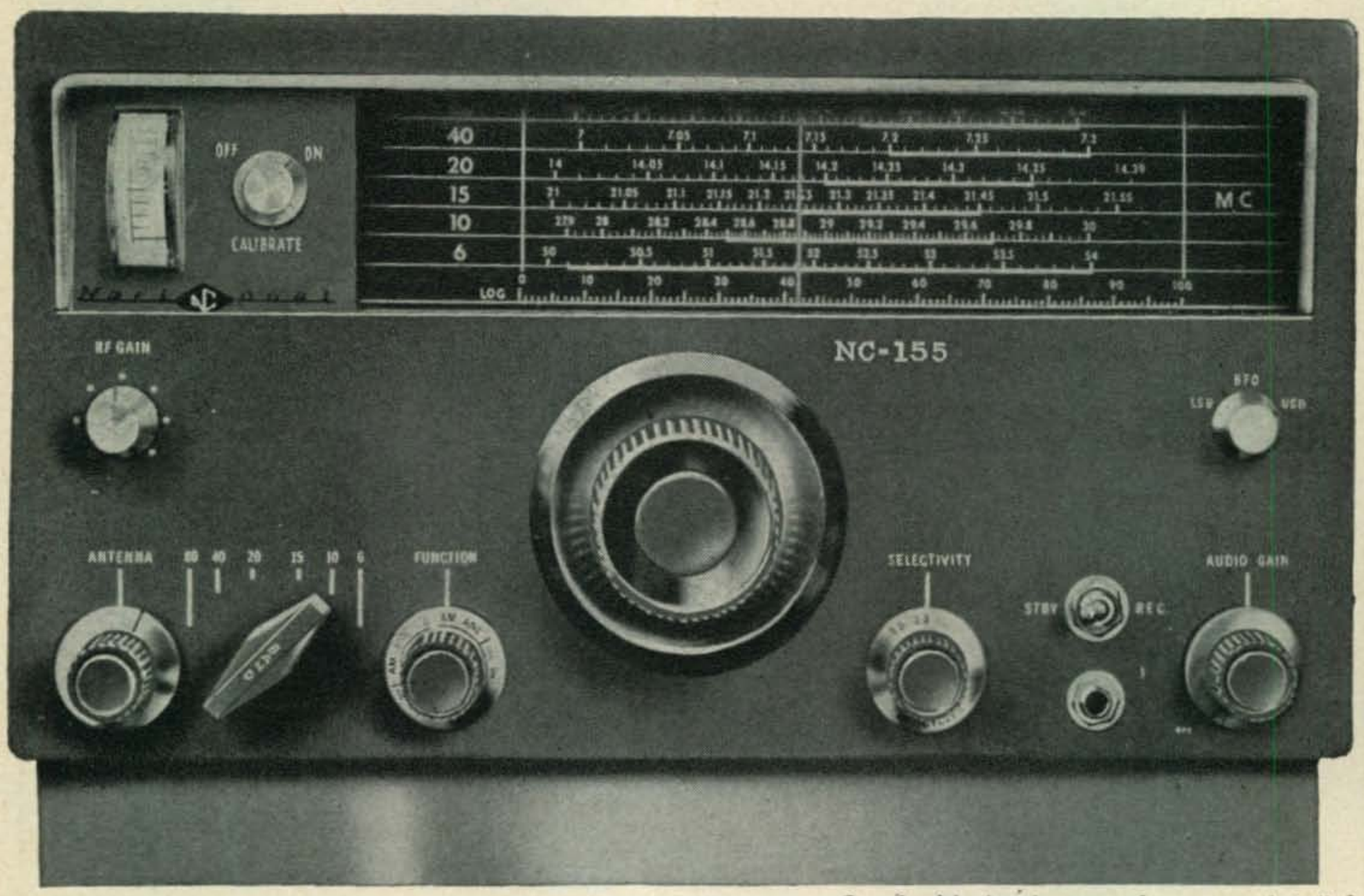

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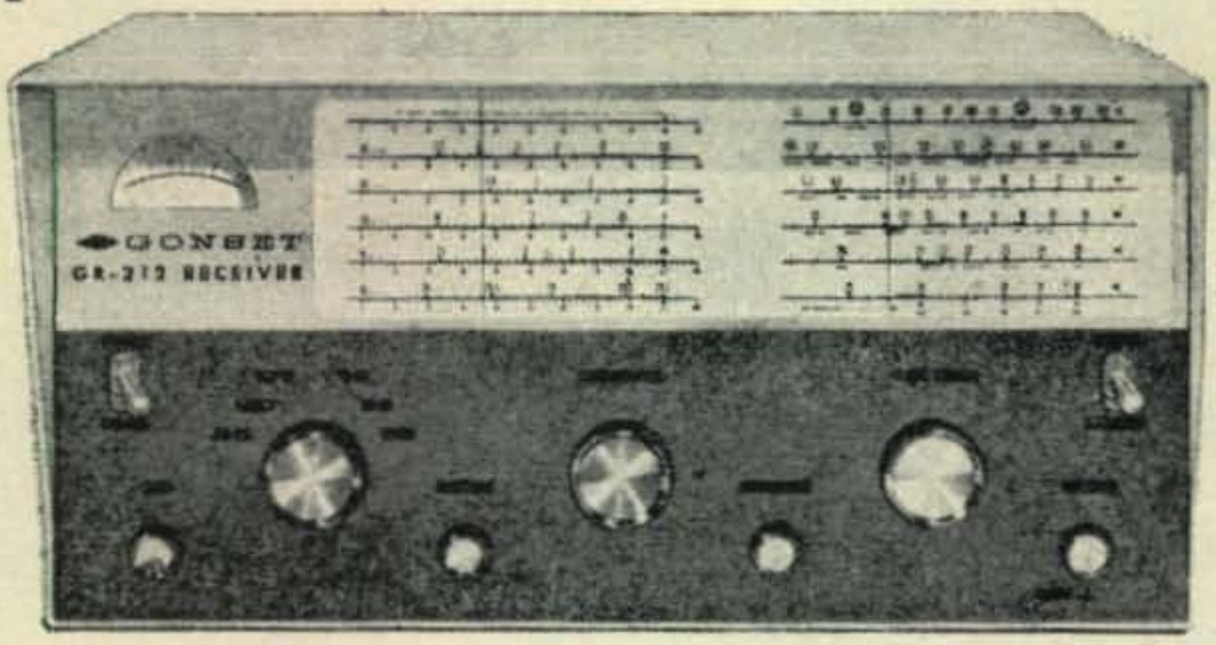

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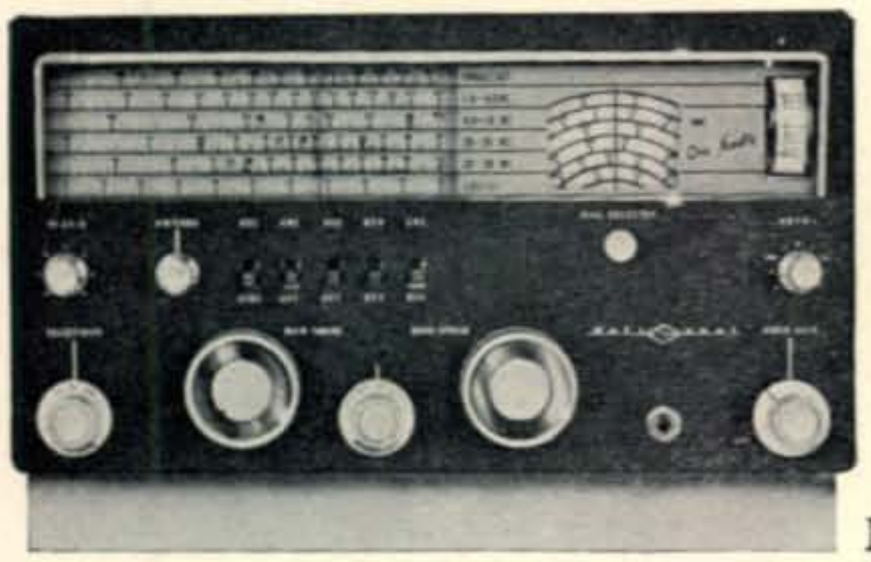

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NATIONAL'S TRIO OF PACE-SETTERS

ere are the three new receivers that are already setting the pace for the industry—Each offering u more solid performance in its price area than you will believe . . . until you tune one. We invite u to try all three—then select the one that best suits your requirements.

NC-270 . . .
Precision double-conversion 80 through 6 meter amateur receiver featuring rock-like stability and unchallenged VHF performance. Five degrees of variable IF selectivity, including selectable SSB with product detector, 1.0 uv sensitivity, 60 db deep T-notch filter, built-in 100 KC calibrator, crystal-controlled 2nd converter. More features than any other receiver in its price range. **$279.95 am. net.**

NC-190 . . .
The 540 KC—30 MC general coverage receiver that tunes like a ham-band-only unit. 1.0 microvolt sensitivity, double conversion with five main tuning ranges, 5.0 KC, 3.0 KC, and 600 cycle variable IF selectivity, full SSB/CW AGC and product detector, 60:1 bandspread vernier drive and National's exclusive dial selector, providing instant choice of calibrated amateur or foreign broadcast bands. **$219.95 am. net.**

NC-155 . . .
National's newest—A double conversion 80 through 6 meter ham-band-only receiver offering superb performance completely out of proportion with its price. With its basic design derived from the famous NC-270, the NC-155 features 5.0 KC, 3.0 KC and 600 cycle variable IF selectivity, full SSB/CW AGC and product detector, and a velvet 60:1 dial drive that makes SSB signals as easy to tune as AM. 1.0 microvolt sensitivity on 6 meters, too! **$199.95 am. net.**

NATIONAL RADIO COMPANY, INC. MELROSE 76, MASS.

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For further information, check number 2 on page 120

FM

RTT

Operating Modes May Come and Go

CW

...But The Message Will Stay Forever

T

SSB

AM

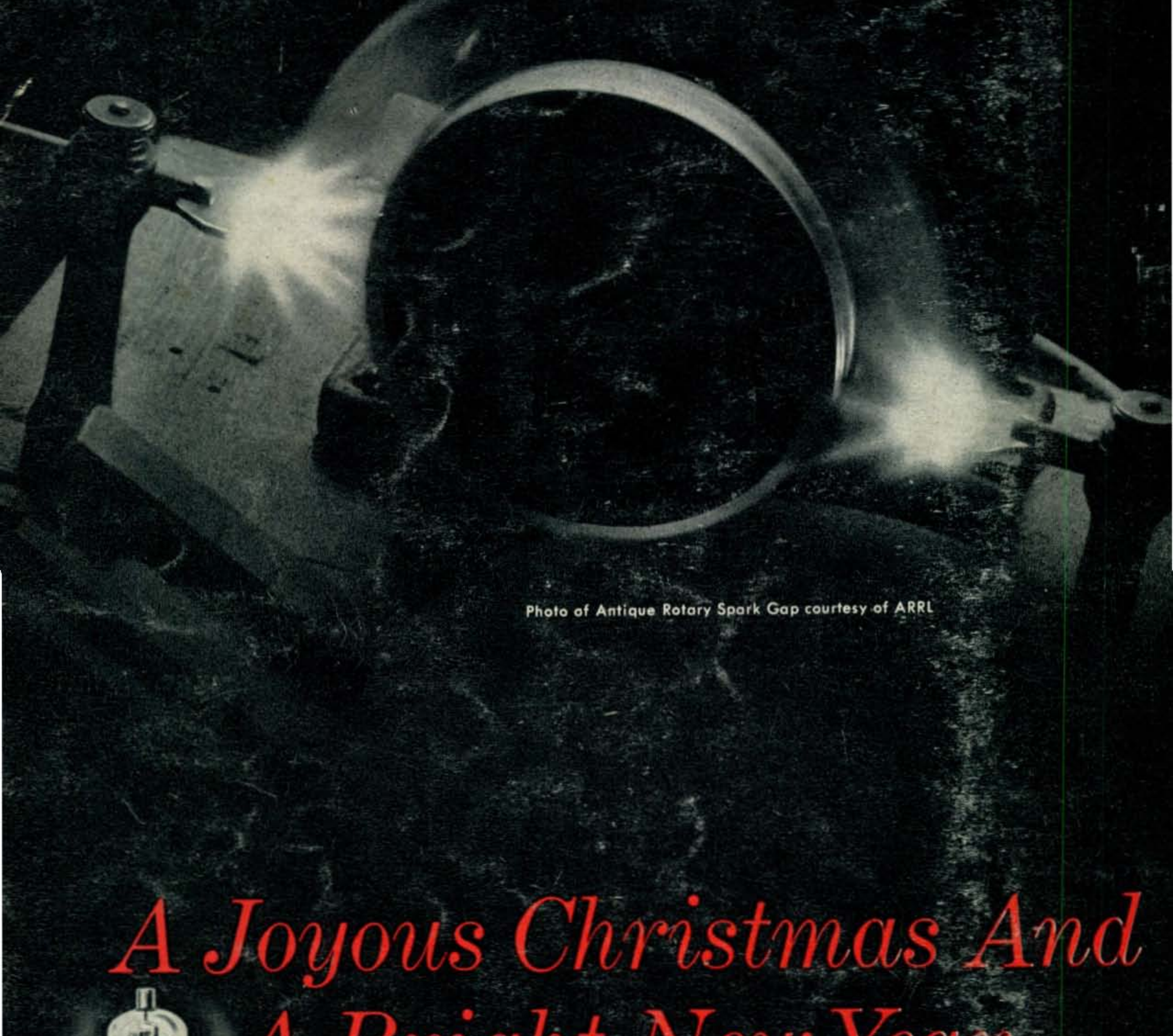

Photo of Antique Rotary Spark Gap courtesy of ARRL

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from the Gang at the RCA Electron Tube Division

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