

QST

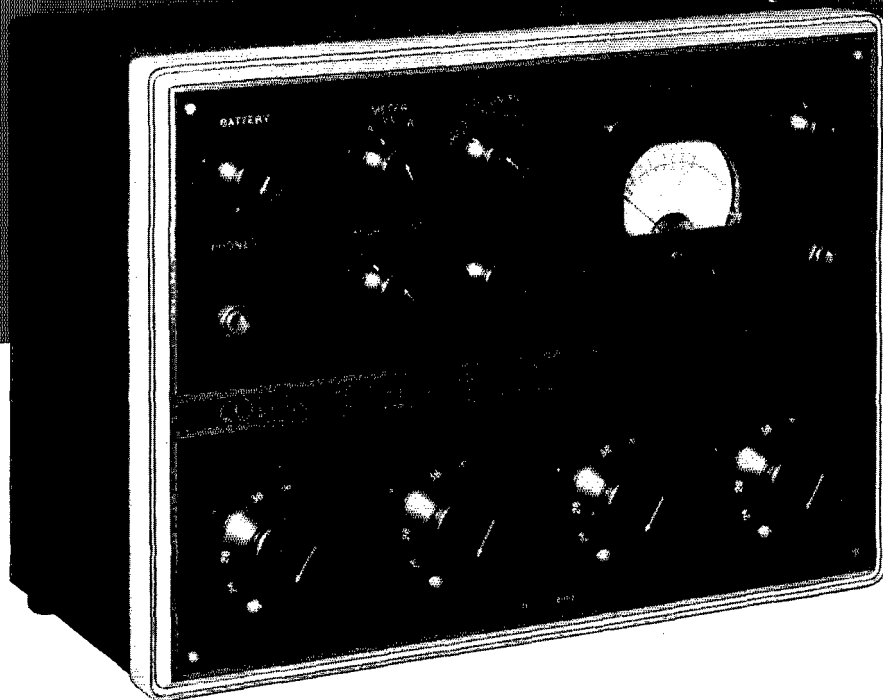
June, 1941
25 cents
35c in Canada

devoted entirely to

amateur radio



A.R.R.L.
FIELD DAY
JUNE 7-8



COLLINS 12Z Remote Amplifier

NUMBER OF MIXING POSITIONS: Three, with a switch arranged to select fourth input.

GAIN: Approximately 85 db.

CONTROLS: Front Access Attenuators (Patented) 2 db per step.

VOLUME INDICATOR: Weston new type 30 instrument calibrated in VU used for reading output level and battery voltages.

TUBES: Three. 2 type 15; 1 type 31.

FREQUENCY RESPONSE: 30 to 10,000 c.p.s. $\pm 1\frac{1}{2}$ db.

NOISE LEVEL: More than 50 db below program level.

INPUT IMPEDANCE: Standard model, 30-50 ohms. A special model supplied for 200-250 ohm input.

POWER OUTPUT: 25 milliwatts at less than 2% distortion.

POWER SOURCE: Batteries suitable for use in the 12Z are standard items of large battery manufacturers. One set of batteries will operate the 12Z approximately 30 hours.

WEIGHT: 12Z with tubes, case, and batteries 28 $\frac{1}{4}$ pounds.

SIZE: 14" wide, 10 $\frac{1}{2}$ " high, 8" deep.

light weight
construction

completely self-
contained

easy accessibility

standard batteries
-long life

3 standard tubes

amplifier chassis
removal

front access
attenuators

COLLINS RADIO COMPANY

CEDAR RAPIDS, IOWA NEW YORK, N. Y. HONOLULU, HAWAII



New **FM/AM**
RADIO RECEIVING STATION

. . . With 25 Watt High Fidelity Amplifier

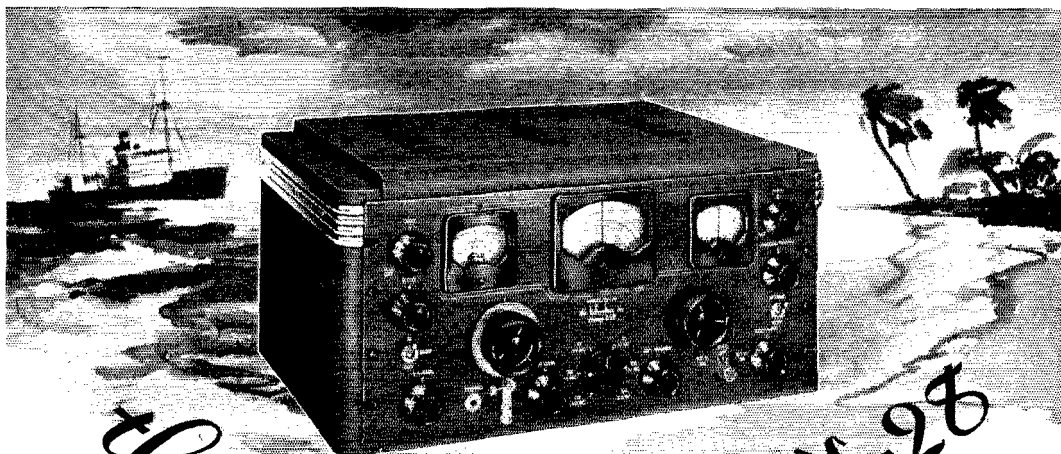
The No. 1 band covers all frequencies used by amplitude modulated broadcast stations. No. 2 band covers frequencies used by high fidelity frequency modulated broadcast stations. Changes from FM to AM with band switch. Self-contained monitoring speaker. The use of additional high

fidelity speakers makes this an ideal unit for installation in hotels, schools, churches, lodge halls, etc. Complete unit is extremely flexible in operation and will provide reproduction of sparkling depth and brilliance. Model RSC-2 complete with tubes and monitoring speaker \$140.

USED BY 33 GOVERNMENTS SOLD IN 89 COUNTRIES

the hallicrafters co.

CHICAGO, U. S. A.



The Cruise of an SX-28

Recently we received a letter from an owner praising the performance of an SX-28. The letter, five pages long, is too lengthy to re-print in its entirety so we are re-printing the paragraphs most interesting to communications performance.

"This letter will deal with the voyage from San Francisco to the Philippines, then to the Far East namely Shanghai and Hong Kong and back to the Philippines then down through the inside passage from the Philippines down through the islands past Thursday Island then down the Australian coast inside the Great Barrier Reef to Newcastle. From Newcastle to Brisbane then almost due east across the Pacific until we approached Pitcairn Island when we turned to about northeast and headed for the Canal, then from the Canal to New York with coast-wise ports enroute. Roughly, the total mileage for this trip was about 32,000 and involved a period of about six months.

"... for about 3 months the ship was in tropical weather, the radio room was very hot, all port holes and doors were open almost continuously day and night. The Hallicrafter SX-28 was exposed to the elements almost as if it were outside, much of the high tropical humidity penetrated the room where the SX-28 was operating.

"We traveled through tropical heat of 120° into the cold slashing gales of the China Sea and remained in extreme cold weather, then back down to the tropical heat again . . . most receivers are prone to develop all kinds of troubles in these varying climates . . . I was busy, at times, repairing other sets breaking down due to the humidity, but the SX-28 went merrily along its receptive way.

"... the SX-28 was almost continuously subject to vibration, one kind of vibration at one depth of load, another at another depth—increasing until the whole ship vibrates when the load was light. At times when receiving short wave the SX-28 was vibrating so that it was actually jiggling back and forth in short, quick jerks as the whole ship vibrated, yet no effect was noticeable on reception . . . I had all kinds of trouble with my regular equipment, yet the SX-28 ran the gauntlet unharmed and unaffected.

"... my listeners of whom I had a regular public at news times have remarked 'the program would fade out and sparks would flip a switch and back in it would come with a bang' . . . the pay-off though is the code reception. With signals weak, static at Woolworth bargain counter proportions of jamming, and code signal interference the ANL circuit jumped into effect in an astounding way. . . one remarkable comparison was XSG Shanghai who comes in with a bang all over a wide space on the dial on the 36 meter band. He was right on top of WCC and would blot him out. A twist of ANL and in comes XSG, a flick of the crystal control and in comes WCC with a bang and out goes XSG. . . . In Shanghai I was offered \$350 in gold for my SX-28.

"I have opened receivers for repair of standard brands and found variable condensers covered with green whiskers from corrosion, coils broken in windings from salt corrosion, bus wires even eaten off inside insulation due to the same corrosion . . . so all in all I think it a high tribute to the Hallicrafter workmanship in this receiver that it has survived a period of two trips now and is still going strong."

JUNE 1941

VOLUME XXV

NUMBER 6



STAFF

Editorial

KENNETH B. WARNER, W1EH
Editor and Business Manager

CLARK C. RODIMON, W1SZ
Managing Editor

GEORGE GRAMMER, W1DF
Technical Editor

DONALD H. MIX, W1TS
BYRON GOODMAN, W1JPE
Assistant Technical Editors

EDWARD P. TILTON, W1HDQ
Contributing Editor, U.H.F.

VERNON CHAMBERS, W1JEQ
Technical Information Service

JAMES J. LAMB, W1AL
Research Engineer, A.R.R.L.

Advertising

F. CHEYNEY BEEKLEY, W1GS
Advertising Manager

Circulation

DAVID H. HOUGHTON
Circulation Manager

RALPH T. BEAUDIN, W1BAW
Asst. Circulation Manager



OFFICES

38 La Salle Road
West Hartford, Connecticut

Subscription rate in United States and Possessions, \$2.50 per year, postpaid; all other countries, \$3.00 per year, postpaid. Single copies, 25 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

Entered as second-class matter May 29, 1919, at the post office at Hartford, Connecticut, under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized September 9, 1922. Additional entry at Concord, N. H., authorized February 21, 1929, under the Act of February 28, 1925. Additional second-class entries to cover sectional editions authorized March 20, 1935.

Copyright 1941 by the American Radio Relay League, Inc. Title registered at United States Patent Office.

QST

devoted entirely to

AMATEUR RADIO

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



CONTENTS

Editorials	7
Ham Forum at WILL	8
QST Visits Gallups Island	9
An Inexpensive 56-Mc. Exciter or Transmitter <i>Vernon Chambers, W1JEQ</i>	13
The Selectable Single Side-Band Receiving System <i>J. L. A. McLaughlin</i>	16
U. S. A. Calling	18
For the Junior Constructor A Fool-Proof Rig for 80 and 40 Meters	20
Improving the Transmitting Loop <i>James R. Green, Jr., W8MYW</i>	24
Ninth A.R.R.L. Field Day	26
In the Services	28
Circulation Statement	29
Tube Keying <i>Byron Goodman, W1JPE</i>	30
What the League Is Doing	34
On the Ultra Highs <i>E. P. Tilton, W1HDQ</i>	42
A Transmitter Frequency Control Unit with Three-Band Output <i>G. W. Shuart, W2AMN</i>	45
New Apparatus	48
Results, 1940 Sweepstakes Contest <i>J. A. Moskey, W1JMY</i>	49
A.A.R.S. Activities	55
Hints and Kinks <i>Balanced Inductive Coupling for U.H.F. — Hints on Drilling Tubing and Rod — Simplified I.C.W. Operation — Soldering Tip for Tight Places — Operation from Three-Wire Power Lines</i>	56
Code Proficiency Notes	58
Silent Keys	59
I.A.R.U. News	60
In QST 25 Years Ago This Month	61
Correspondence	62
Operating News	63
The Month in Canada	64
Brass Pounders' League	65
Would You Believe It?	72
New Receiving Tubes <i>6AH7GT, 12AH7GT</i>	74
Hamads	107
QST's Index of Advertisers	110

Section Communications Managers of the A.R.R.L. Communications Department

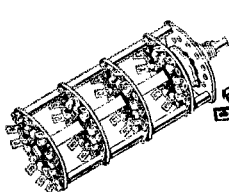
All appointments in the League's field organization are made by the proper S.C.M., elected by members in each Section listed. Mail your S.C.M. (on the 10th of each month) a postal covering your radio activities for the previous 30 days. Tell him your DX, plans for experimenting, results in 'phone and traffic. He is interested, whether you are an A.R.R.L. member or get your QST at the newsstands; he wants a report from every active ham. If interested and qualified for O.R.S., O.P.S. or other appointments he can tell you about them, too.

ATLANTIC DIVISION			
Eastern Pennsylvania	W3BES	Jerry Mathis	6042 Master St. Philadelphia
Maryland-Delaware-District of Columbia	W3CIZ	Hermann E. Hobbs	9701 Monroe St. Linden, Maryland
Southern New Jersey	W3CCO	Lester H. Allen	Silver Spring P.O. Trenton
Western New York	W8PLA	Fred Chichester	704 Quinton Ave. Sonyea
Western Pennsylvania	W8CKO	E. A. Krall	703 Broadway East McKeesport
CENTRAL DIVISION			
Illinois	W9TLH	Mrs. Carrie Jones	2407 Central Ave. Alton
Indiana	W9AB	Harry B. Miller	729 E. Lowell Ave. Mishawaka
Kentucky	W9ARU	Darrell A. Downard	116 N. Longworth Ave. Louisville
Michigan	W8DPE	Harold C. Bird	R.F.D. 2 Pontiac
Ohio	W8AQ	E. H. Gibbs	405 Broad St. Wadsworth
Wisconsin	W9UIT	Aldrich C. Krones	2702 So. 40th St. Milwaukee
DAKOTA DIVISION			
North Dakota	W9WWL	Anton C. Theodos	Box 444 Willist
South Dakota	W9ADJ	E. C. Mohler	Box 149 Rapids City
Northern Minnesota	W9IGZ	Edwin L. Wicklund	R.F.D. 3 Censington
Southern Minnesota	W9VYQ	Millard L. Bender	608 N. Huron Ave. Spring Valley
DELTA DIVISION			
Arkansas	W5GNV	John R. Sanders	P. O. Box 1563 Little Rock
Louisiana	W5DWW	W. J. Wilkinson, Jr.	Room 313, Jefferson Hotel Shreveport
Mississippi	W5EGE	S. Benton Cain	221 E. Monticello Brookhaven
Tennessee	W4DDJ	M. G. Hooper	4908 Georgia Ave. Nashville
HUDSON DIVISION			
Eastern New York	W2LU	Robert E. Haight	511 South Holmes St. Scotia
N. Y. C. & Long Island	W2AZV	E. L. Baunach	102 Central Ave. Massapequa, L. I.
Northern New Jersey	W2LMN	Edward Gursky, Jr.	367 Van Winkle Ave. Hawthorne
MIDWEST DIVISION			
Iowa	W9PTR	L. B. Vennard	1113 So. 9th St. Burlington
Kansas	W9AWP	A. C. Unruh	1617 S. Seneca St. Wichita
Missouri	W9OTD	Miss Letta Allendorf	1013 W. 3rd St. Joplin
Nebraska	W9WKP	Garold Bennett	914 West 7th St. Hastings
NEW ENGLAND DIVISION			
Connecticut	W1CTI	Frederick Ella, Jr.	19 Merrill Rd. Norwalk
Maine	W1IIE	H. W. Castner	147 Church Damariscotta
Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	91 Atlantic St. North Quincy
Western Massachusetts	W1IAH	William J. Barrett	239 Columbia St. Adams
New Hampshire	W1FTJ	Mrs. Dorothy W. Evans	163 South Main St. Concord
Rhode Island	W1GRJ	Clayton C. Gordon	70 Columbia Ave., Gaspee Plataau, Warwick
Vermont	W1KJG	Clifton G. Parker	Box 537 Morrisville
NORTHWESTERN DIVISION			
Alaska	E7GNN	James G. Sherry	Chichagof
Idaho	W7CRL	Clifford A. Jessup	Moscov
Montana	W7CPV	Rex Roberts	Glendive
Oregon	W7GNT	Carl Austin	Bend
Washington	W7FCG	W. Beale	Walla Walla
PACIFIC DIVISION			
Hawaii	K6ETF	Francis T. Blatt	837 16th Ave. Honolulu
Nevada	W6BIC	Edward W. Heim	509 Claremont St. Reno
Santa Clara Valley	W6IUZ	Earl F. Sanderson	101 Claremont Ave. San Jose
East Bay	W6TI	Horace R. Greer	414 Fairmount Ave. Oakland
San Francisco	W6CIS	Kenneth E. Hughes	209 Lincoln Way San Francisco
Sacramento Valley	W6MDI	Vincent N. Feldhausen	113 South Quincy St. McCloud
Philippines	K4GR	George L. Rickard	Box 849 Manila
San Joaquin Valley	W6KUT	Edwin A. Andress	2921 North Van Ness Blvd. Fresno
ROANOKE DIVISION			
North Carolina	W4CVB	W. J. Wortman	P. O. Box 566 Morganton
South Carolina	W4BOE/ANG	Ted Ferguson	1213 College St. Columbia
Virginia	W3GWO	Frank S. Anderson, Jr.	4703 New Kent Ave. Richmond
West Virginia	W8OXO	W. D. Tabler	1004 So. Davis Ave. Elkins
ROCKY MOUNTAIN DIVISION			
Colorado	W9EHC	Carl C. Drumeller	224 Colorado Ave., Apt. 3 Pueblo
Utah-Wyoming	W7GZG	Henry L. Schroeder	P. O. Box 731 Laramie, Wyoming
SOUTHEASTERN DIVISION			
Alabama	W4DGS	James F. Thompson	12 Clanton Ave. Montgomery
Eastern Florida	W4PEI	Carl G. Schaaf	Waucoma Apts. Clermont
Western Florida	W4AXP	Oscar Cederstrom	Lakeview Hotel De Funiak Springs
Georgia	W4AOB	William U. Hanks	Second St. & Bruce Ave. Atlanta
West Indies (Cuba-Puerto Rico-Virgin Islands)	CM2OP	Mario de la Torre	Escobar 110 (Altos) Habana, Cuba
SOUTHWESTERN DIVISION			
Los Angeles	W6MQM	Ralph S. Citek	1038 Milwaukee Ave. Los Angeles
Arizona*	W6KOL	John K. Oliver	Box 642 Nogales
San Diego	W6BKZ	Louis A. Cartwright	370 Nautilus La Jolla
WEST GULF DIVISION			
Northern Texas*	W5EAV	R. E. Hughes	1410 Ave. E, N.W. Childress
Oklahoma	W5GFT	Russell W. Battern	Box 290 Emid
Southern Texas	W5MN	Horace E. Bidy	1746 Schley Ave. San Antonio
New Mexico	W5ENI	Dr. Hilton W. Gillett	Lovington
MARITIME DIVISION			
Maritime	VE1DQ	A. M. Crowell	69 Dublin St. Halifax, N. S.
ONTARIO DIVISION			
Ontario	VE3EF	Flying Officer Donald R. Gunn	% Canadian Bank of Commerce New Toronto, Ont.
QUEBEC DIVISION			
Quebec	VE2CO	Lindsay G. Morris	Apt. 6, 4510 Girouard Ave., N.D.G. Montreal, P. Q.
VANALTA DIVISION			
Alberta	VE4GE	C. S. Jamieson	581 W. Riverside Drive Drumheller, Alta.
British Columbia	VE5DD	C. O. I. Sawyer	2634 West 31st Ave. Vancouver
PRAIRIE DIVISION			
Manitoba	VE4AAW	A. W. Morley	747 McMillan Ave. Winnipeg
Saskatchewan	VE4SY	Arthur Chesworth	1071 4th Ave., N.W. Moose Jaw

* Officials appointed to act until the membership of the Section choose permanent S.C.M.s by nomination and election.



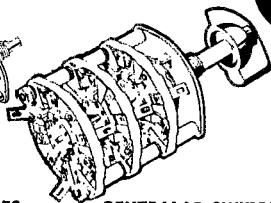
There's a BIG "Swing" to Centralab SWITCHES



**CENTRALAB SWITCHES
WITH BAKELITE
INSULATION**

Centralab Selector and Tone Switches in single or multi-section types with Bakelite insulation available for numerous electronic applications. The double bite control has a resistance of less than .002 ohm and is completely self-cleaning Positive index, with each rotating position 30° apart. Adjustable stop on each switch permits selecting any number of positions from 2 to 11.

Send for catalog giving detailed description.



**CENTRALAB SWITCHES
WITH ISOLANTITE
INSULATION**

Similar to the popular Bakelite selector switches. Isolantite is preferred in high frequency circuits because it has lower losses and less moisture absorption. Isolantite transmitter switches for Amateurs will operate in transmitters rated up to 100 watts and at potentials up to 1000 volts D.C. Contacts spaced 90° apart, adjustable stop to limit rotation to 2 to 3 positions if required.

Send for catalog giving detailed description.

More and more radio receivers and electronic devices call for complicated switch assemblies . . . and more and more set builders . . . experimenters, amateurs and servicemen swing to CENTRALAB Bakelite and Isolantite Switches.

These switches singly and in gangs have an almost infinite variety of adaptations. Whatever your SWITCH need may be . . . for original use or replacement . . . be sure to ALWAYS SPECIFY CENTRALAB.

CENTRALAB — Division of Globe Union Inc., Milwaukee, Wis.

THE AMERICAN RADIO RELAY LEAGUE

Directors

<i>President</i>	
GEORGE W. BAILEY.....	W1KH 74 Webster Road, Weston, Mass.
<i>Vice-President</i>	
CHARLES E. BLALACK.....	W6GG Box 55, Yuma, Ariz.
<i>Canadian General Manager</i>	
ALEX REID.....	VE2BE 169 Logan Ave., St. Lambert, P. Q.
<i>Atlantic Division</i>	
WALTER BRADLEY MARTIN.....	W3QV Box 612, Roslyn, Pa.
<i>Central Division</i>	
GOODWIN L. DOSLAND.....	W9TSN 10 No. Clark St., Chicago
<i>Dakota Division (Acting)</i>	
ADOLPHUS A. EMERSON.....	W9ITQ 5336 S. Elliott Ave., Minneapolis
<i>Delta Division</i>	
E. RAY ARLEDGE.....	W5SI P.O. Box 286, Pine Bluff, Ark.
<i>Hudson Division</i>	
ROBERT AKERIDGE KIRKMAN.....	W2DSY 920 Eighth Ave., Brooklyn
<i>Midwest Division</i>	
FLOYD E. NORWINE, JR.....	W9EFC 7405 Hiawatha Ave., Richmond Heights, Mo.
<i>New England Division</i>	
PERCY C. NOBLE.....	W1BVR 37 Broad St., Westfield, Mass.
<i>Northwestern Division</i>	
KARL W. WEINGARTEN.....	W7BG 3219 N. 24th St., Tacoma, Wash.
<i>Pacific Division</i>	
J. L. McCARGAR.....	W6EY 66 Hamilton Pl., Oakland, Calif.
<i>Raleigh Division</i>	
H. L. CAVENESS.....	W4DW 2607 Vanderbilt Ave., Raleigh, N. C.
<i>Rocky Mountain Division</i>	
C. RAYMOND STEDMAN.....	W9CAA 925 So. Gaylord St., Denver
<i>Southeastern Division</i>	
WILLIAM C. SHELTON.....	W4ASR Box 552, Daytona Beach, Fla.
<i>Southwestern Division</i>	
JOHN E. BICKEL.....	W6BKY 801 E. California St., Whittier, Calif.
<i>West Gulf Division (Acting)</i>	
W. T. CASWELL, JR.....	W5BB 1502 West Ave., Austin, Texas

THE AMERICAN RADIO RELAY LEAGUE, INC., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite. Correspondence should be addressed to the Secretary.



Past Presidents

HIRAM PERCY MAXIM, W1AW, 1914-1936
EUGENE C. WOODRUFF, W8CMP, 1936-1940

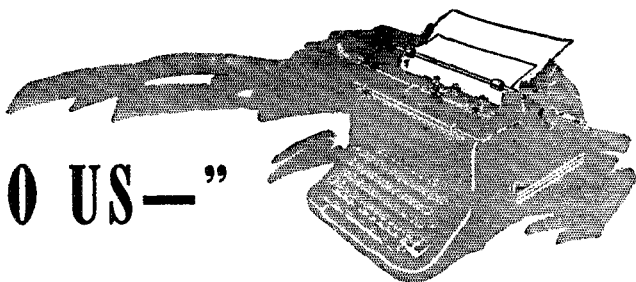
Officers

President.....	GEORGE W. BAILEY, W1KH Weston, Mass.
Vice-President.....	CHARLES E. BLALACK, W6GG Altadena, Calif.
Secretary.....	KENNETH B. WARNER, W1EH West Hartford, Connecticut
Acting Treasurer.....	DAVID H. HOUGHTON West Hartford, Connecticut
Communications Mgr.....	F. EDWARD HANDY, W1BDI West Hartford, Connecticut

General Counsel..... PAUL M. SEGAL
1026 Woodward Building, Washington, D. C.

Address all general correspondence to the administrative headquarters at West Hartford, Connecticut.

"IT SEEMS TO US—"



KEEPING ABOVE SUSPICION

WE WERE talking to some people in the FCC monitoring service the other day. In the course of the conversation they suggested that, in view of the difficult conditions of to-day, every amateur ought to make it a habit to give in each transmission the call of the station called as well as his own call — so as to facilitate identifying and checking up on both sides of a contact. They almost feel that there ought to be a regulation requiring that, and we suspect that it is under contemplation as a rule. In the meantime, they suggest that it would be a very proper form of coöperation by the amateur.

We therefore suggest that we take it on voluntarily, so as to give constant evidence that our hands are clean. We gather that there have been a few smarties who thought they could get away with some DX by simply omitting the call of the other station. But of course the FCC has heard the latter calling *them* and it has been a dead giveaway. Then FCC simply calls for the log, which shows either a correct or an incorrect record of an improper action, or a miserable attempt at hasty alteration, and those particular hams take Balaam's famous ride.

For ourselves, we have never liked to show the call of the other fellow at the signature of the transmission, much preferring just our own call there as a signature; we like it better at the beginning of the transmission, where it can be of definite help to the other fellow in QRM and particularly if there is any slowness in his changing over. For break-in operation we of course do not suggest that every transmission show both calls, any more than it is necessary to show even one's own on every brief transmission. (See §12.83.) But we do believe that, when the periodic signing does occur in break-in operation, both calls should appear as part of the clean-noses policy.

The international situation is such that even minor infractions can hurt amateur radio like hell. We urge caution, circumspection and restraint. In our estimation it is particularly important that the general tone of amateur radio be above suspicion and completely re-

moved from any matters connected with the war. It is part of our Code of Precautions to confine our talk on the air to radio and personal matters, so that there may be no fear in official quarters that our conversations are unwise. If we're smart we'll stick rigidly to that rule — not because it's a regulation but because we *are* smart.

K.B.W.

OURSELVES

THE editors write many words on this page intended to help us all steer a straight course through ham difficulties but we hope you fellows never get the idea that we at Hq. are a smug bunch who think our own work is perfect. We are rarely satisfied with anything we do, and that is particularly true of our efforts in turning out *QST*.

Any magazine needs a shot in the arm from time to time — the whole publishing art is in a constant state of turmoil. For instance, typographic and mechanical methods frequently improve, and it is one of our duties to analyze these ideas and sift out those that are useful for our gang. We try to work subtly so that no changes are startling, because *QST* is a journal many of us have grown up with and drastic changes might alter its warm touch.

A basic problem that is always with us is that of producing a magazine that will interest all amateurs with their diversified approaches. With the development of our art this has become a complex problem and requires no end of study. Moreover, the needs change as do the times. With our increasing connections with the Services, we inaugurated last month the new department called *THE SERVICES* and this month we are starting *THE MONTH IN CANADA* for the VE's. Another new column, *U.S.A. CALLING*, will appear whenever we have material for it. We believe you will find all of these intensely interesting — because they will keep you up to date on what other hams are doing and will bring you into contact with opportunities to serve in the national effort.

How do you like our cover? It is an old friend that has been missing for ten years: a cartoon cover. As of old, this one was pro-

duced by Phil "Gil" Gildersleeve, W1CJD. In addition, we are brightening up the interior here and there in little ways — not too noticeably in any one spot, we hope. Our definite aim is to make the *QST* of to-day a more human and more readable journal. We want it to rate a place in every ham's shack — it should be there and if it isn't, we'd like to know the reason.

C. C. R.

EXIT HETERODYNES

A COUPLE of years ago Jimmy (one-control neutrodyne, single-control superhet, dual-diversity) McLaughlin had an idea for a different kind of receiver to combat 'phone heterodyne interference. Working on it as time permitted, he has brought it now to the point where it has proved its practicability. In its present form it's not simple, nor can it be built for cigarette money — but it does a job! And so we're happy this month to present a description of the system.

As the article sticks to technicalities, we want to describe to you how the receiver works. The heterodyne eliminator, as you will find on reading the article, is the second story of a table-size relay rack, the first story being a conventional communications receiver — any good receiver will do. Between the two is a narrow panel on which is mounted a flip switch: left, center and right positions. For normal tuning we keep the switch in the center and set the i.f. selectivity at medium or broad. We tune in a 'phone signal, observing as we do so that the meter on the upper panel gives a very sharp indication as we go through resonance — much more critical than the receiver's S-meter. That upper meter is im-

portant, and if we want to be ready for interference we have to keep the carrier tuned "on the nose" by its indication. Since this is a ham 'phone band, we hardly get farther than identifying the fellow's call when bang! on comes a 1000-cycle heterodyne which practically blots out the signal we want. We're ready for it, though, so we give the switch a flip and presto! the heterodyne disappears — taking with it most of the interfering sidebands — and our friend's voice comes back; no QRM, no side-band cutting; if anything, improved intelligibility.

It sounds like magic, and very often it actually is. Of course, *all* interference can't be eliminated. After all, there are only two side bands to play with, but even if both of them are QRM'd the interference can be greatly reduced. We've time and again dived into messes of QRM and brought out the guy on the bottom — good enough to understand, if not completely interference-free.

Such a receiver is definitely a de luxe proposition, at least for the time being. Its advantages over ordinary high selectivity such as that afforded by a crystal filter are the absence of attenuation of higher audio frequencies — i.e., no reduction in intelligibility or naturalness — and extremely rapid operation. You eliminate the heterodyne immediately, with no time-consuming critical adjustments. Because McLaughlin's receiver is an elaborate job, incorporating some special components not now available, we haven't attempted to give how-to-make-it details in the article. But the fundamentals are there, providing all the basis necessary for the experimentally-inclined ham to get to work.

G. G.

HAM FORUM AT WILL



Ham Forum, America's oldest program devoted exclusively to the radio amateur, celebrates its sixth anniversary with special broadcast. Now prepared by the hams on the WILL (University of Illinois station at Urbana) staff in conjunction with members of Synton, national collegiate radio fraternity, the "Ham Forum" series was initiated by W9CMZ and W9MLH in March, 1935.

Time: Saturdays, 1:15 p.m. CST.

From left to right: Harold Mautner, Jim Cody and Bill Kuznitsof of Synton; Jim Ebel W9KJV, chief engineer of WILL; Phillip Spradling; Oren Denhart, W9IAW, ham newscaster; Stanley Howell, W9QAF, president of Synton; and Andy Humphrey, W2KBL, Control engineer for the broadcast was Bob Hockfield, W9ZXD, with Ed Hamilton, W9GSS, in the master control room and George Kirkpatrick, W9L GK, at the transmitter.

QST Visits Gallups Island

Radio Instruction for Amateurs Under Ideal Conditions

Do you know that the government conducts a radio school where any American citizen between 18 and 23 years of age may go? Besides that he is fed, clothed, well taken care of and receives from \$36 to \$54 per month while attending! It was a startling bit of news to us when Earl S. Burns, W3HEW, of the Coast Guard in Washington, stopped in at Hq. one April day and presented us with the facts. The things he told us about this school were positively amazing. This should look mighty interesting to any high-school graduate with radio ambitions: an opportunity to get a complete radio course at the U. S. Maritime Service's expense and end up with a 2nd class commercial ticket. The U. S. Maritime Service is a voluntary training organization administered for the U. S. Maritime Commission by the U. S. Coast Guard. (The training program of this service is not connected with any governmental organization or body not mentioned in this article. However, the course of instruction is available to all persons having the necessary qualifications.) As a matter of cold fact, it was all so intriguing that we visited the site the very next day!

Hasty preparations were in order and the following 7:30 A.M. found QST's photographer, Frank Beaudin, and Rodimon, W1SZ (the only member of the staff who could sneak away from the office that day) aboard a Coast Guard cutter in Boston harbor headed for Gallups Island, where the school is located. The cutter makes two round trips a day out to the Island. The run takes about half an hour. Accordingly, we docked at 8 A.M. and proceeded to put in one of the most crammed days of our careers.

Gallups Island was formerly used by the U. S. Public Health Service as a quarantine station. After being idle for many years the U. S. Maritime Service received permission last May to set up their school on the Island and use whatever buildings were necessary. Work started from the ground up and the interiors of the two long narrow buildings near the waterfront, which comprise the school quarters, were completely done over from bow to stern. Polished masonite floors have taken the place of hard concrete; corridors and rooms have the latest in fluorescent lighting and the heating system is of modern design, all room temperatures being thermostatically controlled. Electric water coolers and ventilating fans were included when the buildings were modernized. The tidiness of exteriors as well

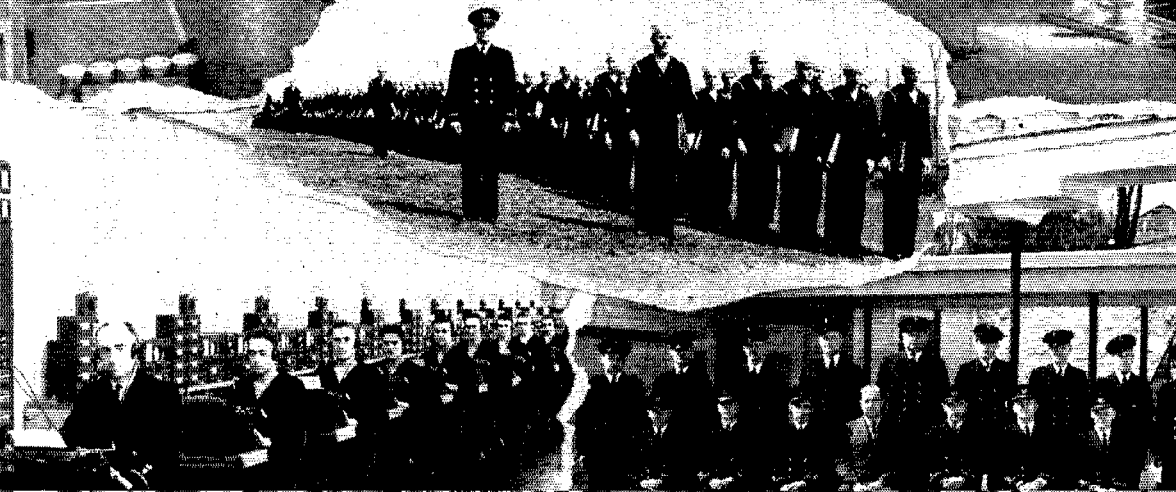
as interiors gives one the feeling that this outfit believes that "cleanliness is next to godliness."

We were first conducted to the office of Mr. D. R. Greenawalt, W1MYW, who is the skipper of the radio school. There we met the instructors and hashed over the problems of radio schools and operators. Requirements for entrance specify two years of high-school math and one year of physics. The individual must pass an elementary examination about radio and be able to handle code at 13 w.p.m. We understand that a ham with the necessary schooling and a Class B ticket would have no trouble in qualifying. A physical examination must be passed in conjunction with the theoretical. Both examinations are given at a government office in the vicinity of the applicant and when passed the lad gets his transportation from point of enrollment to the school and his salary of \$36 per month starts. It is an 8- to 40-week course, depending upon the knowledge of radio and operating ability of the student. The salary is boosted to \$54 per month after three months. The uniform furnished is similar to a sailor's outfit. A health station with doctor and dentist in attendance is on the Island.

The operator enters and leaves the school as a civilian. There is no induction into any branch of the service. If the student feels at any time a desire to quit, he merely goes to the skipper, makes known his wishes, receives the pay due him and shoves off with no strings attached. When the course is completed and the FCC exam passed, the operator may travel back to the point of enrollment at the government's expense.

This school is run purely and simply because Uncle Sam wants to train young men to become loyal and efficient radio operators in the American merchant marine. Entrance requirements are such that those qualifying will be sincere men

When a managing editor gets excited about something you can be pretty sure that it's something to get excited about. He's been bubbling with effervescent enthusiasm ever since returning from Boston with the pictures and story adjoining. The reason for all the excitement will be plain enough after you read about this latest exhibition of interest in the *genus hamus* on the part of Uncle Sam.



anxious and able to do their utmost in becoming first-class ops. From what we saw of the school program it may well be proud of any "Sparks" who leaves there with diploma tucked under arm.

Our tour started with a visit to a watch-standing room where instruction on receiving watches is given. There are 24 actual receiving positions set up in this room — each position simulates a ship's receiving installation. (Right here it should be understood that all equipment of any description is of the very latest design. This also holds for the 200 typewriters of the super-speed variety that are at the school. When one realizes that \$150,000 has been spent in these rooms for equipment alone, since last June, and the end is not in sight, this may well be appreciated!) Twelve of these receiving positions carry Federal Telegraph equipment, complete with long-wave, short-wave and stand-by receivers, not to mention a crystal detector that is required aboard ship even to-day. Across the room are twelve similar Radiomarine installations, equally complete. Each position has its typewriter, W.E. headphones and 8-position selector box. The operator can switch to one of these positions for communication with any one of the 24 operating positions. Also in front of each operator is a miniature loudspeaker which allows the instructor to direct any position, or all simultaneously, by microphone. This room is strictly for code practice under actual receiving conditions and the instructor at the relay-rack installation in the center of the room instructs and directs this operation.

Much emphasis is placed on the importance of reception under natural receiving conditions, for we were told that, regardless of how well the student has mastered the code shot out by the audio oscillator, he would invariably fall down when operating a receiver and finds it necessary to pull the stuff through the slightest amount of interference.

There are also two classrooms for straight



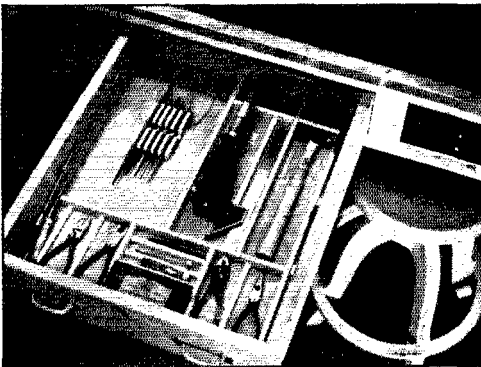
Standard shipboard operating position — practical watch standing section.

code-practice in conjunction with touch typing. The student must be brought up to 25 w.p.m. for straight text and 20 w.p.m. in code groups. This has to be accomplished on the mill as well as by graphite. These rooms also carry the inter-position and instructor-student communication system.

There are six senior and ten junior instructors at the school. The texts used for study were made up by the staff especially for this location and are admirably done. We were also shown a couple hundred A.R.R.L. Handbooks that are in service. (DHH — Don't worry, we told 'em there was a new edition in the works.)

Obviously an unbelievable amount of thought has gone into the course of instruction at the school. As one example: Should the code instructor wish to demonstrate to an individual a fault or bad habit in sending, a flip of a toggle and a recording is made at the instructor's desk and then played back to the student.

Boehme heads and Wheatstone perforators are available for automatic work in code reception and transmission. While it is recognized that an operator is fundamentally present to put on paper what comes into the headphones, the instructors know this is only half the battle. This point was demonstrated when we went into their lab. Here, each student rates his own lab space and drawer with complete set of tools. Available at any position are keyed outlets making 110 volts at 60 or 500 cycles and d.c. at hand all the time — assuring that the op will be familiar with whatever juice will be found aboard ship. The student is shown by mechanical-electrical demonstrators how receivers and transmitters work and what to look for and how to service gear in case of failure. This policy of repair is carried out right down to the generators, which are taken apart; armatures tested and practical instruction given



Individual student tool drawer — radio laboratory.

in general servicing and maintenance. Not being satisfied with merely drilling fundamentals into the boys, the instructors have them carry out individual class demonstrations illustrating Ohm's Law with the aid of resistors and meters. (If you don't believe that takes a pile of resistors and meters, take a look at the equipment stored in the stock-room!) Little is done along constructional lines, for the operator will necessarily only need to repair equipment. Lab measuring gear includes oscilloscopes, signal generators and frequency meters in addition to the ordinary equipment necessary for lab measuring runs. A lathe, drill press, bench saw and high-speed buffer and grinder, all with individual motor drives, sit at one end of the lab and are available for repair work or construction. If problems arise that require more equipment, there is a machine or carpenter shop to go to. Power and telephone communication are piped in from the mainland. In case of emergency or failure a gasoline generator kicks in automatically and takes care of the entire load of the school.

There is a standard marine radio installation lab which contains at least one each of transmitting gear that would be found aboard vessels operating under the U. S. Maritime Commission. These rigs are all hooked up to shielded dummy antennas. (It must be appreciated that Boston harbor has enough radio signals present without some practice signals — and even a few inches of radiator can do quite a job of interfering locally.) These outfits range in size from several hundred watts to the emergency gear in small boats. As in the receiving room this setup contains both Federal and RMCA equipment. Also in this room are two direction-finding layouts — one of each manufacture. The instructors see to it that the students thoroughly understand the workings and repairing of transmitting and D.F. gear as well as other equipment in a ship's radio installation. Automatic distress signal alarm equipment, lifeboat transmitting and receiving gear, as well as small-craft radiotelephone equipment and accessories, are in this lab. Tuned r.f. and superhet receivers that are used in service can be found here.

Classes start at 9 A.M. and are finished at 4 P.M. However, classrooms and labs are open at night and instructors are on hand to help with any individual problems from 6 to 9 P.M. Classes are held in mathematics; radio theory; lab and practice instruction; radio procedure, law and regu-

lations; code instruction and practical watch standing — and last an hour apiece. Along with his radio, the student gets an hour of seamanship a day; it may be pulling on an oar out in a whale-boat or a most interesting hour spent in the sail loft taking in the fundamentals of ship equipment, learning to tie knots, make hoists, read signal lights, flares, repair lines and work with pulleys and lifts.

Students get only the rudimentary elements of military training. In general, the organization, administration, rules and regulations follow closely the Coast Guard organization. After seeing the work that has to be covered in the regular course, the reason for this can be appreciated. However, students have a whack at keeping their classrooms spic and span and their floors polished, and learn to keep their quarters clean. They also help in office duties such as mimeographing and drawing.

Those who have a hankering for spending free time on the water will find sail- as well as pulling boats available. Weekends start at 1 P.M. on Saturday and the student is on his own, whether he desires to stick around or to take shore liberty. Several forms of recreation are provided for the students while aboard, including movies every night. Local organizations from Boston contribute to the recreation of the personnel, supplying orchestras and dancing partners for parties which are held on the island. Religious services are conducted each Sunday.

Also present on the island is a school in cooking and baking. This group prepares all meals so it is no wonder that the students are fed so well. We had originally planned to visit, get all our dope, shoot photos and depart on the 1 P.M. boat, but we found our job only half done at this time — so we partook of the bill of fare at officers' mess.

We met all the instructors and had a chance to chew the fat with each one. Many of them are ex-hams — we must say "ex" for they all confess to having had no free time since the school started. Having a hand in the carpentry work as well as the electrical and radio installations in conjunction with a class starting shortly after work commenced, meant that a great amount of

installation and planning necessarily had to be done after classes each day. We have never seen a more enthusiastic group of instructors and the brief rag-chewing we had with some of the lads certainly showed they appreciate all that is being done for them. This first class
(Continued on page 19)



U. S. Maritime Service Training Station, Callups Island, Boston, Mass.

An Inexpensive 56-Mc. Exciter or Transmitter

Ten Watts of Crystal-Controlled Output from Receiving Tubes

BY VERNON CHAMBERS,* WIJEQ

Here is a simple and straightforward layout that delivers 10 watts of crystal-controlled 56-Mc. output at a minimum of cost. You'll be surprised to find how easily and quickly it can be put together. Bugs? We just weren't able to find any!

ANY amateur who has experimented with crystal-controlled 56-Mc. transmission will admit the advantages of starting out with a crystal of comparatively low frequency. It is well worth while to include several doubler stages in a transmitter design to obtain greater stability and ease of operation, even though at first glance this might seem to run to considerable cost because of the numerous circuits and tubes involved.

Nevertheless the cost can be quite reasonable, as illustrated by the low-power transmitter to be described. This outfit employs a crystal-controlled oscillator, three doubler stages, and a push-pull amplifier working straight-through at 56 Mc. with three ordinary receiving tubes costing only \$2.79! The rest of the transmitter components may be purchased for \$14.00, including everything except the crystal.

Circuits

Fig. 1 shows the circuit diagram of the transmitter. Type 6A6 tubes are used throughout. One

* ARRL Technical Information Service.

section of the first tube is used as a triode oscillator on 7 Mc. while the second half doubles to 14 Mc. The two sections of the second tube are used as 28-Mc. and 56-Mc. doublers, and the third tube is a push-pull final amplifier. Capacitive interstage coupling is employed except between the 56-Mc. doubler and the grid circuit of the final, where inductive coupling of a type previously described¹ is used.

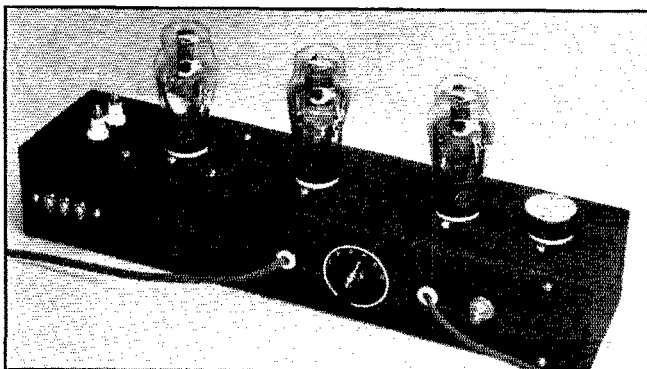
In the triode oscillator circuit parallel plate feed permits grounding the rotary plates of the tuning condenser; since the following grid circuit is series-fed there is no essential difference in r.f. performance between this and the more common circuit with series plate and parallel grid feed. Cathode bias allows the tube to operate at low plate current; it is not necessary to work the oscillator very hard since the excitation requirements of the first doubler are rather light.

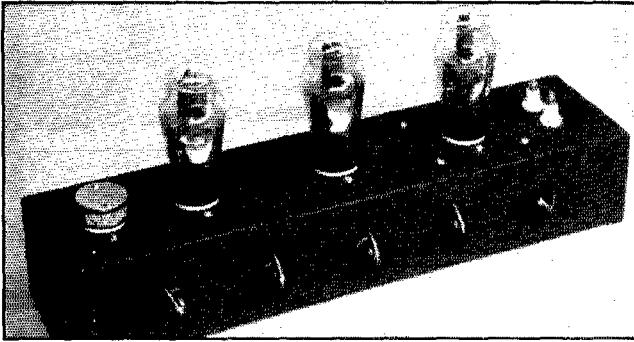
The 14- and 28-Mc. doubler circuits are identical except for the cathode resistor, R_2 in the first doubler stage. The second doubler uses no cathode bias because it is desirable to secure as much output as possible to drive the 56-Mc. doubler. Parallel plate feed is employed in both stages.

The 56-Mc. doubler has series plate feed through an untuned plate coil. Since the coupling to the final grid circuit is fairly loose, the coil is made nearly self-resonant so that maximum energy transfer will result. The push-pull amplifier circuit is the standard arrangement for neutralized triodes.

¹ See page 16, *QST* for Feb., 1941.

The plate-voltage terminals are at the left in this rear-view photograph. The meter switch is flanked by the meter cord on the left and the 110-volt line cord on the right. The crystal-current bulb is mounted in a rubber grommet.





In this front view the oscillator, doubler and amplifier tubes run from left to right. The crystal socket is at the left end of the chassis and the output terminals are at the right. Tuning controls are arranged in line along the front wall of the chassis.

Fixed or cathode bias is not required in the last three stages, either for operating or protective purposes. The plate currents of the 6A6's will not be excessive in the event that excitation fails or is purposely shut off. This is convenient in case the oscillator is to be keyed for c.w. work.

Meter switching with shunt resistors (R_7 to R_{12} , inclusive) provides for measuring plate currents, although the meter is not incorporated in the transmitter itself. The wiring of the switch is shown in the main diagram.

Construction

The transmitter is built on a chassis measuring 3 by 4 by 17 inches. One tube is located at the exact center of the top and the other two are $4\frac{1}{2}$ inches to the right and left, respectively. It is advisable to mount the oscillator and doubler tube sockets with the filament prongs toward the front of the chassis and the amplifier tube socket with its filament prongs facing the right end. This arrangement helps keep the r.f. wiring as

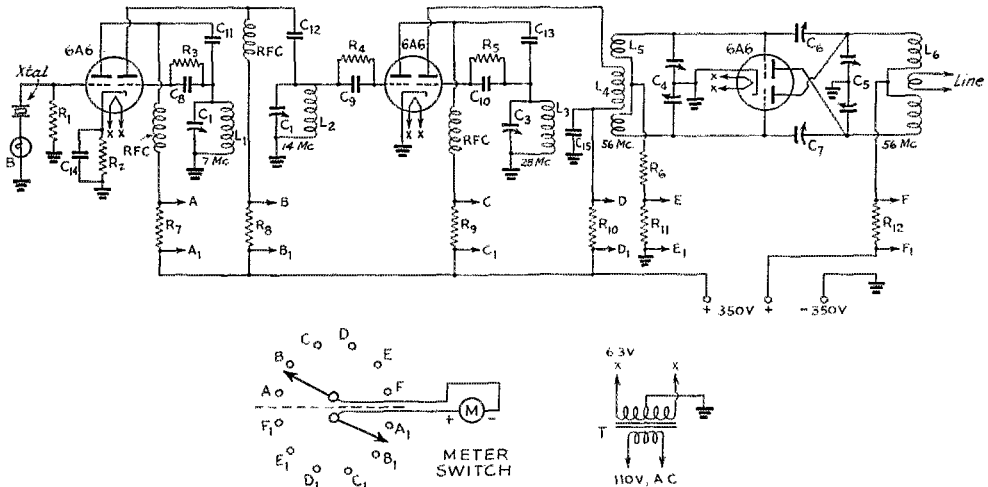
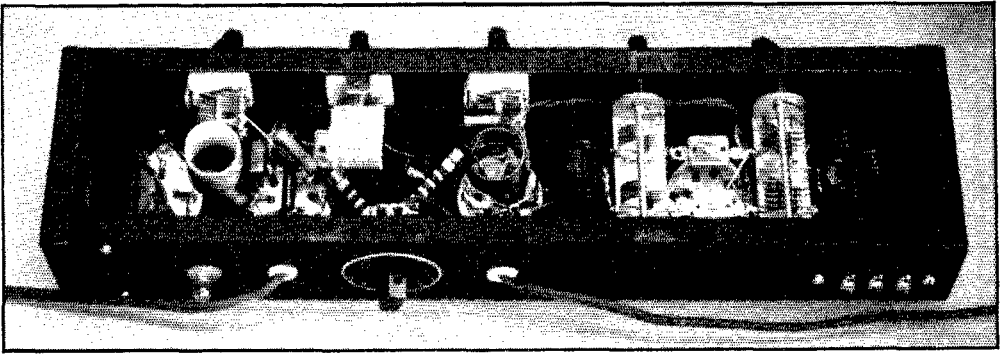


Fig. 1—Wiring diagram of the 56-Mc. exciter-transmitter.

- C_1 — 50- μ fd. variable (Hammarlund HF-50).
- C_2 — 35- μ fd. variable (Hammarlund HF-35).
- C_3 — 15- μ fd. variable (Hammarlund HF-15).
- C_4 — 50- μ fd. per section dual variable (Hammarlund HFD-50).
- C_5 — 15- μ fd. per section dual variable (Hammarlund HFD-15-X).
- C_6, C_7 — 3-30- μ fd. compression-type trimmer (National M-30).
- C_8, C_9, C_{10} — 100- μ fd. midget mica.
- $C_{11}, C_{12}, C_{13}, C_{14}, C_{15}$ — 500- μ fd. midget mica.
- R_1 — 15,000 ohms, $\frac{1}{2}$ -watt.
- R_2 — 500 ohms, 1-watt.
- R_3, R_4, R_5 — 30,000 ohms, $\frac{1}{2}$ -watt.
- R_6 — 1000 ohms, 1-watt.
- $R_7, R_8, R_9, R_{10}, R_{11}, R_{12}$ — 25 ohms, $\frac{1}{2}$ -watt.

- RFC — 2.5-mh. r.f. chokes (National R-100).
- B — 60-ma. pilot bulb.
- Sw — Two-circuit, 6-position selector switch (Mallory 3226-J).
- T — 6.3-volt filament transformer (Thordarson T-19F81).
- L_1 — 21 turns No. 22 d.s.c., close wound, 1-inch diam.
- L_2 — 11 turns No. 22 d.s.c., 1 inch long, 1-inch diam.
- L_3 — 6 turns No. 14, $\frac{3}{4}$ inch long, 1-inch diam.
- L_4 — 9 turns No. 14, $\frac{5}{8}$ inch long, $\frac{3}{4}$ -inch diam.
- L_5 — 2 turns No. 12 each side of L_4 , 1-inch diam., center opening $\frac{3}{4}$ inch. Turns spaced diam. of wire.
- L_6 — 3 turns No. 12 each side of coupling link, $\frac{7}{8}$ -inch diam., center opening $\frac{3}{4}$ inch. Turns spaced diam. of wire.
- Link — 5 turns No. 12, $\frac{7}{8}$ -inch diam., $\frac{1}{2}$ inch long.



This bottom view shows how the tuning condensers are mounted with respect to the tube sockets. The self-supporting coils mount directly on the tuning condensers. The filament transformer is in the lower left-hand corner.

simple and straightforward as possible. The crystal socket and output terminals are each centered $1\frac{3}{4}$ inches in from the ends of the chassis. The second doubler tuning condenser, C_3 , is mounted in the center of the front wall of the chassis. The other variable condensers are to the left and right with $2\frac{3}{4}$ -inch spacing between shaft centers. C_1 , C_2 and C_3 are supported by the chassis wall but C_4 and C_5 are mounted on small metal pillars from the upper side of the chassis. This mounting brings the shafts of C_4 and C_5 in line with the other three.

The rear-view photograph shows the placement of parts on the rear wall of the chassis. Wiring to the meter switch is simplified if the switch is located $6\frac{1}{2}$ inches in from the right-hand end, looking at the rear, where there is a comparatively open spot in the r.f. layout. This point is also convenient to the supply ends of the plate chokes in the first three stages, so that these chokes can be mounted directly to the switch. To save trouble the shunt resistors should be soldered to the switch contacts before the switch is mounted.

The filament transformer and crystal bulb are at the left end of the chassis in the bottom view. The transformer should be kept as far as possible to the left so that it will not be near the r.f. circuits. The bulb is held firmly in the grommet by the stiff leads soldered to its base. The plate supply terminals are out of the way at the extreme left end of the base. Two positive terminals are provided so that a modulator transformer secondary may be connected in the plate lead of the final amplifier.

The rest of the parts are mounted so that r.f. leads will be short and direct; short leads are particularly important in the last two or three stages. The grid connections in the amplifier should be made directly between the grid prongs of the socket and the stator plate terminals of the grid tank condenser, which should be directly above the grid prongs if the unit is laid out as recommended. The plate prongs and the stator sections of C_5 should be cross-connected so that the

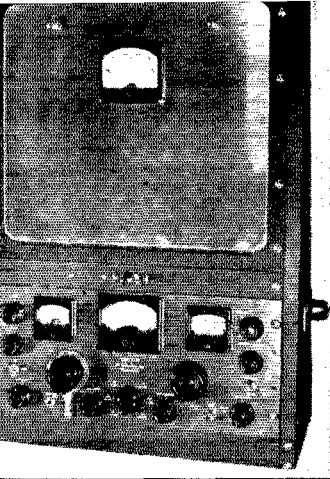
neutralizing condensers, C_6 and C_7 , may be supported by the condenser lugs as shown in the bottom-view photograph. This gives leads of negligible length and perfect wiring symmetry, both of which contribute to good neutralizing. The padder-type condensers used for neutralizing may seem a bit unusual, but since the neutralizing capacity required is small the actual dielectric is mostly air, thus the effect of the mica is inconsequential. The small physical size of the condensers makes them ideally suited for the purpose. The output coupling coil has its ends soldered to lugs which are held in place by the feed-through terminals. The lugs will bend as the position of the coil is varied to change the coupling.

Operation

A power supply delivering 350 volts at 150 ma. is needed. Circuit performance is similar to that to be expected at the lower frequencies; each tank circuit will be in resonance when adjusted for minimum plate current to the tube with which it is associated. These currents should be 10, 18, 18 and 40 ma., in the order listed, for the first four stages. It is quite possible that the values will vary slightly in different layouts, but they should be approximately as given. Tuning of the various tanks should be adjusted to obtain maximum output from the 56-Mc. doubler, as indicated by maximum grid current in the final amplifier grid leak R_6 . If no grid current is obtained it is probably an indication that the coupling between L_4 and L_5 is either too tight or too loose; this coupling is quite critical and therefore deserves careful adjustment. The amplifier grid current should be 25 ma. or more when the coupling is optimum. Each time the coupling is changed, condenser C_4 , as well as the preceding tuning condensers, should be readjusted.

After a grid current indication is obtained the amplifier should be neutralized. Plate voltage should be disconnected from the amplifier but the rest of the circuits should be in normal operating

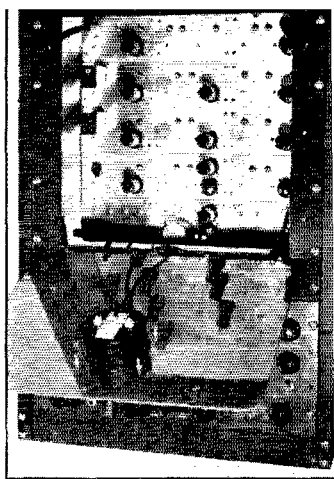
(Continued on page 76)



A Brute-Force Attack on Heterodyne Interference

A front view of the selectible single side-band receiver, in this case an SX-28, is used in conjunction with the side-band selector system which occupies the upper part of the rack. The key switch between the two has three positions giving normal receiver, upper side band alone, or lower side band alone.

The front panel drops down to give access to tubes and controls. The controls are all screwdriver-adjusted and need no attention in regular operation. A cast aluminum catacomb with individual front cover plates gives individual compartments for each stage, with stages readily removable for servicing or revision.



The Selectable Single Side-Band Receiving System

BY J. L. A. McLAUGHLIN*

THIS article will briefly describe a new heterodyne rejection circuit, semi-automatic in operation, and capable of removing several heterodyne beat-notes simultaneously. In effect it is a single side-band radiotelephone receiver with means for rapid selection of the side-band with the least interference and suppressing the one containing the undesired carriers.

A simple heterodyne beat-note is produced by a carrier beating with the desired signal's carrier, the frequency difference between the two being the frequency of the beat, as shown in Fig. 1-A. In Fig. 1-A the interfering carrier is 2 kc. lower in frequency than the desired carrier hence if the lower side-band is rejected the interfering carrier will be eliminated and the beat-note will disappear.

Complex heterodynes are illustrated by Figs. 1-B and 1-C. They are made up of two or more carriers beating with the desired signal carrier and with each other. Fig. 1-B shows two interfering carriers, both on the low side of the signal frequency. Such a combination will produce three principal beat-notes all of which

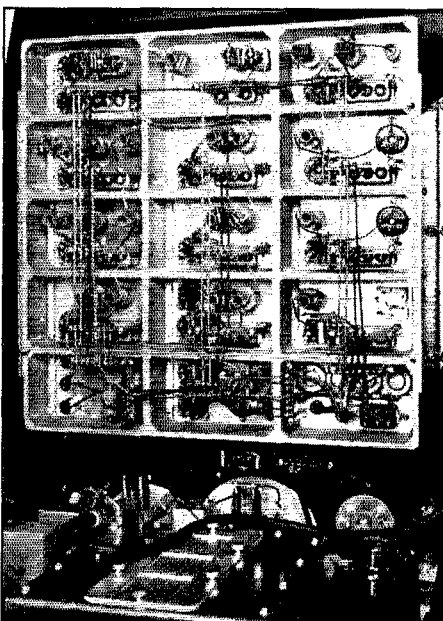
can be removed by selecting the upper side-band and rejecting the lower. So long as all the interfering carriers line up on one side of the signal frequency all the beats can be attenuated. Fig. 1-C shows interference on both sides of the signal; the number of principal beat-notes in this case is six. Selecting the proper side band will remove five of them, leaving but one to fight.

Fig. 2 is a block diagram of the system. In the actual receiver shown in the photographs, a standard communications receiver is used in conjunction with a special second i.f. system which provides a band-pass amplifier, a means for selecting

either the upper or lower side band at will, and a selective amplifier which is used for locating the carrier properly in the pass band.

The 455-kc. input is coupled loosely to the grid of the second i.f. tube in the SX-28 receiver. The audio output of the side-band selector unit is connected back into the SX-28 at the input of the audio amplifier through a relay which simultaneously cuts the receiver diode's audio output. Throwing the key switch (directly over the main dial on the receiver) to the right or to the left

Rear view of the side-band selecting circuits, with back cover off. R.f. is carried from the receiver to the side-band selector through flexible concentric cable.



*7850 E. Jefferson, Detroit, Mich.

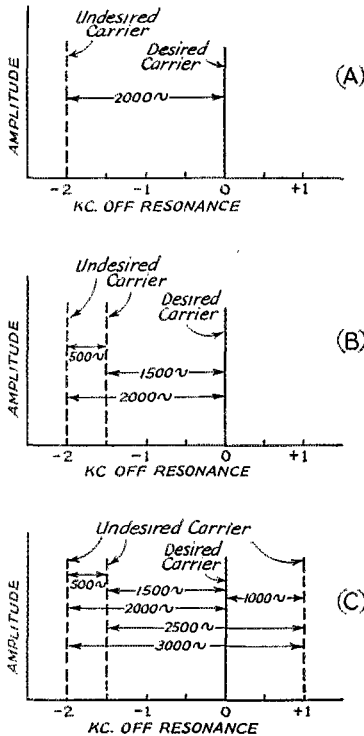


Fig. 1 — Audio beats produced by rectification of two or more carriers. Note that when four carriers are present (C) six beats are produced. Removing the two carriers on the lower side of the desired carrier, before detection, will eliminate five of the beats.

puts current on the relay which disconnects the diode output in the receiver, connects the output of the side-band selector unit and cuts off one side-band. It is possible to use the SX-28 as a normal double side-band receiver when no interference is present by setting the switch in the center.

The 455-kc. signal from the receiver is mixed with the output of a fixed oscillator and converted to 50 kc. Coupled to the output of the mixer tube are two amplifiers. One is a band-pass type with a sharp cut-off on the low frequency side and a fairly flat nose from 50 kc. to 54 kc. The other

Heterodyne interference with 'phone reception arises when an undesired signal is spaced within audio frequency on one side or the other of the desired carrier. Single side-band reception, when either side band of the incoming signal can be selected at will, offers an opportunity for reducing heterodynes, and in many cases completely eliminating them, without affecting the characteristics of the desired signal. Here is a description of a receiving system which does it.

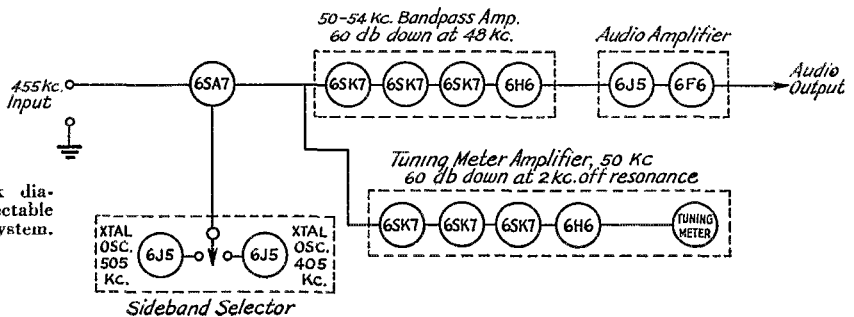
amplifier tunes very sharply to 50 kc. and by means of the microammeter resonance indicator in its output permits setting the signal to the correct point in the band-pass amplifier.

The manner in which the desired side-band is selected is as follows: To produce 50 kc. in the mixer output, an oscillator having a frequency of 455-kc. plus or minus 50 kc. must be mixed with the 455-kc. signal. This calls for an oscillator of either 405 kc. or 505 kc. At first glance it might seem that nothing is altered in the signal's characteristics by using either frequency. Something does happen, however, to the side-bands of the 50-kc. signal with respect to the side-bands of the 455-kc. signal.

If a frequency of 405 kc. is used, the side-bands of the 50-kc. signal will be in the same order as the side-bands of 455-kc. signal. That is, the upper side-band of the 455-kc. signal will be converted to the upper side-band of the 50-kc. signal, and the same goes for the lower side-band conversion. When 505 kc. is used, however, the reverse takes place; the upper side-band of the 455-kc. signal now becomes the lower side-band of the 50-kc. signal and the lower becomes the upper. For example: Take a lower side-band frequency of the 455-kc. signal, say 450 kc., beat this with 405 kc. and the result is 45 kc.; now beat it with 505 kc. and the result is 55 kc. We have reversed the side-band and found the key to an improved single side-band receiver. Since the 50-kc. band-pass amplifier accepts but one side-band, we convert either side-band of the 455-kc. signal, by means of

(Continued on page 74)

Fig. 2 — Block diagram of the selectable single side-band system.





U. S. A. CALLING



FROM time to time we shall publish under this heading data on the calls for radio personnel made by the services and other agencies engaged in defense work. By bringing all the month's data together in one place, interested amateurs can study them all and see for which jobs they are best qualified.

NAVY WANTS 200 ENSIGNS!

ARRL has been asked by the Navy to locate 200 qualified candidates for appointment as communications officers with the rank of ensign in the U.S.N.R., Class C-V(S). While most amateurs think of the Navy in terms of being an enlisted operator, here is a chance for qualified amateurs to get commissions—the best opportunity we have heard of for an amateur desiring to associate himself with the Navy.

Applicants must possess a *scientific college degree* and have a background of amateur or commercial radio; they must be under 30 years of age and preferably between 21 and 26. Appointees will receive an intensive schooling in Navy communications and then given active duty either ashore or afloat. Base pay of an ensign is \$125 a month, plus allowances.

The Navy does not want direct correspondence with applicants at this time. If you fulfill the requirements, are in good health and want this appointment, send a post card to ARRL, West Hartford, giving your name and address, age, call (or grade of license held) and college degree received. We are centralizing the collecting of names and you will then hear directly from the Navy in short order.

MARITIME OPERATORS

WE BRIEFLY call attention here to the swell opportunity described at length in our special article on the Maritime Commission's school for radio operators run by the Coast Guard. Here is an invaluable training course in commercial operating, available without enlistment or commitment to qualified high-school graduates between 18 and 23 years of age who have about Class B qualifications—and free, with everything found. See the article for details.

ATTENTION, O.R.C.

THE Signal Corps needs several thousand additional officers of company grade. Reserve officers of other arms and services who are graduate electrical engineers, or who have had Signal Corps experience or training, may arrange through their Corps Area or Department com-

mander for duty with or transfer to the Signal Corps, with extended active duty immediately available.

About the first of July the Signal Corps will establish an officers' training camp at Fort Monmouth. Regular Army enlisted men and draftees of six months or more experience, who are under 36 and have the necessary qualifications, will be eligible for this course, which yields a lieutenancy.

AIR CORPS COMMUNICATIONS

THE Army Air Corps wants squadron communications officers—who have charge of the operation and maintenance of squadron radio equipment and general supervision of local communication; ground duty only. There is an instruction course of about nine months in the status of cadet: 16 weeks of specialized study at Scott Field, Belleville, Ill., followed by 5 or 6 months of practical experience, terminating in commission as 2d Lieutenant, Air Reserve, and active duty for up to three years. Status in training same as flying cadets: \$75 a month, uniforms, quarters, subsistence. Candidates must be unmarried citizens, 20 to 26; physical requirements less rigid than for flying, but must meet ORC standards. Preference is given EE and other engineering graduates but currently-licensed amateurs, who have successfully completed two years of college work, will be considered. The course offers good practical radio training. A 2d lieutenant receives base pay of \$125 plus \$18 subsistence, plus \$40 rental allowance when living off a post. Address all applications and inquiries direct to Office of the Chief of the Air Corps, Washington.

C.C.C. AND N.Y.A. INSTRUCTORSHIPS

CCC's large-scale training plans still await Congressional appropriations. Many amateurs have registered for employment as instructors—probably enough to fill the needs. As quickly as funds are available, CCC will communicate with the successful applicants already registered.

NYA provides work-experience by building radio equipment for public agencies such as police and forestry departments and schools. Administration is decentralized, each state having its administrator to plan work and engage personnel. Many states need radio instructors and supervisors at salaries around \$1800, and some state radio engineers at higher salary. Applicants must be over 25, possess Class A amateur and

either radiotelephone first or radiotelegraph second licenses, and have had experience in commercial operating or manufacture. NYA youth also receive code and theory under auspices of Office of Education, through state vocational education boards, and frequently radio supervisors are engaged jointly by NYA and OE. Contact the State NYA Administrator, or write for his address and blanks to R. R. Burton, NYA Radio Engineer, 2145 C St., N.W., Washington, D. C.

NAVY RADIO OPERATORS

RECRUITING has been resumed in Class V-3 of the USNR. Young men, who desire to enlist for training as Navy radiomen, may apply at the nearest Navy recruiting station. Instructions have been issued to give preference to applicants holding FCC operator licenses. Successful applicants will be given a short period of instruction at a Naval Training Station and then sent to a Naval Reserve Radio School for a 16-weeks' course in radio, to be followed by active duty afloat or ashore. Those particularly well qualified physically and who have aptitude for aviation communication may be given further training to qualify as "qualair" radiomen. All information from your local recruiting station.

REGISTER WITH A.R.R.L.

ARRL is bringing many individual amateurs in contact with agencies needing personnel for engineering and radio operating — industrial as well as Service work. In February *QST*, page 25, we published a blank form whereby amateurs who wish to be considered for such

positions may register their availability at headquarters. The form also deals with the availability of your station facilities for defense work that amateurs may be called upon to perform. Of equal importance is the fact that, through this mechanism, amateurs may be helped to better positions; and those already employed in satisfactory positions in nonessential industries may be made available to endeavors of greater current importance. For these several reasons we urge the filling out of the form (or a reasonable facsimile) by those who have not yet done so. See February *QST* and register with ARRL.

Gallups Island

(Continued from page 12)

is the guinea pig group — the boys all came from the CCC and were "picked out of the trees." They are coming out in June as 2nd class commercial ops after going in without regard to qualifications. If they can do it, and like it, we can imagine that this will be heaven to any ham who wants to follow radio as a career. *For complete information on the school at G. I. address a note to Chief, U. S. Maritime Service, U. S. Coast Guard Headquarters, Washington, D. C.*

Earl Burns and his co-workers rate great credit for the grand job they have accomplished. It seems that everything has been done and no expense spared to create a comfortable, pleasant atmosphere for the boys. When we tell you about the glass top operating desks with green felt underneath, we think you will understand what we mean! Many kinks were picked up from this trip and we expect to benefit by passing them along to the rest of the gang at our Hq. lab. (And we are mentally including a couple of those positively plutocratic lab stools we saw for the first time. Boy, how we could turn out the gear perched on one of those!)

We were just able to wind up and shove off on the last boat at 4 P.M. When the dog days get us down at La Salle Rd. this summer we'll think of those boys out there in Boston harbor with a nice sea breeze fanning their studious brows. We suggested it as an ideal spot for a hamfest and were told it might be arranged.

Everyone treated us royally — no request of ours, however annoying, was refused — whether it was breaking into an examination and getting students and instructors to fit into photos or up on the parade grounds when we experimented for an hour with 300 men going into various formations to see which suited our photographic purposes best. (It's just possible those boys didn't appreciate seeing us as much as we did them!) Regardless, we are certain of one thing — they will be a credit to Uncle Sam when they are standing watch aboard any ship.

— C. C. R.

SIGNAL CORPS COMMISSIONS!

Word just reaches us of an interesting new opportunity for graduate electrical engineers and electron physicists, aged 21 to 36, unmarried and without dependents. The Signal Corps wants them for immediate commission as 2nd Lieutenants for *special work*; active duty for one year and the option of extending to two. Draftees already selected and in Army camps are eligible — we believe this the only opportunity in the Army for a man subject to the draft to be commissioned. Details next *QST* but watch your daily paper and WIAW's broadcasts. Signal Corps officers will visit major cities to interview candidates. If interested, write at once to G. W. Bailey (WIKH), Academy of Sciences, 2102 Constitution Ave., Washington, or Office of the Chief Signal Officer, Washington.

• For the Junior Constructor —

A Fool-Proof Rig for 80 and 40 Meters

A Two-Stage Low-Power Outfit for the Beginner

IN DESIGNING a transmitter for the beginner, there are three factors which one must attempt to keep in balance. These are cost, simplicity in construction and ease in adjustment and operation. A review of some of our own work in the past shows that it has been all too easy to give disproportionate weight to one of these factors, thereby to a great extent destroying the balance for which we have been striving.

Invariably, the factor which is made to suffer most is that of ease of adjustment and reliability of operation. Yet careful consideration would indicate that this factor should be most important of all to the beginner who is immediately in a quandary when some slight liberty in circuit value or adjustment, innocently taken, results in spoiling the performance of the transmitter. Failures whose sources are promptly recognized by the more experienced usually result in discouragement to the beginner who labels the circuit "N.G." and tries his original parts in another circuit with still poorer results. While cost is an important factor, it is readily possible to carry it to extremes. The saving of a dollar or two, often amounting to only ten per cent or less of the total cost of the transmitter, is really of little importance, especially if extreme economy results in tricky adjustments or complicates construction.

The usual beginner's transmitter is built around a single tube, following the premise that more than one stage will make the first step too complicated or too expensive. The frequent result is a transmitter whose coupling to the antenna circuit is critical in adjustment for a compromise between maximum output and reliable, chirp-free keying. To make matters worse, an attempt is usually made to make up for the lack of additional power stages by running the oscillator at high-power input, incurring the danger of crystal fracture as well. Almost everyone who has had experience with high-power oscillators eventually comes around to the oft-voiced conclusion that most troubles will be avoided if the oscillator, be

it crystal controlled or self-controlled, is treated as a frequency-control unit with power output of decidedly secondary importance.

Most of the prejudice toward a two-stage transmitter for the beginner could be eliminated if a simple and reliable amplifier arrangement could be found. The usual triode amplifier circuit is complicated in both construction and adjustment by the necessity for neutralizing circuits to prevent self-oscillation. On the other hand, the unneutralized screen-grid amplifier requires careful placement of parts and shielding at appropriate points. This often results in even more complication than that of the neutralized triode amplifier.

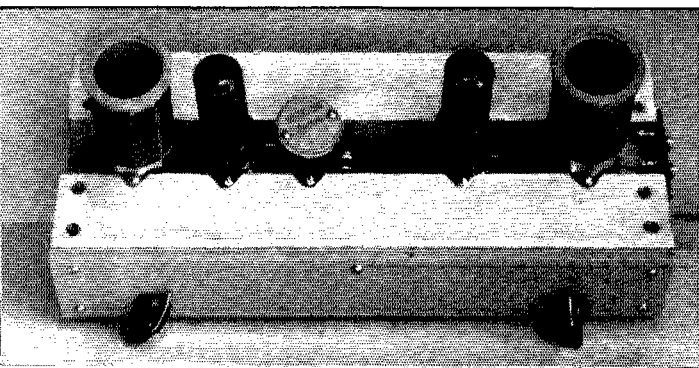
There is one well-known amplifier circuit, however, which has been sadly neglected, although practice has shown it to be one of the best so far as simplicity and reliability of operation is concerned. This is the inverted amplifier¹ in which excitation is fed to the amplifier between the cathode and ground rather than between grid and ground. In a circuit of this type, feedback through the plate-cathode capacity (which corresponds to the plate-grid capacity in the usual amplifier arrangement) is *degenerative* rather than regenerative and this accounts for the unusually stable operation of the amplifier under all conditions. In fact, experience with the transmitter shown in the photographs has indicated that it is practically impossible to make the amplifier oscillate when using a tube such as the 6L6.

Of course, a degenerative amplifier requires greater driving power than normal for the tube in the usual arrangement. But since the required driving power is easily obtained with the normal oscillator complement, a somewhat greater driving-power requirement is of no consequence.

¹ Romander, "The Inverted Ultraudion Amplifier," *QST*, Sept., 1933.

Austin, "Type 59 Tube as Inverted Amplifier," *QST*, June, 1935, p. 42.

Austin, "A Different Portable-Emergency-Transmitter," *QST*, July, 1940.



The completed beginner's transmitter. From left to right, the sockets are: 5-prong for the oscillator plate tank coil, octal for the oscillator tube, 6-prong for the crystal (three prongs wired together on each side), octal for the amplifier tube and 5-prong for the amplifier plate tank coil.

QST for

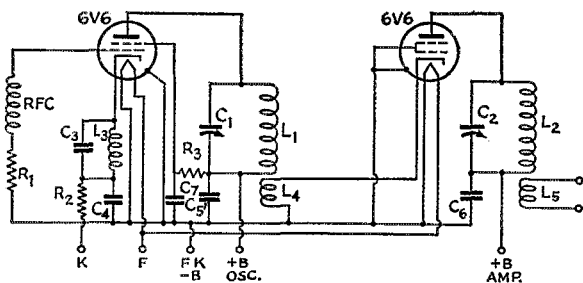


Fig. 1 — Circuit diagram of the beginner's two-stage transmitter.

- C₁, C₂ — 150- μ fd. variable (National ST 150).
- C₃ — 250- μ fd. mica.
- C₄, C₅, C₆, C₇ — 0.01 μ fd.
- R₁ — 0.1 meg., 1-watt.
- R₂ — 500 ohms, 2-watt.
- R₃ — 50,000 ohms, 10 watts.
- L₁ — 24 turns No. 18 enam., 1 $\frac{3}{4}$ -inch long, 1 $\frac{1}{2}$ -inch diam.
- L₂ — For 3.5 and 7 Mc. — 26 turns No. 18 enam., 1 $\frac{3}{4}$ -inch long, 1 $\frac{1}{2}$ -inch diam.
For 7 Mc. — 14 turns No. 18 enam., 1 $\frac{3}{4}$ -inch long, 1 $\frac{1}{2}$ -inch diam.
- L₃ — 12 turns No. 18 enam., 1 $\frac{1}{4}$ -inch long, 1-inch diam.
- L₄ — 9 turns No. 22 enam. close-wound below L₁.
- L₅ — See text.

The complete circuit is shown in Fig. 1. A 6L6 is used in a simplified Tri-tet circuit with fixed cathode components which make it almost impossible to arrive at incorrect operating values. A combination of cathode and grid-leak bias is desirable to prevent high plate current when the circuit is not oscillating and to accentuate the second-harmonic output.

Components for both cathode and plate circuits are chosen to obtain output in the two most-popular frequency bands—the 3.5- and 7-Mc. bands—from a 3.5-Mc. crystal. Both bands are covered with a single oscillator coil by merely swinging the tuning condenser from a point near maximum capacity for 3.5 Mc. to a point near minimum capacity for 7 Mc.

The circuit of the 6L6 amplifier is much simpler than that of the oscillator. The screen and control grid are tied together to form a zero-bias, high- μ triode and are grounded. A single plate tank coil may also be used to cover both bands in this stage, provided it is found possible to couple the antenna circuit sufficiently tight to load the amplifier to normal plate current. Dimensions are given for a separate tank coil for 7 Mc. with a lower inductance which will permit coupling more readily if difficulty is encountered with the larger coil. This stage operates as a straight amplifier on both bands. The amplifier is coupled

to the oscillator by means of a small winding, L₄ close to the bottom end of L₁ on the same form. A winding, L₅, of a few turns at the bottom of L₄ serves as a link for coupling to an antenna tuner.

Construction

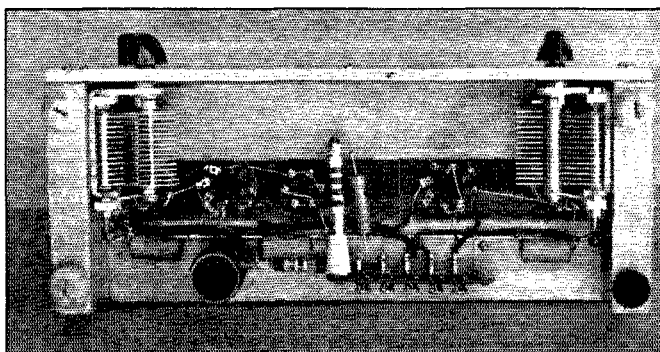
Although in the long run construction on the popular metal chassis requires no more time nor skill than wood-frame construction, it is true that the latter is more readily accomplished with tools ordinarily found about the average household. Unfortunately for the wood-working amateur, however, most components available these days are designed for metal chassis mounting and do not readily lend themselves to mounting on wood. Some of the difficulties with wood have been eliminated by the simple construction shown in the photographs. The frame consists of an assembly of four pieces of "one-by-two" strip which permits flush-mounting of sockets with small wood screws without the necessity for cutting large holes.

The terminals are easily accessible for wiring. The two longitudinal strips are each 12 inches long. They are spaced 1 $\frac{1}{4}$ inches apart to fit the Amphenol type MIP sockets. The length of the side rails will depend upon the actual measured width of the stock. A protective panel made from a scrap of ply-wood completes the construction. The frame is finished off with 2 or 3 coats of shellac, sandpapering after each coat. Rubber feet at each corner provide clearance for the two small variable condensers at either end. The condensers may be mounted on the side rails with countersunk machine screws, as shown, or single-hole-mounted on the panel. Since series plate feed is used in both stages, insulated-knob controls must be used.

The oscillator cathode coil, L₃, is wound on a Millen 1-inch pinless form and fastened with a woodscrew behind the oscillator tube socket. The ends of the coil are left long enough to extend to the appropriate terminals. The 5-contact terminal strip for power-supply and key connections should be mounted on angles far enough inside the rear edge to prevent any possibility of accidental contact. The National R100U r.f. choke is fastened to one of the terminal-strip mounting screws.

The arrangement of parts makes wiring with short leads quite effortless. A piece of No. 12 or

At plate voltages above 300, the screen voltage-dropping resistor, R₃ and by-pass condenser, C₇, not shown in the photograph should be added. Type 6V6's may be used without circuit changes at 300 volts or less, but type 6L6's should be used at higher plate voltages.



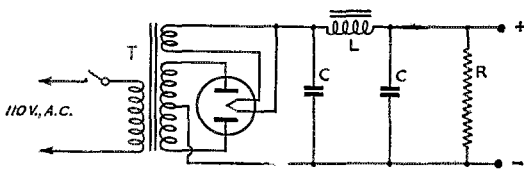


Fig. 2—Suggested power-supply circuit for the beginner's transmitter.

C—Two 8- μ fd., 450-volt working electrolytic condensers in series.

L—10-henry, 150-ma. filter choke.

T—Broadcast replacement transformer, 400 volts each side of center, 150-ma. d.c., with 6.3-volt and 5-volt filament windings (UTC S-39—use low-voltage secondary taps on high-voltage secondary).

Rectifier tube—Type 83.

No. 14 bare bus wire is fastened along the rear strip to serve as a grounding wire. The ungrounded sides of the heater and coupling circuits are run close alongside the grounding wire with insulated push-back wire. Other connections are made directly from point to point with by-pass condensers connecting directly between the points to be by-passed and the ground wire.

Power Supply

Of course, the power output obtainable from the unit will depend to a great extent upon the plate voltage used. The transmitter has been tested thoroughly at a plate voltage of 450 for periods of 15 to 20 minutes with the key closed continuously with no sign of crystal heating nor of creeping in plate current, even when the amplifier was running at power inputs as high as 60 watts. Operation of the 6L6 as a triode, rather than as a tetrode apparently eliminates this trouble which is often experienced with the tetrode arrangement when an attempt is made to operate the amplifier at high input.

Fig. 2 shows the diagram of a simple power supply using a condenser-input filter. Any of the cheaper transformers designed for broadcast-receiver replacement service will be satisfactory, but if one is not already at hand, one delivering 400 to 440 volts each side of center with a current rating of 130 to 150 ma. will be about optimum for maximum power output and its cost will be but slightly above the lower-voltage types. Plate voltage in excess of 450 is not recommended.

Tuning

Before tuning, a careful check of wiring should be made. In connecting up the unit, the key should be connected between the two terminals marked *K* in Fig. 1. The two 6.3-volt heater leads should be connected to the terminals marked *F*. Negative high voltage will be connected to the terminal marked *-B* (common with one side of the heater and key). Separate terminals are provided for the positive high-voltage connec-

tions so that individual meters or other resonance indicators may be connected in each lead. If standard-type meters are not available, cheaper meters will do almost as well, since their chief function will be that of indicating resonances. In fact, a single meter may be used and placed permanently in the amplifier lead after one has become accustomed to the operation of the oscillator. A separate meter for the oscillator should have a scale of 0 to 150 ma., while the one for the amplifier, or for use in checking both stages, should have a scale of 0 to 200 ma. In case even cheap meters are deemed too expensive, dial lamps may be pressed into service. The 150-ma. type (No. 40 tan bead) may be used for the oscillator and the 250-ma. type (No. 46 blue bead) for the amplifier.²

In connecting the meters, or other indicators, a wire from the positive high-voltage terminal of the power supply is connected to the positive side of the oscillator meter, while the other side of the meter connects to the terminal marked *+B OSC*. A second wire from the positive terminal of the power supply goes through the amplifier meter in a similar manner to the terminal marked *+B AMP*. In case only a single meter is used, it is connected in one of the two previously-mentioned leads, while the second lead from the power supply goes directly to the transmitter terminal.

The 3.5-Mc. coil should be placed in the amplifier for initial tests. With the power supply turned on, allow about 30 seconds for the heaters to come up to temperature, while setting both condensers at maximum capacity, and then close the key. The oscillator should show high plate current, while the amplifier should draw but a few milliamperes. Tune the oscillator tank condenser *C*₁ until there is a sharp dip in plate current indicating oscillation. At the same time, the amplifier plate current should rise to a high value. Tune *C*₁ to produce maximum dip in oscillator plate current and then adjust *C*₂ for maximum dip in amplifier plate current. A check will show that the oscillator will cease functioning whenever *C*₁ is adjusted somewhat to the high-capacity side of resonance. *C*₁ should be adjusted to a point as close to the maximum-dip point as possible but sufficiently far on the low-capacity side to allow reliable keying. The transmitter is now tuned up for 3.5-Mc. output.

Now swing *C*₁ to a point near minimum capacity where another dip in plate current will be found. This will be accomplished by high amplifier plate current. The amplifier tank condenser, *C*₂, may then be tuned to a point near minimum capacity where a second dip in amplifier plate current will now be found. The transmitter is now tuned to

² For further information on the use of dial lamps as indicators see:

Sutter, "What, No Meters?," *QST*, Oct., 1938, p. 49.

Sutter, "Current vs. Color of Pilot Bulbs," *QST*, March, 1939, p. 62.

the 7-Mc. band. If the 7-Mc. coil is used in the amplifier plate circuit, tuning of the transmitter will be similar except that amplifier resonance will be found at a point near maximum capacity of C_2 .

Since the oscillator continues to function at all settings of C_1 on the low capacity side of resonance at the fundamental, no cessation of oscillation will be encountered when working at the second harmonic of the crystal and the oscillator tank circuit may be tuned to the exact point of minimum plate current. As a word of warning, a crystal ground to a frequency between 3500 and 3650 kc. should be used to work both the 3.5- and 7-Mc. bands. Crystals of frequencies higher than 3650 kc. may be used for 3.5-Mc. work only, since their second harmonics fall outside the 7-Mc. band.

Antenna

This transmitter will, of course, work with any of the various antenna systems in general use designed for 3.5- and 7-Mc. operation. A very good type is an antenna 136 feet long, with tuned feeders 67 feet long at the center. With these dimensions, parallel antenna tuning will be used on all bands. The antenna tuner should consist of a small-type 330- μ fd. variable condenser (or an old b.c. receiver tuning condenser) in parallel with a coil consisting of 13 or 14 turns of No. 18 wire spaced to occupy a length of $1\frac{1}{2}$ inch on a $1\frac{1}{2}$ -inch-diameter form for the 3.5-Mc. band. For the 7-Mc. band, the coil should have about 8 turns of the same diameter and length. The form should be fitted with a link winding of a few turns wound at the center of the antenna-coil winding.

With the feeders connected across the antenna-tuner condenser terminals and the link on the antenna tuner connected to the link on the amplifier coil by a pair of closely-spaced wires, tuning the antenna tank circuit to resonance should cause an increase in plate current to the amplifier. Plate current will be maximum when the antenna circuit is tuned to resonance. The number of turns in each link winding should be adjusted until the amplifier draws a maximum of about 100 ma. as the antenna is tuned through resonance when the amplifier is operated at 450 volts. At 350 volts, the maximum plate current should be limited to about 75 ma. as optimum loading. Make sure that tuning of the antenna circuit has not disturbed the tuning of the amplifier tank circuit by a final retuning of the amplifier tank circuit to maximum current dip. As the loading is increased, the dip will become less pronounced.

Since it is difficult to give exact figures for antenna-coil dimensions, it may be found necessary to add or subtract a turn or two from the number suggested above. The idea is first to get the antenna circuit tuning to resonance by ad-

justing the coil and condenser and then adjust the links for proper loading.

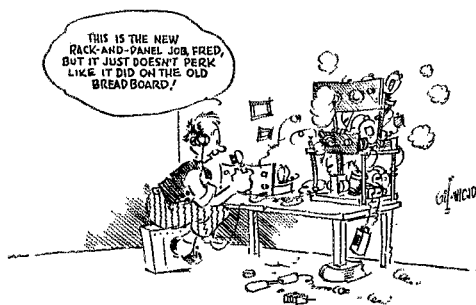
After the antenna-coupling links have been adjusted the following procedure should be followed: First tune the oscillator tank to resonance, then, *with the antenna condenser set at minimum capacity*, tune the amplifier tank circuit to resonance. The third step is that of swinging the antenna tuning condenser up to the point which gives maximum amplifier plate current. By following this procedure it will usually be found that the tuning of the amplifier has not been disturbed. This should be verified by retuning the amplifier tank circuit slightly to make sure that it is still at the point of plate-current dip.

It may have been noticed that no actual figures of currents have been given in the foregoing instructions in tuning. The reason for this is that exact values will depend upon the plate voltage used. The following values, taken at two specific plate voltages, may be used as guides, however. At 350 volts, the oscillator plate current at resonance should run about 25 to 35 ma., the amplifier minimum plate current with no load at 20 ma. with the large plate coil and 25 ma. with the 7-Mc. coil, and grid current to the amplifier 40 ma. on either band. With the final loaded to 75 ma., the output on either band should be 10 to 12 watts.

At 450 volts, the oscillator plate current at resonance should run 30 to 40 ma. (the higher value when operating at 7 Mc.), the amplifier minimum plate current without load 25 ma. with the large coil and 35 with the 7-Mc. coil, grid current 55 ma. With the amplifier loaded to 100 ma., the output on either band should be between 20 and 25 watts. Oscillator screen voltage will remain practically constant at 250 volts with the transmitter in operation at either plate voltage.

The adjustment of the antenna coupling and tuning system will be the most difficult part of the job of getting the transmitter built and on the air. Once this difficulty has been bridged, we think that you will agree that its smoothness of operation and reliability is just about all that could be asked for.

— D. H. M.



Improving the Transmitting Loop

Side Loading for Increased Radiating Properties

BY JAMES H. GREEN, JR.,* W8MYW

ALMOST since the inception of radio transmission the notion of using loop antennas for the propagation of radio waves has appealed to a goodly number of the amateur fraternity. The convenient physical form and the marked

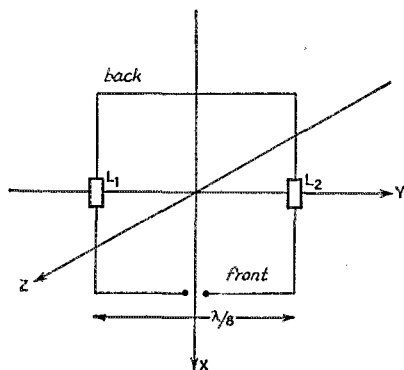


Fig. 1 — The loop circuit with side loading. L_1 and L_2 are the loading coils, described in the text.

directional properties of the loop are assets greatly to be desired in an antenna for use with a portable transmitter for the five- or ten-meter bands, or even for home locations where space is limited and it is impracticable to erect the large, cumbersome framework needed for the common type of array. The attractiveness of this type of radiator was further enhanced when, in 1939, J. L. Reinartz¹ described a loop antenna with a definite unidirectional pattern, a unidirectivity not predicted by the existing theory and still without a complete mathematical analysis.

One very serious drawback, however, prevented any very general use of these loops. Their overall efficiency was very low. Even the loop developed by Reinartz, while almost infinitely superior to anything that had been introduced to the amateur previously, still failed to produce an overall gain quite equal to that of a simple dipole.

However, recent developments chiefly due to E. M. Williams have produced a loop which has a gain of about 1.4 decibels over a simple dipole, thus removing this last and very formidable objection to the use of frame aerials. Perhaps those

of you who have been wondering how you could get that five- or six-element beam into the space allotted to you by the family may find your answer in the description which follows, for these loops may be combined in much the same fashion as simple dipoles to form multi-element beams.

In attacking the problem of how to increase the efficiency of the loop antenna for transmitting Williams² started by recognizing the fact that for maximum radiation in any given direction it was necessary to construct, if possible, a loop with current maxima on the two sides perpendicular to the direction in which the greatest radiation was desired. With reference to Fig. 1, in which the loop is diagrammed, this means that if we are

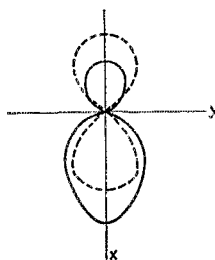


Fig. 2 — Field strength patterns of loop (solid line) and dipole (dotted line). In the optimum direction the loop field strength is 1.4 db higher than that of the dipole.

to have maximum radiation in the X direction current loops must appear on the sides marked "front" and "back." The greatest radiation actually will occur off the front or open side, while a minor lobe will be found off the back. This is shown in Fig. 2 which gives the directional pattern of the loop as compared to that of a simple dipole, and will be discussed in more detail later on.

Transmission line theory predicts that this desired distribution of current is that existing in a half-wave transmission line. We may assume, therefore, that by loading the loop with inductances of the proper value a condition electrically similar to that existing in the half-wave transmission line could be obtained with a loop having a periphery much smaller than one wavelength.

Williams tried this with a loop one eighth of

* 1593 Yale Station, New Haven, Conn.

¹ J. L. Reinartz, "Half Wave Loop Antennas," *QST*, vol. 21, pp. 27-29, Oct., 1939.

² E. M. Williams, "Radiating Characteristics of Short Wave Loop Aerials," *Proc. I. R. E.*, vol. 28, No. 10, pp. 480-484, Oct., 1940.

a wavelength square and found that the desired current distribution was obtained with a loading coil of 180 ohms reactance placed in the middle of the back of the loop.

This loading also produced the optimum time-phase relationship between front and back for unidirectional X radiation, according to the transmission line theory being used. It might be well to point out here that the use of transmission line theory in the study of this particular problem is scarcely justifiable if one is attempting a rigorous mathematical analysis. Here, however, no such attempt is being made. The theory is being used only as an aid to good guessing as to what line of attack to follow in the experimental investigation of the problem.

Side Loading

Perhaps because of this inadequacy of the transmission line theory a completely unidirectional pattern was not obtained from the loop described above. The suggestion was made by Williams that perhaps some other arrangement of loading coils would produce a completely uni-

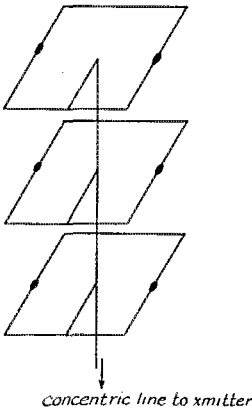
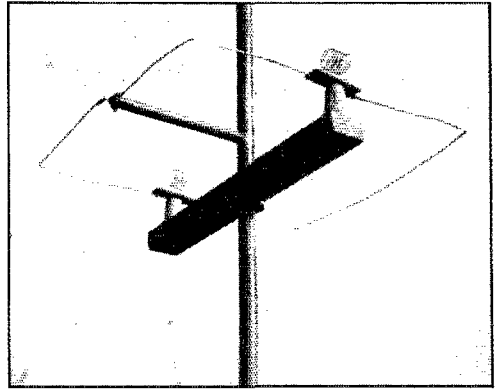


Fig. 3 — The three-loop array for increased gain and directivity. A 50-ohm concentric line is used for feeding the loops.

directional loop. Working on this suggestion we tried all possible locations of one and two loading coils and found that none of these produced the desired results. One, however, was found which

By appropriate loading of a loop having sides of the order of one-eighth wavelength long, radiation in the optimum direction greater than that from a conventional doublet can be secured. Thus compactness and directivity can be obtained without sacrifice of transmitting range.



A close-up of one of the loops. The loading coils in the sides are clearly visible in this photograph, as is also the spur feeder of concentric line.

was considerably better than the others tried. This one, shown in Fig. 1, is realized when one loading coil is placed in the center of each side. The pattern of this arrangement is not completely unidirectional but the overall gain is slightly better than that of any other arrangement. This presumably is because the loading coils are placed at points which are current nodes, not loops, leaving the current maxima along straight pieces of wire. These loading coils, L_1 and L_2 on the diagram, should have a reactance of slightly more than 360 ohms. It is found to be advisable to insert coils of approximately the right size (10 turns, 1 inch in diameter, spaced to occupy 4 inches, for 112 Mc.) and to tune for maximum

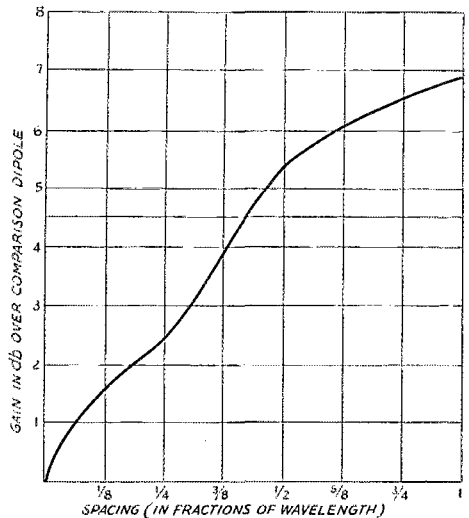
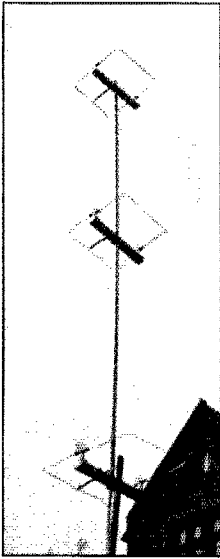


Fig. 4 — Measured gain over dipole for two loops at various center-to-center spacings, fed in phase. Planes of loops are parallel.



A three-loop array for 112 Mc. The concentric feed line is the vertical support.

pair or, preferably, a concentric line.⁴
One of the few faults to be found with the an-

radiation.³ This precaution is advisable inasmuch as the reactance of the loop itself changes somewhat depending upon the size of wire used and other indeterminate factors. The tuning may be easily accomplished by shorting turns until maximum reading is obtained on a field strength meter or on an r.f. current meter inserted in series with the loop at the junction with the transmission line.

For the purpose of determining the proper type of transmission line to use with the loop an accurate measurement of the impedance of the loop was made. It was found to be very low—approximately 50 ohms—so that the loop may be fed from a twisted

tenna is that a fairly high component of its radiation is in the Z direction. This fault can be corrected, it is found, if two or more of the loops are placed side by side (common Z axis) at a spacing of one-half wavelength.⁵

In the model in use at W8MYW/1 a concentric line coincident with the Z axis of the loops feeds three such loops through short spurs which run from the main feed line to the loop terminals (see Fig. 3). Tests indicate that arrays made up in this way are equally good in directive properties and overall gain as a broadside array of simple dipoles and are in addition more compact and easily managed.

³ The inductance of a coil having a reactance of 360 ohms is equal to 57.3/f; if f is in megacycles the inductance will be in microhenrys. A coil of the required inductance can be constructed with aid of the *Lightning Radio Calculator*, or from the *Handbook* formula

$$N = \sqrt{\frac{3A + 9B}{0.2A^2} \cdot L}$$

where N is the number of turns, A the coil diameter, B the length of the winding, and L the inductance in microhenrys.—Ed.

⁴ The method by which this measurement was made, which may be of some interest to the advanced amateur who is faced with the problem of making measurements at ultra-high frequencies, is described by Lewi Tonks in *Physics*, June, 1932, pp. 1-11.

⁵ Close spacing is also possible, loops being spaced 1/10 of a wavelength. This is advisable when more than four elements are to be used.

June 7th—8th—Ninth A.R.R.L. Field Day!

Test Self-Powered Emergency Rigs Afield—Arrange Outings, Report Results for QST—Don't Miss Radio Opportunity in the Field Day

CLUBS are all invited to encourage their members to build portables and to arrange special Field Day activities. Every amateur is invited to take part, whether or not able to participate in club plans. Join a group or get up a group to get maximum fun and profit from FD opportunities. Test equipment in the Field Day. Ask for application forms for registering equipment and availability in ARRL's Emergency Corps, if you do not already hold a membership card in this organization. Plan for an outing. Make testing of self-powered stations in actual operation the watchword. In making FCC notification¹ refer to Order No. 73-D which authorizes properly notified operation of portable amateur stations participating specifically in the ARRL Field Day Tests for the period of that test.

No amateur station should be regarded as

complete without *some* measure of self-powered equipment. Get set in however modest a way for such contingency. Take part in the FD; it's often a revelation what 20 or 25 watts can do! The annual FD is dedicated to testing in actual operation, independently powered station equipment. *To be prepared for communications emergencies* requires advance readiness on the part of every amateur. The operator must have the equipment, know how to set up quickly for efficient operation, know how to formulate and handle messages (proper order of parts, check, receipting for responsibility, recording of handling data), know how to tune up workable ready-cut antennas in new locations, how to make the most of low power, and many other things. Operator experience is as essential as the equipment.

Operation: The aim for each field-portable is to work as many other amateur stations as possible (either home or afield) in the time allotted. Report your FD location and circumstances by radio message to ARRL. Advance entry is not required. All participating will use

¹ To comply with FCC regulations for portable station operation, licensees must make advance notification of the location in which the portable will be operated, to the Inspector-in-Charge of the district, and use proper station identification (DN 1-2, etc.) unless work is confined to 28-Mc., 56-Mc. and higher frequency amateur bands.

the call (c.w.) CQ FD or ('phone) CALLING ANY FIELD DAY STATION. Mobile work does not count. It is a test of portables. Manufactured contacts with any station or stations of members of the same field group in the contest do not count. Any or all amateur frequency bands may be used.

Portable stations operated in the field (away from "home" address) are eligible to submit field scores. Only portable set-ups may be listed with FD classification. Individuals or groups under one call must be "in the same locality," "in one group or building or field" constituting a single FCC-notified¹ location. To have points count, all station control points at a FD station must be within 500 horizontal feet of some given point.

The Operating Period: Operating time for the FD shown in logs must be between Saturday, June 7th (4 P.M. EST, 3 P.M. CST, 2 P.M. MST, 1 P.M. PST), and Sunday, June 8th (6 P.M. EST, etc.).

Note that the specification of time has been changed from 4 P.M. LOCAL time this year so that all stations open at the standard time specified for their area, time in all instances corresponding exactly to that specified in the F.C.C. Order No. 73-D to make our Field Day successful.

FD Scoring: Each non-portable amateur station worked counts *one point* toward the score. Portable-to-portable contacts will count *two points*. The same station contacted again counts again *only* if the FD transmitter credit reported was on a different amateur frequency band, as for example, a contact when using 3.5-Mc. c.w., followed by one with the FD set up on 3.9-Mc. 'phone, on 7-Mc. c.w., etc. An extra credit of 25 points² before multiplier may be claimed for radio origination of not more than one message addressed to ARRL Hq., *provided only* message copy is submitted with claimed score. FD Messages to Hq. all will include the following data: Number of operators, location, conditions, power. One additional point (also before multiplier) may be claimed for radio handling of each FD message of another group if copy showing full handling data is submitted with station list and claimed score ($\frac{1}{2}$ point for receiving and $\frac{1}{2}$ point for radio relay transmission).

Multipliers: Score may be multiplied by 2 if *either* the receiver or transmitter is independent of mains or commercial power source, by 3 if *both* transmitter and receiver are supplied from an independent local source or sources. The following additional score multiplier is determined by the power input to the final stage (plate voltage times plate current):

- (a) Up to and including 30 watts — multiply score by 3.

² 10 points will be deducted from the possible 25 for incorrect check, failure to show full handling data, improper order of sending preambles, or other defects or variance from standard ARRL procedure. Word count for correct checking is explained in *The Radio Amateur's Handbook*, Chapter 31, page 432. (Change example 6YA2 to read 4 words.)

HOME STATIONS

Home stations are invited to list all their contacts with FD stations in the above period, sending these in for a separate score listing — to show what they can do — and to encourage the cause of amateur preparedness even if they are personally unable to join a FD group as yet. Home station scores will be THE NUMBER OF FD PORTABLES WORKED plus POINTS FOR FD MSGS HANDLED (1 ca. rec'd if copy mailed Hq.) (2 for relays; 1 when rec'd, 1 when sent forward). Stations claimed must be listed with the time worked, and message credits must be substantiated by copies of the messages, with full handling data.

- (b) Over 30, and up to 100 watts — multiply score by 2.

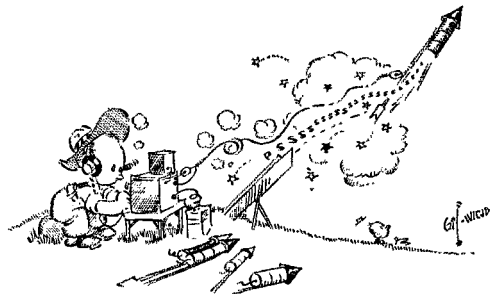
- (c) Over 100 watts — multiply score by 1.

Entries for stations located in the Northwestern, Pacific, Rocky Mountain, Southwestern, and West Gulf Divisions may have the score computed as above described multiplied by a final multiplier of 1.5 to assist in equalizing contact opportunity for Field Day set ups in the less populous areas.

Reporting: Score claims must be shown as the sum of points for each set-up. A station-worked list for each band must show contact times for each contact. A statement covering on-off times for bands and transmitters is required. State the maximum number of transmitting units in simultaneous operation at any time. Attach copies of all messages for which any credit is expected, just as handled and with time and stations indicated. Note the source(s) of plate and filament power, along with the "watts input" for each rig. All reports to count must be mailed on or before July 11, 1941, to constitute an entry.

In the event of any doubtful points the interpretation and evaluation by the rules committee on the matter in question will be final. For the purpose of QST listings groupings of participating stations will be based on the maximum number of

(Continued on page 78)





IN THE roster of League directors we find many actively contributing to the national defense. Lt. "Brad" Martin, 3QV, is on active duty at the Philadelphia Navy Yard. Robert Kirkman, 2DSY, is doing civilian research work for the Signal Corps at Ft. Monmouth. Raleigh (N. C.) State College will have to get along for a while without Capt. H. L. Caveness, 4DW, now military representative on a selective service board. Lt. (jg) G. L. Dosland, 9TSN, has forsaken his law practice to instruct at the Navy's Indianapolis radio school. Ens. W. A. Green, 5BKH, has just been called to active duty. Fred Young, 9MZN, has a year's leave from teaching to inspect ground schools of the CAB's training program.

Radiomen on the U.S.S. *Vincennes*, down Puerto Rico way, include Casey, 1LXP; Lee, 1IRJ; Eberhardt, 9FTJ; Galambos, 3EPQ; Cermak, 2JSB; Bartosik, 8QCR; Borchert, 9PPY; Coulombe, 1MVG; Weigand, 9LHY; Lewis, 5BNS; Oehmer, 1LQD; Jewett, 2MGD, and Muhlbach, 2IUH. RM1c Brand, 8NTQ, and CRM Thompson, 91NX, operate under Lt. (jg) McAllister, 8HKT, aboard the *Dubuque*. Ens. Jones, 5BRQ, supervises a communications watch on the *Oklahoma*. Former Director Glasscock, 9FA, reports Colorado Naval Reservists on active duty as follows: Fairfield, 9REU; McClelland, 9DSD; Haase, 9GLI; Samuel, 9SBB; Fearn, 9TEJ; Coleman, 9TSQ; Parks, 9MTE; Hooper, 9BYY; Richards, 9KSE; Miller, 9WTW, and Lt. (jg) Shields, 9PWO.

Ens. Wicks, 1IZO, is an instructor at the Annapolis Naval Academy, while his former reserve superior, Lt. Young, 1CAB, handles communications for the *Kaskaskia*. OMs Edwards,

6RDQ, and Munsell, 6PCP, are "strikers" (apprentice radiomen) aboard the Coast Guard's *Itasca*. Chicago is well represented on the *Sacramento*, with CRM Janiga, 9HPQ, RM1c Namény, 9FZH, and S1c Varga, 9WIB, handling communications assignments. RM1c Storms, 4EIA, and Baker, 4FIL, monitor from the Navy's DF station at Jupiter, Fla. Seamen Larson, 9UJG, and Winkleman, 7HCW, are learning Navy ropes at San Diego and Los Angeles, respectively. San Francisco's SCM Hughes, 6CIS, is RM1c on active duty at Long Beach. NPG's (S. F.) operating crew includes Radiomen Powell, 6OEI, Rose, 6DNU, and Nelson, 6QGN. RM1c Nagata, 2EGI, is teaching procedure to Navy recruits at Floyd Bennett Air Base, and Lt. (jg) Harry Tummonds, 8BAH, former Ohio SCM, is ditto at Great Lakes, Ill.

When the New York National Guard (27th Div.) was called into service at Ft. McClellan (Ala.) last winter, it included Lt. Pritchard, 2IHM, as communications officer, and Sgt. Nerf, 2NHP, and Pvt. Robinson, 2KPH, as radio operators. Cpl. Brands, 9YTV, pounds brass at the post radio station, Ft. Sheridan (Ill.). Supply Inspector Coan, 2AUQ, makes certain the Signal Corps at Ft. Monmouth gets its money's worth. One of Ft. Bragg's (N. C.) Army Net watches is assigned to P1c Hawn, 4HBT. Sgt. McClain gave up 4FCB to become K6SZH and an air mechanic at Wheeler Field, Hawaii. More Camp Shelbyites are Radio Sgt. Bennett, 9EUP, Pvt. Babb, 8OIL, Lt. Schwenn, 8CGN, and Staff Sgt. Richie, 9TKV.

Capt. Newman, 7YG-GPZ, is liaison officer for the Ninth C.A., AARS. Former QSL Manager Melvin, K5AP-W4FBD, is an Air Corporal at Albrook Field, C. Z. Signal Corps 1st Lts. include Peck, 3CND, at Fort Knox; Janes, 9KS, at Ft. Des Moines; and Blencoe, 9ESM, at Camp McCoy (Wis.). Lt. Buckalew, SASW, finds AARS experience helpful in his present duties at Ft. George Meade (Md.). In the 36th Signal Co. at Camp Bowie (Tex.) we find Lts. Nemic, 5GYA, and Wells, 5HRV; Staff Sgt. Aldridge, 5GWP; Cpl. Cannon, 5IMB; and Privts. Richardson, 5EWK, Chewing, 5IOE, Bowers, 5EWZ, and Riggs, 5JM.

In the Lieutenant-Colonel department: Davis Boyden, 1SL, was recently made division signal officer of the Massachusetts State Guard. League Asst. Director W. A. Beasley, 9FRC, is with the 35th Division at Camp Robinson (Ark.). Down at Camp Shelby we find Cleveland's 8AV, Robert C. Bohannon, with an eye out for Ohio

SERVICE RECORDS WANTED

We are compiling data on the participation of radio amateurs in defense work, and want the following information from all amateurs serving in radio work with our military forces. A postcard will do the job:

- (1) Are you a Selective Service conscript, a volunteer, or a reservist on active duty?
- (2) For how long a term are you serving?
- (3) Is your service in the Army, Navy or the Marine Corps?
- (4) To what outfit or organization are you assigned?
- (5) Location; where is your organization stationed?
- (6) What rank or rating do you hold?
- (7) What is your present radio duty assignment?
- (8) Were you previously a member of NCR or AARS?
- (9) Give your name and your home call.

amateurs "caught in the draft" so he can get them assigned to his section of the Signal Corps. Then there are Lt. Cols. Calvin Burkhead, K4GTH, of the Signal Office in San Juan, P. R.; James C. Hughes, 9BQU, at the Ft. Bragg (N. C.) replacement center; and Stanley G. Saulnier, 9DJZ, at Ft. Knox.

The newly-formed 1st radio intelligence company at Ft. Monmouth, now training its members in monitoring and direction-finding work, includes the following hams assigned duties as intercept operators: Cpl. Russell, K6SMD; first-class privates Barolet, 1KLR, Sickly, 8ROU, Priggen, 1MCJ, Bissonette, K6MAW, and privates Podolsky, 1MYP, and Bottorff, 3HTL. Plc Schoner, 8LYF, and Pvt. Getter, 1MIJ, are maintenance men. In free hours they all keep W8ROU/2 and W1MCJ/2 plenty active on the air.

Out near Pearl Harbor, Hawaii, operating on the U.S.S. *Pennsylvania*, are RM1c Lundmark, 9MGS, RM1c Hallet, 6OSX, and RM2c Ryburn, 8RKG. Among the crew at NAD, Boston Navy Yard, are Lt. Story, as communications officer, and CRM Paounoff, 1EOB — the latter of Massachusetts AARS fame. RM3c Knickerbocker, 8RZP, and Sims, 8RZZ, are operating buddies on the *Philadelphia*, out Hawaii way. One of the yachts converted by the Navy for patrol work is the *PC509*, on which Radiomen Meyrowitz, 2EVO, Goldberg, 2IEK, and Szafranski, 1AFG, handle communications assignments. Ens. Atchley, 1HKK, is taking further d.f. training at Charlestown (Mass.) Navy Yard. RM3c Haire, 1LLY, and Leonard, 1DIJ, operate on the *St. Louis*.

Cpl. Babin of the Marine Corps has finished radio school and is now en route to Cuba. RM3c Ledbetter, 9WTT, is assigned to the aircraft carrier *Enterprise*, and CRM Garmston, 6NKM, mixes observing and radio operating on her sister ship, the *Lexington*. More temporary Hawaiianites are RM1c Dmitruk, 9NUN, and Mitchell, 9THE, aboard the *Detroit*. OMS Roberts, 5DRQ, and Minton, 5FUE, are buddies from Dallas at the Navy's Charleston (S. C.) school. RM1c Baddorf, 3FZO, operates at the Cape May (N. J.) air base, and RM2c Maciejko, 1GVV, is stationed at Connecticut's Meriden airport. RM2c Hoffman, 9YLE, prepares for a trip to Panama operating aboard the *YP26*. RM3c Hunter, 2MAB, finds amateur past experience invaluable aboard the *Texas*. CRM Jenkins, 8GWY, reports his unit has sent RM2c Gilchrist, 8SJJ, and RM3c Giroux, 8MPN, to active duty.

Hams at Ft. Dix (N. J.) in the 174th Inf. are Tech. Sgt. Erickson, 8QLJ; Staff Sgts. Howe, 8SZK, Vaccarelli, 8UQJ; and Ortner, 8PSO; Sgt. Reisch, 8RTC; and Cpl. Boss, 8TZC. All have radio duties, and many were previously AARS members. Dr. McArthur, 4FCW, is contributing

his bit with a medical detachment at Ft. Jackson (S. C.), where also is Staff Sgt. Beeler, 4FUI, in the radio section. At Camp Beauregard (La.) are Plc Litwin, 8UKD, and Fallis, 9BAR. Sgt. Allyn, 4EEP, former AARS member, is stationed at Camp Blanding (Fla.).

When the Naval Reserve Radio School at Los Angeles convened early this year for several months' radio and signal training, fifty-four hams were in the first class, representing sixteen states and four call areas. Our thanks to 7IIA for the following list: 6AXC, R. E. McLarney; 6CUQ, Ed Hawkins; 6DLF, A. J. Hopkins; 6FDL, Leroy T. Petersen; 6FTV, Ed Falls, Jr.; 6FVQ, N. O. Wicker, Jr.; 6HKX, Bob Spargo; 6JNU, Al Sperry; 6KRM, Roy Dunaan; 6ONG, Jack Sanders; 6ONK, Russell Smith; 6HQW, Bill Rex; 6ROI, James Chiles; 6RPW, Dave Kerr; 6STH, Glen Nish; 6TAC, Ed Follmer; 6TCA, Hobart R. Clark; 6TJF, Dale Welling; 6TJL, Bob Tatarsky; 6TLG, Dan Wachner; 7BMF, Ken Stone; 7ECI, E. Zochert; 7EPH, Thad T. Tull; 7GMH, E. J. Miller; 7GSX, Jim Hargis; 7GYQ, Pat J. Carty; 7HCW, F. S. Winkleman; 7HEK, R. A. Smith; 7HES, D. W. Lindstrom; 7HQJ, Robert Buckbee; 7IBC, Albert T. Lenny; 7IIA, Edwin H. Marvin; 7QHC, Curt Craig; 7TWL, Blaine Ringer; 8UGV, Dale Andrews; 8UMX, Don Meyer; 9ARQ, Chas. V. Crane; 9CCA, W. L. Lungstrum; 9DSF, John G. Gale; 9GRP, F. G. Soyring; 9IIY, Mike Brennan; 9IVJ, W. L. Wright; 9IYH, Don Stewart; 9JTT, D. A. Berke; 9LRW, A. T. LaPlante; 9NGU, Edw. Christensen; 9OGN, Harry Wright; 9OKG, Zeno W. Jones; 9OYA, Gwynn Lassey; 9UGN, Bob Glamm; 9VLA, George R. Mole; 9WIA, Ralph Van Natta; 9WZC, B. W. Lewis and 9ZVN, Bill Culp.

— J. H.

Strays

This gem from a letter to our Technical Information Service: "I am aware that everything published in *QST* is copyrighted, but may I build one of these sets just for my own use?"

— . . . —

At the Mitchell Field, L. I., Barracks T73 is directly across the street from Barracks T88. — *W3FIS*.

— . . . —

CIRCULATION STATEMENT

PUBLISHER'S STATEMENT OF CIRCULATION AS GIVEN TO STANDARD RATE AND DATA SERVICE

This is to certify that the average circulation per issue of *QST* for the six months' period July 1st to and including December 31, 1940, was as follows:

Copies sold	41,577
Copies distributed free	621
Total	42,198

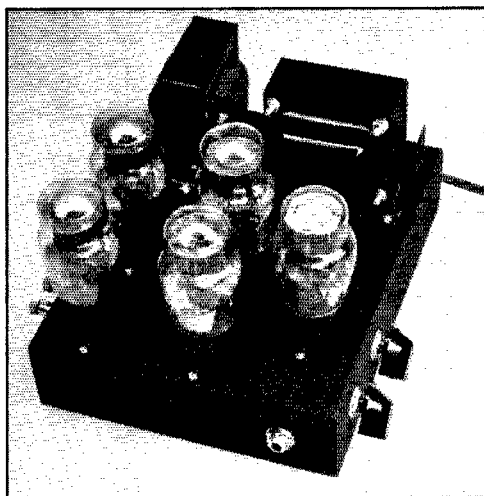
K. B. Warner, Business Manager
D. H. Houghton, Circulation Manager

Subscribed to and sworn before me on this 13th day of March, 1941
Alice V. Scanlan, Notary Public

Tube Keying

BY BYRON GOODMAN,* WIJPE

The tube keyer used to obtain the oscillograms shown on these pages. This unit is more elaborate than is necessary for most installations, and it is usually necessary to use only one or two tubes, unless a high-current circuit is being keyed. The knobs on the right-hand side control the degree of lag introduced by the keyer, the jack at the front is for the key leads, and the binding posts on the left are used to connect to the keyed circuit in the transmitter. A separate filament transformer was necessary to handle the four 45 tubes in this case, but normally a single transformer would handle both the blocking voltage and keyer tube filament requirements.



TO OBTAIN clickless keying of any transmitter, it is necessary to use a filter circuit that will slow up slightly the "make" and "break" of each character.¹ The most common system uses an inductance in series with the key lead and a capacity across the key, the values depending upon the current and voltage of the circuit. Since the filter values will not be correct for a different value of current, any filter used will be a compromise unless the keyed circuit works at the same current value for every frequency band and tuning condition, and not many transmitters are built that way. Further, changing the keying to some other circuit or transmitter will require new filter constants unless the voltage-current ratio happens to be similar.

What is needed is a gadget that can be applied to the transmitter and give the proper degree of

keying lag for many various tuning conditions without readjustment. Tube keying systems are not new, of course, having been used for years, but they present the only solution to the above problem that we know of, and this article will deal with them and their adjustment and installation.

The Principle of Tube Keying

A vacuum tube is, in effect, a variable resistance (between plate and cathode) controlled by the value of voltage on the grid. If the plate circuit is substituted for the key in a transmitter, a high value of negative voltage on the grid will prevent any current flow through the tube, and reducing the grid voltage to zero will allow current to flow and a signal to be transmitted. It is apparent that the flow of current in the plate circuit can be controlled by the way in which the grid voltage is changed, so in a tube-keying system the filter is put in the grid circuit of the keying tube or tubes. By changing the constants of the grid-circuit filter, the keying of the transmitter can be controlled. Further, the keying characteristic will not change materially no matter where the keyer tube is used or how much current is drawn, within limits that will be mentioned later.

The circuit in Fig. 1 shows a tube keyer that may appear elaborate at first glance, but that is only because it has been designed to give some degree of adjustment after installation. The number of tubes used in parallel is determined by the current through the keyed circuit. The 80 rectifier, T_1 , C_1 and R_1 comprise a power supply that provides the necessary cut-off voltage for the keyer tube. R_2 , R_3 and R_4 are used instead of a

* Assistant Technical Editor, *QST*.

¹ Goodman, "Some Thoughts on Keying," *QST*, April, 1941.

Articles on keying the past two months have shown how it is impossible to design a single key-click filter that will handle the keying of any transmitter. However, it is possible to build a "little black box" that will handle any rig, provided the rules set forth in this and the previous articles are observed, and this story points out the important factors in the construction and use of the "little black box" — or tube keyer, as it is known to most.

Clickless and Safe Keying of the Transmitter

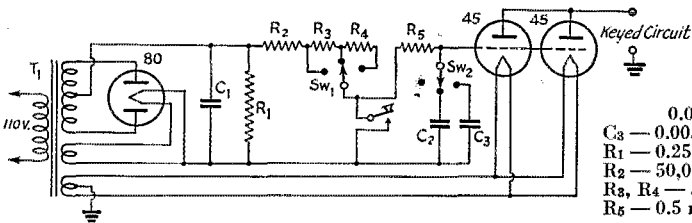


Fig. 1 — Wiring diagram of a practical tube keyer.

C₁ — 2 μ fd., 600-volt paper (don't use electrolytic).

C₂ — 0.003- μ fd. mica (0.001 and 0.002 in parallel if necessary).

C₃ — 0.005- μ fd. mica.

R₁ — 0.25 megohm.

R₂ — 50,000 ohms, 10-watt.

R₃, R₄ — 5 megohms.

R₅ — 0.5 megohm.

All resistors 1-watt unless otherwise mentioned.

Sw₁, Sw₂ — 3-position 1-circuit rotary switch.

R₁ — 325 volts each side c.t., with 5-volt and 2.5-volt windings (Thordarson T13R01).

If desired, more degrees of lag may be obtained by

single variable resistor because no variable resistor was available in the necessary range. The capacity across the grid circuit can be varied by selecting the proper capacity through Sw₂. The keyer tube is connected in the keyed circuit with the proper polarity for current flow, which means that the positive side of the circuit goes to the keyer tube plate. A voltmeter can be used to check the polarity if one isn't sure how the circuit goes.

If Sw₁ is set so that only R₂ is in the circuit, and Sw₂ is set on the open point, there is no lag introduced in the keying, because the grid voltage applied to the keyer tubes is immediately removed when the key is closed and immediately replaced when the key is open. This allows testing of the keying with no lag, as should first be done with crystal oscillators. R₂ is necessary to prevent

using rotary switches with more points and more resistors and condensers. Suggested values of capacity, in addition to the above (C₂ and C₃), are 0.001 and 0.002 μ fd. From R₂, resistors would run 2 megohms, 2 megohms, 3 megohms and 5 megohms.

the key from placing a direct short across the power supply. However, if some capacity is placed across the grid, as by moving Sw₂ to another point, this capacity will be charged up to the potential of the power supply (the blocking voltage) when the key is open. When the key is closed, this condenser discharges through R₅ but, depending upon the capacity and the value of R₅, takes a finite time to do so. Therefore, instead of immediately allowing current to flow through the keyer tube and to the transmitter, the keyer tube does it more slowly, and adds exactly the same kind of lag to "make" that an inductance does. When the key is opened, the condenser (and thus the grid) does not immediately assume the full blocking voltage because it must charge up through R₅ plus R₂. Hence lag is introduced on "break," and the keying characteristic can be

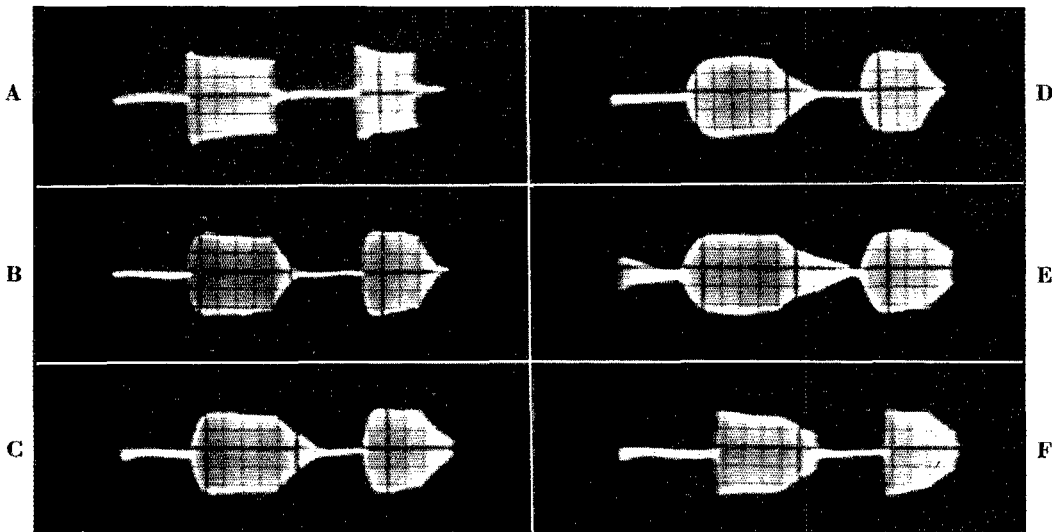


Fig. 2 — Oscillograms of a grid-plate crystal oscillator keyed by a tube keyer sending dots at 50 w.p.m.

A — Straight keyer with no lag. B — 0.003 μ fd. and 5 megohms. C — 0.003 μ fd. and 10 megohms (note longer tail than B). D — 0.005 μ fd. and 5 megohms. E — 0.005 μ fd. and 10 megohms (dots beginning to run together, but perfectly readable and excellent characteristic for all normal speeds). F — Same as E but cathode keying (the others are keyed in negative h.v. lead). Comparing E and F shows strikingly how difficult it becomes to satisfactorily key filter an oscillator keyed in the cathode circuit. The sharp "make" and curtailed "break" characteristics introduce clicks that are not present with the same lag and negative (or positive) lead keying.

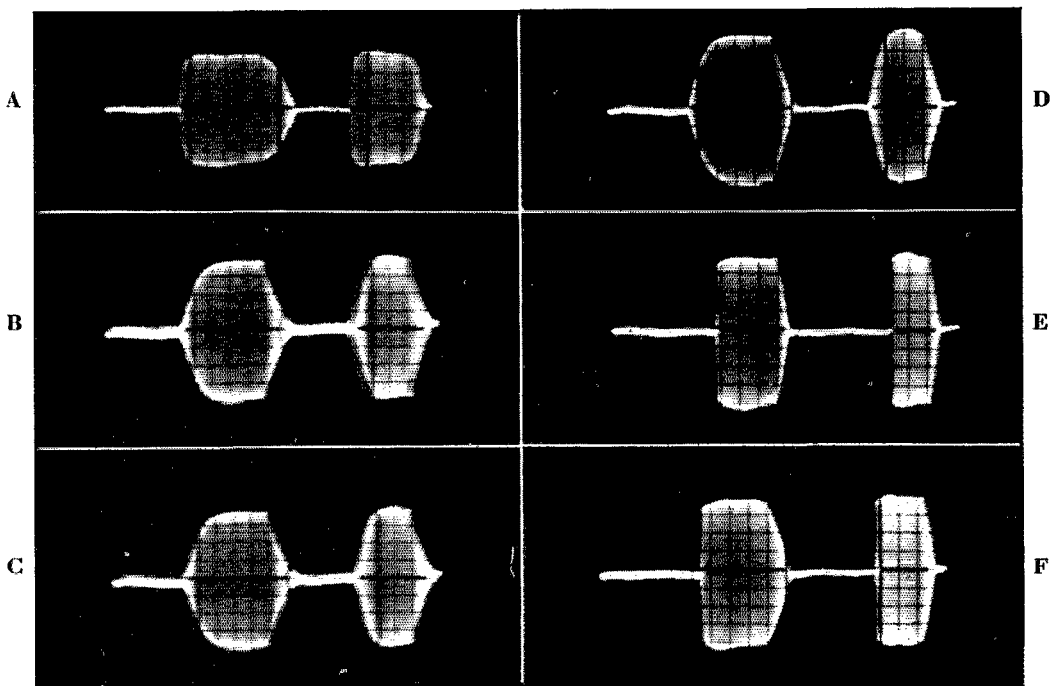


Fig. 3 — Oscillograms of a crystal oscillator-neutralized amplifier transmitter tube keyed at 50 w.p.m. The amplifier is battery biased to beyond cut-off.

A — Oscillator keyed same as Fig. 2-D. B — Amplifier keyed in negative lead with same lag as A. C — Amplifier keyed in center tap with same lag as B. Note that there is practically no difference when an amplifier is keyed in negative lead or center tap, in contrast to Figs. 2-E and 2-F. D — Oscillator and amplifier both keyed in negative with same lag as C. There is practically no difference between B, C and D. E — Oscillator and amplifier both keyed in center tap, with same lag as D. Here again is shown the reduced lag obtained when using center-tap keying of an oscillator, resulting in clicks that are almost impossible to eliminate. F — Same as E but with lag increased to 0.005 μ fd. and 10 megohms.

adjusted by control of the constants in the grid circuit. Adding capacity across the grid circuit softens both "make" and "break," and adding resistance between the key and R_2 softens the "break." The use of high resistances and small capacities is convenient and results in a small demand on the blocking voltage power supply. They also make the key absolutely safe to handle.

Practical Considerations

The tube keyer can take almost any physical form, ranging from a unit built into the transmitter to a separate unit that can be mounted on the operating desk. The unit shown in the photograph was used to obtain the oscillograms and experimental data and is unnecessarily elaborate, except where considerable current is being keyed or where only a very low voltage drop is permissible. The resistance of a 45-type tube with zero grid bias runs from 1800 ohms at 50 ma. current to about 2600 ohms at 20 ma., resulting in a 90-volt drop at 50 ma. and a 52-volt drop at the lower current level. Tubes in parallel reduce the drop in proportion to the number of tubes used.

Type 2A3 tubes were tried in the keyer but, among five different tubes, none were found that would cut off completely, even with 450 volts on the grids. This would not be important if an amplifier were being keyed because the current passed is only a milliampere or so, but when used to key an oscillator it was enough to allow the oscillator to operate, resulting in a signal in the receiver and prohibiting break-in operation on one's own frequency. Leakage across the tube base and socket and/or leakage through Sw_2 and its associated condensers were all eliminated as possible reasons for this slight current, and we are at a loss to explain the phenomenon. However, the only reason for wanting to use 2A3's is that they would have a lower voltage drop, and 45's are enough cheaper to make connecting a number of them in parallel quite economical.

The condensers used in the lag circuit (C_2 and C_3) should be good mica condensers, to avoid any trouble with leakage giving a voltage-divider effect and reducing the voltage at the grids. It is advisable to use a good paper condenser for C_1 in order to guarantee that the blocking voltage will

be constant and not somewhat dependent upon the leakage of the condenser.

Where and What to Key

If the transmitter consists of only an oscillator, or an oscillator and low-powered amplifier, it is recommended that the entire transmitter be keyed in the negative lead, as suggested in previous articles.^{1,2} However, this results in placing the full plate voltage across the key and represents some danger of shock. On the other hand, a tube keying system allows one to place his hand directly across the key terminals (if he wants to) without feeling the slightest shock. The reason, of course, is that a high resistance (R_2 plus R_3 or more) is in series with the bias voltage and the key, and the current through the key is so slight that no shock can be felt. However, one should never try the experiment with less than a megohm in series because then the current is not limited to such a low value.

A high-powered transmitter should also be keyed in the low-power stages, and in the oscillator if break-in is to be used. Some years ago there was considerable justification for high-level keying (of which primary and rectifier keying were probably the most successful) because fixed bias was uneconomical to obtain. However, the use of regulator tubes of the VR-150 and VR-105 types allows an economical bias supply to be built,³ and we can see little or no justification for high-level keying. By using a minimum of fixed bias on the stages following the keyed stage, as suggested previously,¹ the keyed characteristic can be satisfactorily maintained throughout the transmitter and no serious clicks should be encountered. The power supply used to furnish blocking voltage for the keyer tube (or tubes) can also be used in conjunction with the regulator tubes to provide bias for the stages of the transmitter following the keyed stage.

If cathode (or center-tap—the two are identical) keying is used at the present time in one's oscillator, the tube keyer can be used with very few changes. The plate of the keyer tube is connected to the cathode of the oscillator, and the filament of the keyer tube is connected to the ground of the transmitter. The grid leak return of the oscillator is then moved from ground to the cathode, as are any r.f. by-pass condenser returns in the oscillator, and you are keying in the negative lead. The tube keyer can be used in cathode keying, too, but the lag will not be as effective and cannot be made very great, as pointed out in a previous article. If an amplifier is keyed, the excitation will be on the keyed stage constantly, and it makes little or no difference whether negative or cathode keying is used. In this case, the keyer tube output terminals can go directly to the old keying terminals of the amplifier (if cathode or negative keying is used) with the proper polarity to allow current to flow through the keyer.

The tube keyer seems to be the answer to satisfactory keying. Having established that negative power lead keying responds best to the addition of lag, the obstacle of high voltage across the key presents itself. However, with a tube keyer one can inadvertently place his hand directly across the key without the slightest shock, provided the resistance in series with the key and blocking voltage is high, as previously mentioned. The only other way we know to make a key safe is to use a relay, which is not always convenient or desirable. Further, the use of an inductance-capacity filter means trying many different values until the proper combination is hit upon, and this can be a lengthy and expensive process if one isn't connected with a dealer or manufacturer. On the other hand, the tube keyer will give the same desirable characteristic in many different transmitters, and it uses inexpensive resistors and condensers instead of iron-core chokes and, in some cases, high-capacity condensers. Combining the keyer blocking-voltage supply with the bias supply is economical enough to appeal to anyone and should certainly overcome any last objection one might offer to the use of the system.

² Goodman, "Keying the Crystal Oscillator," *QST*, May, 1941.

³ McCullough, "Another Approach to High Power," *QST*, Feb., 1940.



Strays

Regarding a stray on page 98 of *QST* for April stating that the pamphlet, "Instructions for the Operation and Calibration of Radio Direction-Finding Equipment," could be obtained from the Government Printing Office for 5 cents, it has been reprinted and the cost is now 10 cents.

— Jim Conrad.

★ WHAT THE LEAGUE IS DOING ★

F.C.C. NOTES

BY VIRTUE of a considerable increase in personnel, the amateur unit of the FCC licensing section is now nearly caught up in the handling of amateur licenses. . . . As many amateurs are aware, there has been considerable confusion about the operation of Sec. 12.93b of our regs, which permits change of residence for a period not exceeding four months by invocation of portable procedure rather than by modification. Some amateurs have endeavored to employ this device to authorize one-day operation of portable equipment, and in the attempt to stop such abuses some amateurs have been denied the normal right to make a temporary move of a fixed station. This situation is now under study and will probably result in a clarifying order or regulation which, while preventing abuses by probably putting a minimum limit on bona-fide moves, will continue the intended purpose of the section. . . . Gerald C. Gross, W3GG, ex-2BFY, has been appointed assistant chief engineer of FCC in charge of the broadcast division. For some years chief of the international division of FCC's engineering department, he has represented the government at twenty-one international communications conferences, where we could always count on him as a friend of the amateur. Since 1933 he has also been secretary of the important Interdepartment Radio Advisory Committee. As chief of the international division, he has now been succeeded by his former assistant, Philip F. Siling.

N.C.R. ABOLISHED

BECAUSE most of its men are already in the service, the peace-time organization and training of the NCR have been discontinued, all units and sections abolished, and there are no more drills and instruction classes. The national drill circuit, too, has now been suspended. The remaining V-3 enlisted men are to be ordered to training soon and C-V(S) officers are also being ordered up. . .

ACTING DIRECTORS

ARRL by-laws provide that upon the giving of notice by a director that he is unable to perform his functions, the alternate director takes over the office with all the powers of director. The exigencies of national defense have now taken two of our directors from their divisions, and they have turned over their affairs to their alternates:

Ensign William A. Green, W5BKH, of Abilene, Texas, has assumed activity duty at the naval

air station at Pensacola, Florida, and for the year ending April 9, 1942, the functions of West Gulf Division director have been taken over by W. T. Caswell, Jr., W5BB, of Austin, Texas, the alternate director.

Fred W. Young, W9MZN, Dakota Division Director, is on leave of absence from the Mankato State Teachers' College, serving as a ground school supervisor for the Civilian Pilot Training Service of the CAA. He has now been transferred out of his division to the Milwaukee district office of his organization, and so has turned over the functions of director of the Dakota Division until the coming autumn to his alternate, Adolphus A. Emerson, W9ITQ, of Minneapolis.

BOARD MEETING

THE Board of Directors held its annual meeting in Hartford on May 9th-10th with all divisions represented, its first assembly under President Bailey. As always, the Board first accumulated a background of information by hearing reports from all the directors, from its committees and from the officers of the League, and then addressed itself to new business. The complete story is told in the appended minutes, but here are the highlights.

National defense, of course, received prime consideration and the Board devoted many hours to defense matters and the future of amateur radio. The facilities of the amateur institution were again pledged to the government, while at the same time the extraordinary powers and means granted the President a year ago were reaffirmed. Provisions were made for assuring that newly-licensed amateurs are fully informed on new regulations and on ARRL precautionary practices and their cooperation enlisted in our mutual need to keep clean noses.

Amateur radio is a great training school. From it come not only enlisted operators for the services but expert technicians, designers, engineers, production men, candidates for commission and communication executives. The Board believes that at such a time as this we ought to do something to accelerate the training afforded by the actual practice of ham radio. After long deliberation they decided to ask FCC to set up, for the duration of the emergency, a special temporary type of amateur license which will have c.w. privileges only and which will have a life of but one year, nonrenewable, during which time the holder can qualify for a regular type of license. It is suggested that the new type be called Class D and that it be available at a code speed of but 7 w.p.m. and with a simpler written ex-

amination. The idea is that it takes too many months to get up to 13 or 15 w.p.m. on a buzzer, while every amateur knows from his own experience that, once one is on the air, speed is increased rapidly. It is believed that this plan will bring new amateurs up to 15 or 20 w.p.m. months sooner than is possible under our present license structure.

The only other requests made of FCC were to extend 10-meter 'phone down to 28,100, and to open up 29,250-30,000 kc. to f.m. This is the harmonic of the 5-meter f.m. assignment.

The Board spread on its records resolutions of grief at the loss of Treasurer Hebert, ordered a tablet to his memory at WIAW. David H. Houghton, for twenty years *QST*'s circulation manager, was appointed acting treasurer, in some of which duties he has been participating in recent years.

One of the most far-reaching acts of the Board was the establishment, effective July 1st, of two classes of ARRL membership — as a result of studies that have gone on for several years. Henceforth, any person interested in amateur radio is eligible to be an Associate Member of ARRL but only a licensed amateur is eligible to be a Full Member with voting rights. Particulars will appear in our next issue. The arrangement will not become effective in Canada until three months after the resumption of licensing. In fact, because Canadian elections cannot now be held within the spirit of the by-laws, the Board ordered that the Canadian SCM's and the Canadian General Manager and his alternate shall continue in office during the present unsettled period, with new elections to be held as soon as possible after the resumption of licensing. . . . The Constitution was amended to exclude the President and Vice-President from voting on further amendments thereto, as well as amendments to by-laws — although, under our rules of order, our president has long been authorized to vote only to make or break a tie.

A proposal that the SCM's be appointed by the directors instead of elected by members was roundly defeated. Both the SCM's and the operators at WIAW were given special thanks by the directors for their excellent work of the past year, and the arrangement to send SCM's and QSL Managers to division conventions was continued. The Planning Committee was discharged with thanks, since present conditions do not permit it to perform useful work. The important Finance Committee of course was continued, and Canadian Manager Reid was again named as its chairman, its other members for the coming year being Directors Caveness and Norwine. . . . The Chicago gang reported that business conditions were not propitious for a 1941 national convention, and this conclusion was ratified. . . . The Communications Manager was asked to study the possibility of West Coast stations for code pro-

iciency work, and some alterations in the BPL box score.

You will find numerous other interesting matters mentioned in the minutes and gradually creeping their way into our affairs, but this is all we have time for now if we are to get the news into June *QST*. Here are the minutes themselves:

MINUTES OF 1941 ANNUAL MEETING OF
THE BOARD OF DIRECTORS AMERICAN
RADIO RELAY LEAGUE

May 9-10, 1941

Pursuant to due notice and the requirements of the by-laws, the Board of Directors of the American Radio Relay League, Inc., met in regular annual session at The Hartford Club, Hartford, Conn., on May 9, 1941. The meeting was called to order at 10:11 A.M., Eastern Daylight Saving Time, with President George W. Bailey in the chair and the following other directors present:

Charles E. Blalack, Vice-President
Alexander Reid, Canadian General Manager
E. Ray Arledge, Delta Division
John E. Bickel, Southwestern Division
Hugh L. Caveness, Roanoke Division
Goodwin L. Dosland, Central Division
William T. Caswell, Jr., West Gulf Division
(alternate, acting)
Robert A. Kirkman, Hudson Division
W. Bradley Martin, Atlantic Division
J. Lincoln McCargar, Pacific Division
Percy E. Noble, New England Division
Floyd E. Norwine, Jr., Midwest Division
William C. Shelton, Southeastern Division
C. Raymond Stedman, Rocky Mountain Division
Karl W. Weingarten, Northwestern Division
Fred W. Young, Dakota Division

There were also present Secretary K. B. Warner, Communications Manager F. E. Handy, General Counsel Paul M. Segal, Assistant Secretary A. L. Budlong and, as technical adviser to the Board, George Grammer, technical editor of *QST*. At the invitation of the Board, there was also in attendance, as a nonparticipating observer, Alternate Director Clayton C. Gordon, New England Division.

The Chairman, in his opening remarks, paid tribute to the League's late treasurer, Arthur A. Hebert, and the meeting stood silent a moment to his memory.

On motion of Mr. Arledge, unanimously VOTED that the minutes of the 1940 annual meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

On motion of Mr. Norwine, unanimously VOTED that the annual reports of the officers to the Board of Directors are accepted and the same placed on file.

On motion of Mr. Caveness, VOTED that all acts performed and all things done by the Executive Committee since the last meeting of the Board, and by it reported to the Board, are ratified and confirmed by the Board as the actions of the Board. Mr. Kirkman requested to be recorded as voting opposed.

On motion of Mr. Dosland, after discussion, VOTED that the Board, having considered its several mail actions of the previous year, now ratifies the actions taken and decides to take these positions

as follows: (a) to postpone taking the poll of sentiment on increasing the width of 'phone bands — as of June 20, 1940; (b) to approve the draft of an article in *QST* on the business survey of the League — as of July 23, 1940; (c) to request the Federal Communications Commission to establish a Class D license — as of February 17, 1941. Mr. Kirkman requested to be recorded as voting opposed.

Mr. Reid, chairman of the Finance Committee, presented a report on behalf of his committee. On motion of Mr. Martin, unanimously VOTED to receive the report and to thank the committee for its work.

Mr. Reid made his annual report as Canadian General Manager. In turn, every division director read and submitted a written report on conditions in his division, for the common information of the Board.

The Board was in recess from 11:37 A.M. to 11:44 A.M. Proceeding to a consideration of subjects raised by individual directors at their own initiative:

Moved, by Mr. McCargar, pursuant to notice given a year before, to amend Article VII of the Constitution by inserting the words "excepting the President and Vice-President" after the words "Board of Directors." The yeas and nays being ordered, the said question was decided in the affirmative: Whole number of votes cast, 15; necessary for adoption, 12; yeas, 13; nays, 2. Those who voted in the affirmative are Messrs. Arledge, Bickel, Caveness, Dosland, Caswell, Kirkman, Martin, McCargar, Norwine, Shelton, Stedman, Weingarten and Young. Those who voted opposed are Messrs. Noble and Reid. Messrs. Blalack and Bailey abstained. So the Constitution was amended as proposed.

On motion of Mr. McCargar, unanimously VOTED to approve the holding of a Pacific Division convention at Fresno, California, November 8-9, 1941, under the auspices of the San Joaquin Valley Radio Club.

Moved, by Mr. Shelton, that the next annual meeting of the Board be held in Florida. But, after discussion, with the permission of his second, Mr. Shelton withdrew the motion.

On motion of Mr. Shelton, unanimously VOTED that the Board gives to Mr. Handy and his department a vote of thanks and congratulations for the splendid manner in which they have executed the League's code proficiency program. Mr. Handy thanked the Board but stated that such credit should be shared with the Secretarial Department for grading the papers and issuing the certificates.

On motion of Mr. Shelton, after discussion, unanimously VOTED that the President is requested to appoint a committee to investigate "Ham Haven," with a view to determining the desirability of its approval or sponsorship by the League.

Moved, by Mr. Caswell, that the ARRL at the earliest possible moment send a friendly circular letter containing no direct soliciting of membership to all licensed but non-ARRL stations in the United States and Possessions, stating briefly the present position of the radio amateurs, all new regulations recently adopted, the operating code deemed desirable by the ARRL because of existing conditions and the reasons for adopting this code, the possible penalties not only to the individual but also to all amateurs resulting from violation of FCC orders at this time, and enlisting the cooperation of all amateurs in the common cause; this not to be an

alarming or dictatorial document but just a friendly statement of facts and a plea for cooperation. After discussion, Mr. Caswell, with the consent of his second, withdrew the motion and moved that the ARRL at the earliest possible moment prepare a friendly circular letter containing no direct soliciting of membership and send same to all newly-licensed but non-ARRL stations in the United States and Possessions, stating briefly the present position of the radio amateurs, all new regulations recently adopted, the operating code deemed desirable by the ARRL because of existing conditions and the reasons for adopting this code, the possible penalties not only to the individual but also to all amateurs resulting from violation of FCC orders at this time, and enlisting the cooperation of all amateurs in the common cause; this letter also to be made available in quantity to directors, SCM's, Official Observers, and other League officials, the Official Observers being requested to send same during the next year to offending stations observed by them. After further discussion, on motion of Mr. Caswell, VOTED to amend the pending motion to provide that the contemplated circular letter may contain or be accompanied by matter soliciting membership in the League. The question then being on the adoption of the original motion as thus amended, the same was ADOPTED.

Moved, by Mr. Caswell, that it be adopted as policy that two Official Observer reports or one FCC citation for illegal operation, in a period of one year, be sufficient to disqualify ORS, OPS, or RM appointees. During the ensuing discussion the Board recessed for luncheon from 12:57 P.M. to 2 P.M., reconvening with all persons hereinbefore mentioned present. After discussion, Mr. Caswell, with the consent of his second, withdrew the motion.

On motion of Mr. Martin, unanimously VOTED that the Board will adopt resolutions on the passing of its treasurer, Arthur A. Hebert, these resolutions to be presented to his widow; that a plaque to his memory shall be procured and placed on the wall of station WIAW, similar to those erected to the memory of Messrs. Stewart and Hull; that the sum of fifty dollars (\$50) is herby appropriated for this purpose from the surplus of the League as of this date, any unexpended remainder of same to be restored to surplus.

On motion of Mr. Martin, unanimously VOTED that, in view of the impracticability of carrying on planning work under present conditions, the Planning Committee is discontinued for the present; that it is discharged with thanks and that the Board shall express to each member of the committee its appreciation of the service rendered by means of a letter signed by the President; that the Communications Manager is also thanked for his efforts and additional duties in connection with the work of this committee.

On motion of Mr. Martin, VOTED that the Secretary is directed to take steps to compile and retain for future reference as much data as possible on amateur personnel in the national defense service; that the cooperation of the military services and defense industries should be sought, to make the survey as complete as possible; that the Secretary is authorized to retain data as confidential where the sources consider it should be classified as restricted or confidential.

Moved, by Mr. Martin, that the Federal Com-

munications Commission be requested to permit the use of frequency-modulated emission within the frequency band 28 to 28.5 Mc. for amateur communication for a period of not less than one year. But there was no second, so the motion was lost. ⁷

Mr. Dosland read a report from the Chicago committee for the 1941 national convention, addressed to the Chicago Area Radio Club Council, recommending that the 1941 convention be postponed. On his motion, unanimously VOTED that the recommendations of the General Committee for the 1941 ARRL National Convention, as approved by the Chicago Area Radio Club Council, are accepted and placed on file and are ratified by the Board.

On motion of Mr. Dosland by unanimous VOTE, affiliation was granted the Joliet Amateur Radio Society, Joliet, Illinois, and the Dial Radio Club, Middletown, Ohio.

Moved, by Mr. Young, that By-Law 9 be modified to read, "The Section Communications Managers shall be appointed for a two-year term of office by the director of the division in which the section in question is located"; that By-Law 10 be amended by striking out the second and third words and substituting the words "appointee to," and by striking out the last six words; that By-Law 11 be amended by changing the word "election" to "appointment." After discussion, the yeas and nays being ordered, the said question was decided in the negative: Whole number of votes cast, 15; necessary for adoption, 10; yeas, 1; nays, 14. Mr. Young voted in the affirmative; every other director (except the President and Vice-President) voted opposed. So the proposal was rejected.

Moved, by Mr. Arledge, that the sum of four hundred dollars (\$400) be hereby appropriated from the surplus of the League as of this date for the purpose of defraying the traveling expenses of the Section Communications Managers of the League, within the continental limits of the United States, to attend one official ARRL convention within their respective divisions in the period between this date and the date of the next annual meeting of the Board; reimbursement to be made at the rate of two cents per mile via the shortest commonly-traveled route, plus one night's hotel accommodation at \$2.50, and an allowance of the registration fee; allowance of these expenses to be subject to approval by the Communications Manager upon examination of detailed report of the activities of the Section Communications Manager at each such convention, to be submitted with his expense account; and any unexpended remainder of this appropriation at the date of the holding of the next annual meeting of the Board to be restored to surplus. On motion of Mr. McCargar, unanimously VOTED to amend the motion to change the amount of the appropriation to five hundred dollars (\$500) and to provide the further purpose of defraying the traveling expenses of the QSL Managers of the League, within the continental limits of the United States, to attend one official ARRL convention within the call areas for which they are the respective QSL Managers during the time between this date and the date of the holding of the next annual meeting of the Board, provided that such convention be within a radius of 500 miles from the QSL Manager's place of residence; and to require a similar report from the QSL Manager as a condition to the allowance of his expenses. The

OFFICERS' REPORTS AVAILABLE TO MEMBERS

* In April of each year the officers of the League make comprehensive written reports to the directors. The Board of Directors has made these reports available to the membership of the League. Interested members may obtain copies postpaid at the cost price of 50¢ per copy. Address the Secretary at West Hartford.

question then being on the adoption of the amended motion, the same was unanimously VOTED.

On motion of Mr. Arledge, unanimously VOTED that the Board extends an expression of its thanks for the excellent services rendered the League by the Section Communications Managers during the past year.

On motion of Mr. Arledge, VOTED that the Board, having examined its action of last year in which it granted the President extraordinary powers to act as a committee of one in all aspects of protecting amateur operation, and in which it made an open authorization of ten thousand dollars (\$10,000) available to him for the defense of amateur frequencies, now reaffirms those actions. Mr. Kirkman asked to be recorded as abstaining from voting.

Moved, by Mr. Kirkman, that, in view of the fact that the two operators of W1AW represent the League to thousands of amateurs who contact and visit W1AW, and whereas it should be the policy of the Board to express its appreciation of a job well done, the salaries of Hal Bubb and George Hart be increased (to certain suggested figures). After discussion, on motion of Mr. Martin, unanimously VOTED to amend the pending motion by striking out its entire text and substituting the provision that the Secretary and Communications Manager are requested to examine the salaries of the operating personnel at W1AW and to make suitable increase if it is found to be warranted. The question then being on the adoption of the original motion as thus amended, the same was unanimously VOTED.

Moved, by Mr. Kirkman, that the Secretary be instructed to arrange suitable means for accumulating accurate numerical data on the number of League members who are licensed amateurs in each League division; that he also compile data based on population and/or FCC amateur license bureau data showing the probable number of amateurs licensed in each League division; this information to be revised at least once a year and available to directors and officers of the League. But, after discussion, the motion was rejected.

Moved, by Mr. Kirkman, that the Secretary be instructed to establish and make use of a system similar to that used by Mr. Handy in disseminating RM-Nite information, to the end that each member of the Board of Directors may be familiar with the opinions and activities of his colleagues in connection with the various subjects and questions which arise between Board meetings. But, after discussion, the motion was rejected.

Moved, by Mr. Kirkman, that the Communications Manager be instructed to organize as soon as practicable a system of spectrum observation and

report, whose purpose shall be to maintain a master chart or file with accurate and up-to-date information concerning the use of the entire radio spectrum by any station whatsoever, and so conceived that irregular or unusual use of any frequency shall be immediately apparent; this information to be made available to any director, to any officer of the League and, at the discretion of the Secretary, to any government official or agency. But, after discussion, the motion was rejected.

Moved, by Mr. Kirkman, that, in view of its large membership, the Hudson Division annual appropriation be increased to three hundred dollars (\$300); that the sum of one hundred dollars (\$100) be hereby appropriated to increase the 1941 appropriation to that figure; and, that from the unexpended balances of Hudson Division appropriations for the past six years amounting to the sum of \$458.72 and subsequently returned to surplus, there be appropriated the sum of two hundred dollars (\$200) for the primary purpose of underwriting Hudson Division conventions, which sum shall be earmarked for the Hudson Division and shall remain to the credit of the Hudson Division director until expended. After discussion, on motion of Mr. Young, VOTED to amend the motion by striking out the portion after the semicolon relating to an appropriation for division conventions. After further discussion, on motion of Mr. Stedman, the amended motion was put on the table.

Moved, by Mr. Kirkman, that the Secretary be instructed to request the FCC to assign to the amateur service a frequency band from 448 Mc. to 460 Mc., to be open to all classes of transmissions. But, after discussion, the motion was rejected.

The Board was in recess from 4:00 to 4:05 p.m.

On motion of Mr. Norwine, affiliation was unanimously VOTED the following investigated societies:

- Waltham Amateur Radio Association Waltham, Mass.
- YL Radio Club St. Louis, Mo.
- Unit Number Three, North-Minnesota Amateur Radio Association Coleraine, Minn.
- Fayette Radio Club Kincaid, W. Va.
- San Diego Radio Club San Diego, Calif.
- La Crosse Radio Amateur Club, Inc. La Crosse, Wis.
- The Mount Rushmore Radio Club Sturgis, So. Dak.
- Moscow Radio Operators Club Moscow, Idaho
- Radio Explorer Troop 501 St. Louis, Mo.
- Greensboro Radio Club Greensboro, N. C.
- Richmond Radio Club Richmond, Calif.

On motion of Mr. Norwine, unanimously VOTED to convey the thanks and congratulations of the Board to Messrs. Harold Bubb and George Hart for the splendid manner in which they are handling WIAW and for their courtesy shown to visiting amateurs.

Moved, by Mr. Noble, that the FCC be approached on the idea of notifying by mail all holders of amateur licenses of all changes in regulations affecting amateur operation; if absolutely necessary, we would favor a nominal fee for amateur licenses to defray the expenses of same. After discussion, on motion of Mr. Stedman, unanimously VOTED to strike out the portion after the semicolon relating to a fee. After further discussion, the question being

on the adoption of the amended motion, the same was rejected.

Moved, by Mr. Noble, that a 10 per cent tax be placed on the net profits of all official ARRL conventions in a division to build up a fund to be held by the director of a division to permit him to underwrite future official conventions to the following extent: no more than 25 per cent of the total fund could be used to reimburse loss at any one convention. But, after discussion, with unanimous consent, Mr. Noble withdrew the motion.

On motion of Mr. Noble, after discussion, unanimously VOTED that, since many traffic-handlers feel that 100 deliveries should not qualify an amateur for the BPL in QST, the Communications Manager is instructed to make a further study of this matter, to see whether traffic-handling amateurs would not be more accurately rated if deliveries counted less than at present, and that he is directed to change the figure of 100 deliveries if, in his opinion, it would be in the general interest so to do.

On motion of Mr. Weingarten, after discussion, VOTED that the Communications Manager is directed to make a further study of, and to report back to the Board by mail the feasibility of, transmitting code proficiency runs and code practice from an amateur station or stations on the Pacific Coast.

The Chair here appointed two committees: On the Hebert resolutions, Messrs. Martin and Caveness. To investigate Ham Haven, Messrs. Shelton (chairman), Dosland and Norwine.

Moved, by Mr. Caveness, that there be hereby appropriated from the surplus of the League as of this date, the sum of three thousand two hundred dollars (\$3200) for the purpose of defraying the expenses of holding this meeting of the Board of Directors, any unexpended remainder of the sum to be restored to surplus. On motion of Mr. Young, unanimously VOTED to amend the motion to add the provision that the Secretary be instructed to report to the directors the expenses of each director. The question then being on the adoption of the motion as amended, the same was unanimously VOTED.

On motion of Mr. Caveness, after discussion of the necessary figures, unanimously VOTED that the sum of three thousand three hundred and seventy-five dollars (\$3375) is hereby appropriated from the surplus of the League as of January 1, 1942, for the legitimate administrative expenses of directors in the calendar year 1942, said amount allocated to the Canadian General Manager and to the division directors as follows:

Canadian General Manager	\$ 150
Atlantic Division Director	200
Central Division Director	400
Dakota Division Director	200
Delta Division Director	250
Hudson Division Director	300
Midwest Division Director	225
New England Division Director	175
Northwestern Division Director	250
Pacific Division Director	200
Roanoke Division Director	150
Rocky Mountain Division Director	200
Southeastern Division Director	175
Southwestern Division Director	200
West Gulf Division Director	300
	\$3375

Any unexpended remainders of these funds at the end of the year 1942 to be restored to surplus.

The Board was in recess from 5:08 P.M. to 5:17 P.M.

Moved, by Mr. Norwine, that the Secretary be instructed to request the Federal Communications Commission to extend the 10-meter 'phone band down to 28,100 kc., and to make available the use of f.m. 'phone emission in the frequencies 29,250 to 30,000 kc. Moved, by Mr. Kirkman, to amend the motion to provide that the frequencies 28,100 to 30,000 kc. shall be open also to A-2 emission; but, after discussion, the proposal was rejected. After further discussion, Mr. Norwine, with the consent of his second, withdrew the pending motion. On the further motion of Mr. Norwine, VOTED, 10 votes in favor to 4 opposed, that the Secretary is instructed to request the Federal Communications Commission to extend the 10-meter 'phone band down to 28,100 kc., so that the 'phone allocation reads 28,100 to 30,000 kc. Messrs. Reid and Caswell requested to be recorded as voting opposed, and Mr. Weingarten asked to be recorded as not voting. On motion of Mr. Stedman, VOTED that the Secretary is instructed to request the Federal Communications Commission to make available the use of f.m. 'phone emission in the frequencies 29,250 to 30,000 kilocycles.

On motion of Mr. Shelton, VOTED, 7 votes in favor to 6 opposed, that the Board recommends to manufacturers of amateur receivers the adoption of a uniform standard for S scales.

On the Secretary's proposals to alter the requirements for membership in the League, moved, by Mr. McCargar, (1) that the Constitution and By-Laws be amended as follows:

Article II: Replace Paragraph 1 with the following:

1. The membership of the League shall consist of:

a) Full Members, who shall be entitled to all rights and privileges of the League;

b) Associate Members, who shall be entitled to all rights and privileges of the League except the right to vote in the affairs of the League and the right to hold the office of Director or Alternate Director except as may be hereinafter provided.

Whenever the general term "member" or "members" is used in this Constitution or in the By-Laws, it shall apply equally to both grades of members.

**THE A.R.R.L. BOARD OF DIRECTORS PAUSES
IN ITS 1941 MEETING TO BE PHOTOGRAPHED**

Left to right, front row: Goodwin L. Dosland, W9TSN, Central Division; H. L. Caveness, W4DW, Roanoke; Charles E. Blalack, W6GG, Vice-President; George W. Bailey, W1KH, President; K. B. Warner, W1EH, Secretary; Floyd E. Norwine, Jr., W9EFC, Midwest. Second row: Percy C. Noble, W1BVR, New England; W. T. Caswell, Jr., W5BB (Acting Director), West Gulf; Robert Akeridge Kirkman, W2DSY, Hudson; Clayton C. Gordon, W1HRC (Alternate), New England; C. Raymond Stedman, W9CAA, Rocky Mountain; Paul M. Segal, ex-W3EEA, General Counsel. Third row: George Grammer, W1DF, Technical Advisor; Alex Reid, VE2BE, Canadian General Manager; J. L. McCargar, W6EY, Pacific; Fred W. Young, W9MZN, Dakota; John E. Bickel, W6BKY, Southwestern; F. E. Handy, W1BD1, Communications Manager. Rear row: Walter Bradley Martin, W3QV, Atlantic; A. L. Budlong, W1JFN, Assistant Secretary; Karl W. Weingarten, W7BG, Northwestern; E. Ray Arledge, W5SL, Delta; William C. Shelton, W4ASR, Southeastern.



2. To be eligible for Full Membership an applicant, at the time of his application, must be a resident of one of the administrative divisions of the League in the United States & Possessions or in the Dominion of Canada, as defined in the By-Laws, and must be either:

a) the holder of either an amateur radio station license or an amateur radio operator's license or both, issued by the administration of the country of which he is a citizen. Such Full Membership shall be granted for no longer than one year at a time, and the holding of an amateur radio license must be demonstrated before each renewal for an additional year; *provided*, however, that if such a Full Member becomes without amateur radio license during a year for which he has been accepted as a Full Member, he shall continue to possess all the rights of a Full Member until the expiration of the year but shall not be eligible to renew as a Full Member unless and until he again demonstrates the holding of an amateur radio license; or

b) a person who has held continuous and unexpired membership in the League since May 15, 1934.

3. Any person interested in amateur radio shall be eligible to Associate Membership.

4. Upon attaining possession of an amateur license, an Associate Member shall be transferred to Full Membership upon his application therefor, if he is otherwise eligible.

Remember the remaining paragraphs of this Article. In what is now Paragraph 2, change the word "membership," in two places, to read "Full Membership." In what is now Paragraph 5, change the word "members" to "Full Members." Delete the comma after "matter"; insert a comma after the following word "and"; insert a comma after "reason."

Article IV: In Paragraph 1, change the word "members" to "Full Members."

By-Law 4: Change the word "member," in two places, to read "Full Member."

By-Law 5: Under the Pacific Division, delete the word "and" and substitute a comma, and at the end add the words "and the United States Possessions in the Pacific." Under the Southeastern Division, put a comma after "Alabama," and change the words "island of Puerto Rico" to "United States Possessions in the Caribbean."

By-Law 6: Delete the words "and Isle of Pines."

By-Law 9: In the second sentence delete the words "its island possessions or territories, or the Republic of Cuba." Change "members" to "Full Members." In two places change "member" to "Full Member." At the end of the paragraph, delete the words "Newfoundland or Labrador" and put a period after "Canada." Then add the following new sentence:

Provided, however, that whenever the operating territory of a Section includes additional territory not part of the administrative divisions of the League but attached thereto for the activities of the Communications Department, Associate Members residing in the said attached territory and possessing amateur radio licenses shall be eligible equally with Full Members of the Section to hold or to nominate for and vote for the office of Section Communications Manager, provided they otherwise comply with the requirements of these By-Laws.

By-Law 13: Change "members" to "Full Members."

By-Law 18: Change "members" to "Full Members."

By-Law 19: Change "members" to "Full Members." Change "member" to "Full member."

By-Law 20: Change "member" to "Full Member." Change "members" to "Full Members". Delete the sentence reading: "No ballot shall be counted unless it shall affirmatively appear either from such ballot or the envelope in which it is contained that the member either is at the time the holder of an amateur radio station or operator's license or has been continuously since May 15, 1934, a member of the League."

By-Law 28: Change "members" to "Full Members."

(2) that, except in the Dominion of Canada, the above amendments become effective July 1, 1941, in the case of all applications for new membership or renewal of membership; provided, however, that they be without effect on memberships now in force until the same shall have run the period for which dues are now paid, but not to exceed one year from this effective date, such present members to continue to be governed for the remainder of their paid-up period of the said year by the provisions of the Constitution & By-Laws as they existed prior to these amendments; (3) that in the dominion of Canada these amendments become effective three months after the resumption of the issuance of amateur licenses by the Canadian Government, the one-year period above mentioned to be counted from that date. Moved, by Mr. Kirkman, to lay the subject on the table; but there was no second, so the motion was lost. After discussion, the yeas and nays being ordered, the question was decided in the affirmative: Whole number of votes cast, 15; necessary for adoption, 10; yeas, 15, nays, 0. Every director (except the President and Vice-President) voted in the affirmative. So the Constitution & By-Laws were amended as proposed.

Moved, by Mr. Norwine, that By-Law 5 (a) be amended by striking out the words "and the Philippine Islands" and inserting the word "and" after the word "Nevada"; and that By-Law 6 be amended by adding a new item at the end thereof,

reading "Philippine Islands — attached to the Pacific Division." After discussion, on motion of Mr. McCargar, unanimously VOTED to lay the subject on the table.

On motion of Mr. Norwine, after discussion, the Board by unanimous vote ADOPTED the following resolution:

In view of the facts that the Canadian membership of the League is temporarily at a low figure because of the effects of the war, with many members absent from their homes; that amateur licenses are temporarily not available in Canada; and that it is apparent that elections for Canadian General Manager, Alternate Canadian General Manager and Canadian Section Communications Managers cannot be held this year in conformity with the spirit of the by-laws; BE IT RESOLVED by the Board of Directors that By-Laws 9 and 28 be, and the same hereby are, declared inoperative until the further order of the Board, so far as they apply to the election of Canadian General Manager, Alternate Canadian General Manager and Canadian Section Communications Managers; and that in the meanwhile the incumbent Canadian General Manager, Alternate Canadian General Manager and Canadian Section Communications Managers shall continue to hold office; provided, however, that an election for these offices shall be held as promptly as possible after the resumption of Canadian amateur licensing.

On motion of Mr. Stedman, VOTED that the Board do proceed now to the selection of a new treasurer. At the request of the Chair, Messrs. Handy, Budlong and Grammer retired from the meeting. During the ensuing discussion, the Board was in recess for dinner from 6:45 P.M. to 8:23 P.M. On motion of Mr. Caveness, unanimously VOTED that, in view of the sudden death of our treasurer, and pursuant to Paragraph 11 of Article IV of the Constitution, the duties of treasurer shall be performed by David H. Houghton until the further order of the Board, he to have the title of Acting Treasurer. Messrs. Handy, Budlong and Grammer were thereupon recalled to the meeting.

At this point, the Board heard supplementary oral reports from the President, Vice-President, Secretary and Communications Manager, and devoted the remainder of the evening session to an examination of plans for national defense and the future of amateur radio. On motion of Mr. Norwine, the Board recessed at 10:05 P.M., under order to reconvene at the same place at 10 A.M. on the morrow. The Board reassembled on May 10, 1941, and was called to order at 10:06 A.M., with all directors and other persons hereinbefore mentioned in attendance except Messrs. Noble, Martin, Norwine and Gordon, who joined the meeting at 10:10 A.M. The morning session was similarly devoted to a discussion of plans for national defense and the future. During the morning the Board was in recess from 11:41 A.M. to 11:50 A.M., and from 12:02 P.M. to 12:15 P.M.

In the course of the foregoing discussion, the Board gave consideration to pending proposals for the establishment of a Class D amateur license. After long discussion, moved, by Mr. Dosland, that the Secretary be instructed to request the FCC, if the FCC concurs that such action would be in the national interest, to establish a Class D feeder type

of amateur license, to be nonrenewable and to have a term of not over one year, during which time the holder may qualify for a regular type of amateur license; such license to permit only A-1 operation on all amateur frequencies; to be made available upon passing a code speed of seven words per minute and a written examination simpler than the present requirements, and to be assigned a call distinctive from amateur calls of other amateur license qualifications. Moved, by Mr. Noble, to amend the motion by inserting the words "crystal control" before the words "A-1 operation"; but, after discussion, the proposal was rejected, Mr. Kirkman asking to be recorded as abstaining. On the question of the original motion, the same was thereupon adopted; Mr. Kirkman, the sole dissenter, asking to be so recorded for the reason that he feels the proposal does not solve the problem but his action not to be interpreted as a vote against national defense.

The Board was in recess for luncheon from 1:10 P.M. to 2:08 P.M., reconvening with all persons hereinbefore mentioned in attendance except General Counsel Segal.

Mr. Shelton, making a preliminary report for the committee on Ham Haven, requested further time for investigation, to report later to the President.

Mr. Martin, reporting for the resolutions committee, presented and moved the adoption of the following resolutions, the same to be prepared and delivered by the Secretary:

Whereas the board of Directors of the American Radio Relay League is now convened in its first session after the unfortunate death of our treasurer, Arthur A. Hebert; and

Whereas Arthur A. Hebert has served the League for a generation, as a loyal radio amateur, an inspiring leader and an efficient administrator; and

Whereas, as officers and directors of the League we are deeply grieved at the loss of our colleague as an amateur, as a co-worker and above all as a friend; now therefore

BE IT RESOLVED by the officers and directors of the American Radio Relay League in annual meeting assembled:

That we now record for the permanent records of the League our grief and sorrow at the passing of Arthur A. Hebert, and

That we extend to his bereaved family our sincerest condolence and sympathy.

Whereupon the same was adopted by a standing vote of the entire assembly.

The Chairman appointed to membership on the Finance Committee, for the following year, Mr. Reid, chairman, and Messrs. Norwine and Caveness.

Moved, by Mr. Stedman, that the FCC be requested to restore the twenty-word-per-minute code speed requirement for the Class A examination. But, after discussion showing that FCC probably would be opposed, Mr. Stedman, with the consent of his second, withdrew the motion.

Moved, by Mr. Kirkman, that the code practice speed of W1AW be reduced to five words per minute. But the motion was rejected.

On motion of Mr. Weingarten, unanimously VOTED that the sum of five hundred dollars (\$500) is hereby appropriated from the surplus of the League as of this date for the use of the Finance Committee, any unexpended remainder to be returned to surplus at the next annual Board meeting.

On motion of Mr. McCargar, unanimously

VOTED to take up the Philippine Island matter from the table. On his further motion, unanimsously VOTED to adopt the following resolution:

In view of the new requirements for membership which make of the League an integrated organization of amateurs licensed by either the FCC or the Dominion of Canada, with the single exception of the Philippine Islands; and whereas the Philippine Islands are already quasi-independent and operate under entirely independent radio regulation and control; and whereas it appears that the administrative structure of the League would be improved by transferring the Philippine Islands from the Pacific Division to a status of attachment thereto which will preserve all our traditional operating relations with them but will overcome certain administrative inconsistencies: BE IT RESOLVED that the Secretary is directed to explain the situation to the members of the League residing in the Philippine Islands and to request them, in the name of the Board, to agree to the change in status, reporting the result of his canvass to the Board.

On motion of Mr. Stedman, the Board unanimously ADOPTED the following resolution:

Whereas the Board of Directors in annual meeting assembled is, as a result of a detailed deliberation, conscious of the responsibilities of the American Radio Relay League in the present national emergency;

BE IT RESOLVED that the League reaffirms its policy of wholehearted cooperation with our government in every feasible manner; and

Further, it urges upon all amateurs a similar attitude.

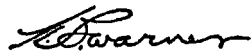
On motion of Mr. McCargar, unanimously VOTED that the Board grants a leave of absence to Communications Manager F. E. Handy for such time as his services may be required in the Navy.

Moved, by Mr. Noble, that there be established a new type of membership certificate, "Contributing (Full/Associate) Member", these certificates to be issued members contributing money to aid in the research and development work of the QST laboratory. But, after discussion, the motion was rejected.

Moved, by Mr. Noble, that any radio club, in order to qualify as an affiliated club, must have at least fifty-one per cent of its membership licensed amateurs and at least fifty-one per cent of these licensed amateurs must be League members. But, after discussion, the motion was rejected.

On motion of Mr. McCargar, after discussion, VOTED, 11 in favor to 5 opposed, that the sum of one hundred dollars (\$100) is appropriated from surplus as of this date as an additional allocation for the legitimate administrative expenses of the director of the Hudson Division in the calendar year 1941, any unexpended remainder of this sum at the end of the year 1941 to be restored to surplus. At this point Mr. Segal rejoined the meeting.

The Chairman thanked the members of the Board for their assistance and cooperation. On behalf of the Board members, Vice-President Blalack thanked the Chairman for the manner in which he had conducted the meeting. On motion of Mr. Caveness, the Board adjourned *sine die* at 2:51 P.M. Total time in session, 12 hrs., 17 min. Total appropriations, \$7,725.


Secretary



ON THE ULTRA HIGHS



CONDUCTED BY E. P. TILTON,* W1HDQ

IN PAST years April has been principally the month in which five-meter men sit around and wait for May. Not so April, 1941, however. A few bits of aurora refraction, some splendid temperature inversions, and the season's first sporadic-E DX kept Five unusually active in most sections of the country.

Unseasonably warm weather during the week of April 6th produced a welcome extension of operating ranges after the infrequent inversions of the winter months. A solid week of exceptional conditions for long range work was climaxed on April 12th, by one of the finest nights of inversion bending ever seen in the East at this time of year. Many contacts over distances up to 200 miles were made with low power and several up to 300 miles were made by the fellows having more power and good locations. Notable work was done by W3CGV, Wilmington, Del., and W3IIS, Rockdale, Md., in working numerous W1's and W2's at distances up to 300 miles.

After this strong inversion, followed by the first thunderstorm of the season, it was no great surprise to see the band open up for W4 on April 14th, two weeks ahead of schedule. W4FLH and W4CYU, Miami, Fla., were apparently the only W4's in on this, but they made the most of the opening. W4CYU, in his first experience with 56-Mc. DX, worked the following stations between 7:15 and 9:45 P.M.: W1's SI BJE JLI JIS AVV JTB HDQ; W2's AMJ FJQ DDV; W3's DI HFY AXU GUF CGV BKB. Bob first realized that the band was open when he heard the Empire State Television transmitter, W2XPS, on 55,750.

* 329 Central St., Springfield, Mass.



Stanley F. Brigham, W1MBS, West Roxbury, Mass. With nothing more than 10 watts input to a 76 oscillator, Stan has worked 122 different stations already this year.

Many additional reports on the aurora session of March 30th were received too late to be included in last month's brief summary. From these it appears that the territory extended out as far as South Dakota, making this one the most widespread on record. In addition to those acknowledged last month we wish to thank W8's KKD FGV QXV KQC and W9's ARN ANH and YKX for their reports. A recurrence was expected in late April, and the date of the Relay was set with this in mind, but the only signs of aurora seen as this is being written occurred on the nights of April 23rd, 24th, and 28th! Northern lights were visible on these dates, but the disturbances were of mild character and intermittent as well. Fuzzy carriers of 'phone stations were noted by several operators, but the only DX reports came from W1AVV, Stamford, Conn., and W1HXP, Newton, Mass., both of whom heard W8OPB on the 24th. These two worked each other on what appears to have been aurora-refracted c.w.

Your conductor picked the date of the April UHF Relay. It looked like a good guess last winter — but the fates that control such matters were most unkind, and the East had about the worst possible conditions during the entire contest period. If any relays were completed from the East Coast to any remote points we have not heard of it. The band opened up for the West, however, and a swell chance for a 56-Mc. Transcon was missed when W6ANN started a message on its way to your conductor in a surprise contact with W9ZJB. Vince got the message off to W9YKX, Woodbine, Iowa, but it died on Bill's hook. W9ZJB heard W6QAQ originating a message "To any East-Coast Amateur" at 11:30 A.M. CST. No signals were heard on Ten at the time, but W6ANN and W6MXY were worked, with signals similar to those heard from W6's on 28 Mc., being 20-25 db over S-9 for nearly two hours!

HERE AND THERE

THE high-pressure efforts of W9ZHB and others in behalf of horizontal polarization are gradually taking effect. Some Easterners now having horizontals of one form or another are W1SI, Revere, W1JDD, Waltham, W1AEP, Springfield, and W1HDQ, Wilbraham, in Massachusetts; W1LLL, Hartford, and W1KLJ, Bristol, Conn.; W1MEP/1, Vermont; W2AMJ, Bergenfield, N. J.; W3EZM, Langhorne, Pa.; and W3BZ, Danville, Va. There are many others. Installation of a horizontal extended double Zepp at Glastonbury Mountain, Vermont, brought up the signals of flea-powered W1MEP/1 to a consistent character for W1AEP in Springfield when the latter uses his new 3-element horizontal array.

W1DJ says that the roster of the New England Net now includes more than 50 calls! In the Thursday-night round-

ups there are often upwards of 25 active stations, with a record of 29 answering on April 17th. And out in Illinois the "Pink Network" makes a nightly check of the band at 7 p.m. This keeps interest up and W9ARN says that the boys in the Marathon no longer have any trouble making their activity points every night now. Organization does help!

Want a "marker" to show you when the band is open? Watch 58,970 for W1AW. Practically the entire W1AW schedule, including the code practice, now goes out on Five. And just outside the low end, at 55,750, is W2XPS, NBC Television station in New York City. This carrier (the sound channel) may be heard, often with little or no modulation, almost every evening. From the West Coast comes word that W6XAO (Don Lee Television) will soon be occupying the same channel on regular schedule. These should serve to reduce those periods of wondering if the band is open when no signals are heard coming through.

W1DEI/3 is back in Washington after a trip to South America. Trust Mel to get back in time for the opening of the DX season! It is hoped that Mel will be able to dig some more of the Washington gang out of hibernation. Activity all through the northern part of W3 seems to be going along at a new high. More stations are operating in the area around Philadelphia than at any time in the past two years. W3CGV at Wilmington remains the only station on Five in his state, Delaware. Look for Gary on 56,816. W3AXU sends along some unique car registrations! John got LO-73-K, while W3ABS has SL-73-S — sounds like a QSO on Forty!

W4GJO, Winter Park, Fla., is holding forth on 57,216, along with W4QN who is e.c.o. near the same frequency. They have W4BGZ coming along, and are desirous of working up some skeds with other Florida stations.

W5DXB, Vivian, La., lists W5's ML, AKI, ZS, EEL, ERU, CQV, and DXB as the active Louisiana group. Over in Texarkana are recent converts, W5BDB and W5DXV. The horizontal-vertical question comes up for discussion here, with all but Mims (W5BDB) and W5DXB using verticals. All these boys are hoping to be able to make the grade with W5AIG and other Texas stations. This is quite a hop, 180 miles, but not at all impossible.

W5VV has finally sold the band to one prospect! W5DNN came to Five the long way — all the way from the old 200-meter days as 5BR down through the successively higher frequencies. Eighty, Forty, Twenty, Ten — "and now the breathless delight of the first QSO on Five!" The rig is a Thordarson job, temporarily doubling in the final to 58,104 or 57,700. The receiver is an NC-101-X with QST's February converter ahead of it. The antenna is a 4-element "W6QLZ Beam."

Look to your coupling link if you're having trouble getting grid drive. Changing from a twisted pair to a concentric line, W5FSC, Huntsville, Texas, picked up eight of those elusive grid mills! Bud has been having tough luck with his antennas, though. He lost his long wire, and a new 4-element array erected for tests with W5VV, before the scheduled tests came off.

More horizontals, this time from California. W6QG reports that W6's LFN, Los Angeles, OFU, Compton, QUK, San Bernardino, MYS, South Los Angeles, and MXY, Lynwood, have been trying out horizontal polarization. Results have been generally poor, locally, because the new arrays are somewhat lower than the verticals with which comparisons are being made. Wait 'til the band opens, boys!

W6OVK and W6QLZ have been running tests on 56 and 112 Mc. before dawn! They find that signals are invariably good around 5 A.M., with a reduction as daylight comes. Ho-hum — we'll take your word for it, Clyde! Signals on 112 Mc. have been running fully as good as those on 56 in recent comparative tests at all hours.

W8KKD, Royal Oak, Mich., says that April was a very active month around Detroit. The warm weather early in the month helped out the extended-local work considerably. W8CIR, Aliquippa, Pa., and W8's QXV and OPB at Barberton and Dalton, Ohio, were contacted frequently with signals running S8-9 each way. The distance is around 200 miles in each case. Dusty reports that the polarization con-

U.I.F. MARATHON

Second period winner: W8CIR, Aliquippa, Pa., 271 points *

Call	Contacts Through			Score	States in 1941
	56	April 15th 112 224	400		
W1AEP	43			313	6
W1AVV	60	34		389	8
W1BCT		7		21	2
W1DJ	73			266	4
W1EHT	37			204	2
W1EKT	51			229	3
W1HDDQ	112	19	4	327	10
W1IJ	23	15		209	4
W1JJR	1	35	1	163	2
W1KJLJ	65	12		297	7
W1LCC	6	3		20	2
W1LLL	50	19		489	10
W1LSN	38			219	3
W1MBS		122		406	3
W1MEP	4			28	2
W2ADW	1	12		142	2
W2AMJ	99			628	10
W2BYM	17			60	4
W2COT	66			228	5
W2DZA		128		438	4
W2FJQ	42	10		199	8
W2LAL	62	5		257	4
W2LXO		26		83	2
W2MEU	38			164	5
W2MGU		71		296	3
W2MPA	23			92	4
W2MQF		30		123	2
W1MUX/2	10	10		63	3
W3ABS	42			173	5
W3ACC	66			389	9
W3AXU	53	13		261	8
W3BZJ		58		306	3
W3CGV	53	4		297	6
W3GJU	26	4		67	4
W3HOH	43	55		377	7
W3IIS	26			189	7
W4FBH	7			34	3
W5DNN	1			1	1
W5FSC	4			46	2
W5VV	4			31	2
W6ANN	20	47		324	1
W6IOJ	16	24	1	213	1
W6OVK	10	1		180	3
W6QG	24	5		163	2
W6QKM	4	35	1	151	1
W6QLZ	8	3		162	2
W6RVL		102		379	1
W7CIL	8			83	2
W7RT		2		9	1
W8CIR*	52	10		908	10
W8KKD	32	32		305	5
W8PKJ	11			75	4
W8QQS	8			37	2
W8RUE	24	3		190	5
W8TDJ	12			125	3
W8UUY		7		68	1
W9AB	2			16	1
W9ANH	8			169	2
W9ARN	23			285	5
W9BDL	17			228	3
W9FHS	2	1	1	17	1
W9LLM		12		42	1
W9PNV		50		302	2
W9RLA		21		72	2
W9UNS	9			137	5
W9YKX	9			202	4
W9ZHL	14			190	2
W9ZJB	6			41	3

* Not eligible for award.

* The fine showing of W8CIR in the aurora session of March 30th ran his monthly total up to 504 points — a sure winner for the third period.

Starting with this issue, stations not reporting for two consecutive months will be omitted. These will be re-listed upon receipt of further reports.

U.H.F. RECORDS

Two-Way Work

- 56 Mc.: W1EYM-W6DNS, July 22, 1938 —
2500 miles.
112 Mc.: W6BJI/6-W6KIN/6, July 4, 1940 —
255 miles.
224 Mc.: W6IOJ/6-W6LFN/6, Aug. 13, 1940 —
135 miles.
400 Mc.: W6IOJ/6-W6LFN/6, Jan. 28, 1941 —
20 miles.

trovrsy is getting hotter, with several of the boys working on horizontal arrays. This appears to be another instance of needing one of each — or an array which can be used in either position.

W9ZHL, Terre Haute, is working on an emergency rig to go with his 500-watt 110-volt generator so that he can pile the whole business into the car and go out and operate a 56-mc. field station, should the need arise. The Ultra-Highs are the ideal field for this sort of work. With no QRM problem, and the ability to cover a wide local area under any and all conditions, gear for 56 and 112 Mc. should be a part of every emergency setup.

A new Indiana station, reported by W9ANH, is W9HUV at Lafayette. Bob is ideally situated for contact with the Northern Indiana stations, as well as with the fellows in Illinois who are frequently out of reach of the boys in Terre Haute and Marshall. He may be found on 56,064, c.w. only, at present. W9CNJ (he of the "Q" array atop the gas tank) is now located at Kirksville, Mo. He should help to make things interesting for W9ZJB and W9YKX. Some other new ones (reported by W9ARN) are W9PK, Lyons, W9AKF, Elmhurst, Ill., and W9UTZ, Lisbon, Iowa.

W9YKX, Woodbine, Iowa, continues successfully the 200 and 235-mile skeds with W9ZJB and W9NFM. Bill has also worked W9UTZ in Lisbon, another 235-mile hop. Skeds with W9USI at Brookings, S. Dak., were interrupted by the loss of the latter's 4-element array in high winds.

W9LLM, Downers Grove, Ill., also lost his 56 and 112-Mc. arrays in high winds early in the month. In their place he erected a 5-element $\frac{1}{4}$ -wave spaced array for Five, but finds this beam "too sharp for comfort," and is considering replacing it with a 3-element job. Frank may be found on 57,072, running 150 watts to a 35T. Higher power with a 250TH is forthcoming.

112 MC. AND UP

WANTED: Operators in the East to have a try at breaking the 112-Mc. DX record of 255 miles now held (along with all the other records) by W6's. With some of the fine spots available to portable enthusiasts along the Atlantic Seaboard, it should not be impossible to better this record during the favorable conditions of summer. Among the W1's who would like to try is W1JLI, Dedham, Mass., who would take gear to the top of Mt. Wachusett, Princeton, Mass., or Pack Monadnock, near Peterboro, N. H., for a try with some ambitious W3 who could get up on some high spot in Eastern Pennsylvania. W3BZJ, W3BYF — how about it?

We have word from Bob Paine, W1MHW, that the boys at Bowdoin College are getting set for 2 $\frac{1}{2}$. The favorable situation of Brunswick, on the Maine Coast with an over-water path to Boston, should make W1OR a nice DX shot for the gang in Eastern Massachusetts and Rhode Island.

More 112-Mc. emergency organization is reported by W6SRH. In cooperation with the AEC and the Santa Monica Sea Scouts, an Emergency Net has been formed in the Bay District. The first workout was held on April 6th, with W6OJQ operating from Point Dume, aided by W6SRH. W6RWQ operated aboard the 35-foot officer's gig, *Bucaneer*, with W6RUF standing by. W6SQO, stationed at the lighthouse on Santa Monica Pier contacted stations throughout the Los Angeles Area, as well as W6LQM who

was operating from Mt. Palomar. Rigs used were all 7A4-7C5 transceivers, similarly designed, operating from emergency power supplies. Another "mobilization" is planned which will include a trip to Catalina Island.

W6QKM reports that he is now portable-marine, as well as portable-mobile. Don has a small rig, also a 7A4-7C5 transceiver, aboard his 38-foot cruiser and is exploring the possibilities of 2 $\frac{1}{2}$ over water in trips to Catalina Island and other points. Don's present problem is to get an antenna high enough above water to really "get out."

You wouldn't expect to work out on any low-frequency band with a fraction of a watt of output and a hay-wire indoor antenna — why expect that it will be any different on the u.h.f. bands? W9RLA reports that many newcomers around Chicago (and wherever there is u.h.f. activity, we add) go on 2 $\frac{1}{2}$ with a midget transceiver and an inefficient antenna and give up in disgust after a few unsuccessful nights on the band. This is no argument against low power and simple equipment — wonders have been worked with this sort of gear — but the antenna must have what it takes! Get that skywire up in the air, and take some pains to see that it is working efficiently if you expect to work farther than you can see on any u.h.f. band!

2 $\frac{1}{2}$ was acting up during Sunday afternoon, April 20th, according to W9PNV, Riverside, Ill. Some local stations developed a rapid fade and intermittent voice and m.c.w. sigs were heard. George goes on to say that horizontal antennas are being tried out by some of the "South Side" gang. This may be a clue to the fading condition, as flutter fades and other peculiarities are frequently noted on 56-Mc. sigs within local range when there is a mixture of polarization, especially when sigs are coming in from the back or sides of a directional array.

W9INI, Pleasant Hill, Mo., is having nice results on 2 $\frac{1}{2}$ with a single 800 at 76 watts input. The antenna is a 6-element multi-wire beam. Harry works with W9ZD and W9DDX in Kansas City and W9GK of Overland Park, Kansas. W9INI and W9DDX have both been heard as far west as Leavenworth, Kansas, a distance of 53 miles.

For a long time we've been hearing talk of going on 224 Mc. by various operators around Philadelphia, but it took W3VX to break the ice. First contact was with W3CUD, Collingswood, N. J., with the latter on Five. This was on March 30th. On April 4th, W3CFG of Philadelphia heard VX, who is at Audubon, N. J., a distance of 11 miles. W3GGC, 12 miles away, also hears VX. Contacts two-way await the completion of rigs at GGC and CFG. W3GNA, Abington, Pa., W3DI, Philadelphia, and W3HDJ, Delanco, N. J., are other 56-Mc. men who are likely prospects. The rig used by W3VX is an 834 in a "Peterson Pot."

U.H.F. KINK OF THE MONTH

MANY fellows have discovered that fluorescent lights which are defunct for 110-volt operation make excellent substitutes for neon-bulbs — but have you tried them as standing-wave indicators? The 40-watt units, which can be obtained from your friends who work in factories or offices where they are in use, are 4 feet long. They light with much less "soup" than the ordinary neon; and, being entirely glass, they present no detuning effect when moved along a feed-line. The length of the illuminated portion serves as a very sensitive indication of the presence of standing waves. They're fine for tuning-up operations of any kind — and they have the decided advantage that their length permits the operator's hands to be well-removed from any "hot stuff" — a real safety feature.

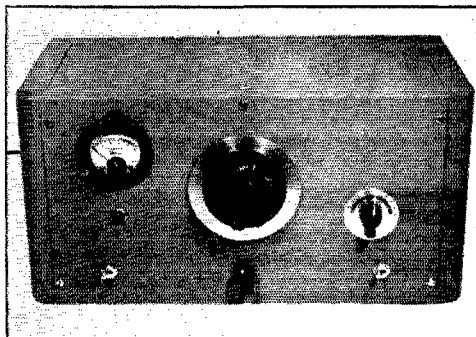


U. S. CITIZEN-STATIONS IN P. I.

Under F.C.C. Order No. 72, U. S. amateurs may contact only those KA stations licensed to U. S. citizens. The P. I. stations listed below may be worked without fear of violating Order 72. We strongly urge all U. S. amateurs to refer to this list before calling any KA stations: KA1AB, KA1AC, KA1AK, KA1AQ, KA1AR, KA1BB, KA1BN, KA1CM, KA1CO, KA1CW, KA1DM, KA1FA, KA1GC, KA1GH, KA1JH, KA1JJ, KA1MA, KA1ME, KA1NF, KA1RX, KA1WJ, KA1YL, KA14LH, KA7FS, KA7HB, KA8AA.

The performance of an e.c.o. is at least as much in the construction as in the circuit. Here's a frequency-control unit which combines a circuit novelty or two with interesting constructional features. It has had a thorough "air test" and come through with flying colors.

A compact and businesslike instrument having output on 80, 40, and 20 meters. Complete, including power supply, it measures only 8 by 16 by 8 inches.



A Transmitter Frequency Control Unit with Three-Band Output

A Self-Contained Cabinet-Type Exciter or Low-Power Transmitter

BY G. W. SHUART,* W2AMN

THE variable-frequency oscillator, while not new by any means, has really only begun to come into its own within the last year or two. We shudder to think of the amateur bands eventually cluttered up with thousands of e.c.o.'s or v.f.o.'s darting back and forth like a bunch of sizzlers in an aerial fireworks display; while the v.f.o. is a swell piece of apparatus, it requires some careful and prudent use. Undoubtedly, before the evil of these instruments manifests itself, plenty will be written to overcome the problem. In the meantime we have found in the v.f.o. something that can never be replaced by any other instrument. The particular v.f.o. to be described is an e.c.o. It seems that the type of circuit used is not so important as the physical arrangement and general mechanical design. Before we get into the

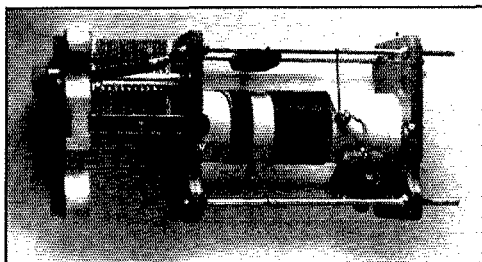
details of construction, let's see what makes this v.f.o. different from others.

In its design, a definite effort was made to keep it simple to build and operate. Only one control is operated during normal use and output is available on three bands—80, 40 and 20—by changing only the output coil. Although plug-in coils are used, band-switching could be employed without difficulty. Also, the tuned circuit could be arranged to cover two bands with one coil so that only two coils would be necessary for complete coverage. The entire design of this unit is simplified by the use of only a single tuning condenser. Usually three-gang condensers are employed in this type of instrument.

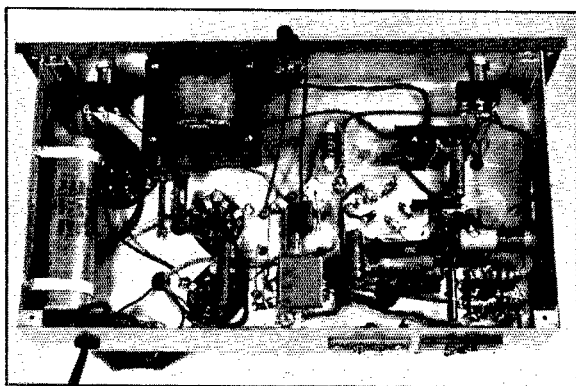
The Oscillator

The electron-coupled oscillator operates in the 160-meter band and covers 1750 to 2000 kc. The tuned circuit is a self-contained unit and includes everything but the main frequency-changing condenser. The mechanical arrangement of this unit provides excellent stability and freedom from frequency changes caused by vibration or shock. This e.c.o. doesn't have to be operated on sponge rubber pads. As a matter of actual fact, there is only slight modulation, and that from tube element vibration, when the instrument is subjected to mechanical shock. As shown in the photograph four vertical bars hold the entire oscillator assembly together, and these also serve as terminals for external connections. One goes directly to the

*c/o Hammarlund Mfg. Co., New York City.



Inside the oscillator tuned circuit assembly. The stiff wires at the corners serve both as supports and terminals.



On the extreme right can be seen the permeability tuned coil which provides excitation for the output stage on 80, 40 and 20 meters. This coil is mounted under the chassis so there will be no coupling between it and the output circuit.

grid of the 6SJ7 tube, a second to the cathode, one to the B-negative and the last to the tuning condenser.

Keying in the oscillator circuit is accomplished by breaking the negative lead. A simple filter consisting of a small r.f. choke and a 0.005- μ fd.

silvered mica condenser removes all traces of r.f. and permits clean keying.

The voltages to the plate and screen grid of the 6SJ7 are regulated, the screen by a VR-105 and the plate by a VR-150. The screen voltage, being more critical, has compound regulation and consequently a high degree of voltage stability is obtained. The 6SJ7 proved to be the best tube for the purpose since very little output was required. In this particular case connecting the screen and suppressor together proved beneficial.

The output of the oscillator is tuned to 3550 kc. with a fixed tank circuit. Unless the entire unit is to be operated in the high-frequency portion of the 80-meter c.w. band, this circuit will require no adjustment. Tuning it to 3550 kc. permits operation over a very wide portion

of the c.w. band and all of the 40- and 20-meter bands.

Buffer Multiplier

The second tube in the line-up is a 6SK7, operated as a fixed-tune amplifier-doubler. Its plate

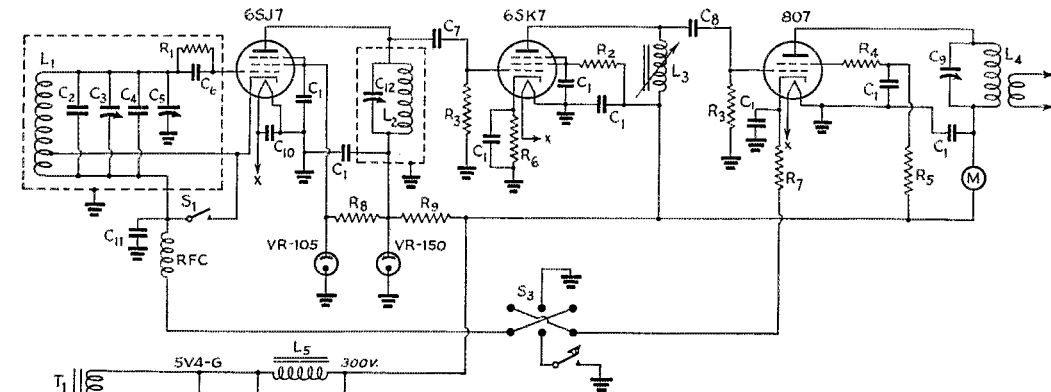


Fig. 1—Circuit diagram of the transmitter frequency control unit.

C₁₃ — 8- μ fd. electrolytic, 150-volt.
C₁₄ — 32- μ fd. electrolytic, 450-volt.

R₁ — 20,000 ohms, 1/2-watt.
R₂ — 50,000 ohms, 1-watt.
R₃ — 20,000 ohms, 1-watt.

R₄ — 20 ohms, 1-watt.
R₅ — 20,000 ohms, 2-watt.
R₆ — 400 ohms, 1/2-watt.
R₇ — 400 ohms, 10-watt.
R₈, R₉ — 3000 ohms, 20-watt.

L₁ — 30 turns No. 24 enamelled, close-wound, on 7/8-inch diameter form. Cathode tap 10 turns from bottom. (In Hammarlund ECO-160 unit.)

L₂ — 60 turns No. 24 enam., close-wound, on 7/8-inch diameter form. (L₂ and C₁₂ in Hammarlund ETU-80 unit.)

L₃ — 17- μ h., 36 turns No. 28, close-wound, on 3/4-inch form, with tuning plug (Hammarlund No. 6014).

L₄ — 3.5 Mc. — 38 turns No. 21, length 1 1/2 in., diam. 1 1/2 in.; link 11 turns.

7 Mc. — 18 turns No. 20, length 1 1/2 in., diam. 1 1/2 in.; link 6 turns.

14 Mc. — 9 turns No. 16, length 1 1/4 in., diam. 1 1/2 in.; link 4 turns.

L₅ — 15 henrys, 150-ma.

T₁ — 300 volts d.c. at 100 ma., with rectifier and 6.3-volt filament windings.

S₁ — S.p.s.t., low-capacity type.

S₂ — S.p.s.t. toggle.

S₃ — D.p.d.t. toggle.

C₁ — 0.01- μ fd. paper.
C₂ — 35- μ fd. compensator (Erie Ceramicon N680).
C₃ — 75- μ fd. air trimmer.
C₄ — 300- μ fd. variable (Hammarlund MC-140-S).
C₅ — 140- μ fd. variable (Hammarlund MC-140-S).
C₆ — 100- μ fd. silvered mica.
C₇, C₈ — 500- μ fd. silvered mica.
C₉ — 100- μ fd. variable (Hammarlund MC-100-S).
C₁₀ — 0.001- μ fd. mica.
C₁₁ — 0.005- μ fd. silvered mica.
C₁₂ — 50- μ fd. air trimmer.

R₄ — 20 ohms, 1-watt.
R₅ — 20,000 ohms, 2-watt.
R₆ — 400 ohms, 1/2-watt.
R₇ — 400 ohms, 10-watt.
R₈, R₉ — 3000 ohms, 20-watt.
L₁ — 30 turns No. 24 enamelled, close-wound, on 7/8-inch diameter form. Cathode tap 10 turns from bottom. (In Hammarlund ECO-160 unit.)
L₂ — 60 turns No. 24 enam., close-wound, on 7/8-inch diameter form. (L₂ and C₁₂ in Hammarlund ETU-80 unit.)

circuit is resonated to 7050 kc. with a permeability-tuned coil. Once set, this coil requires no adjustment regardless of the output frequency.

It may seem unusual to tune this circuit to 7050 kc. and expect the amplifier which follows to operate in the 3.5-Mc. band, but that is exactly what happens. The 807 can be operated in the 80-meter band with efficiency as great as if not greater than that obtained when it is operated in the 20-meter band as a doubler. Sufficient r.f. excitation gets by L_s to make the amplifier work efficiently over the complete 80-meter band. The 807, of course, is a straight amplifier on 7 Mc.

Output Stage

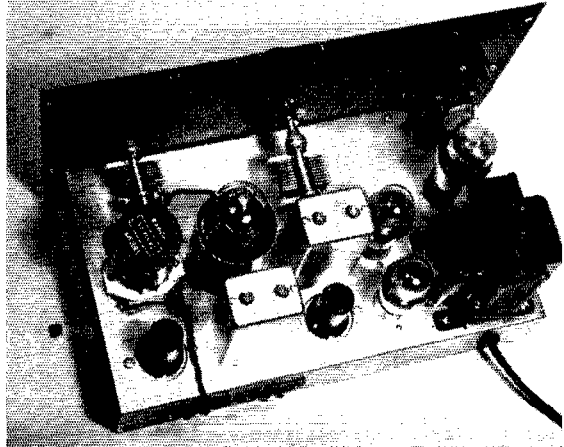
The output of the 807 is relatively constant over any one band and is approximately the same on all three. A careful check of the 807 grid current showed that ample excitation was present at any frequency in the 40- or 20-meter bands and over two-thirds of the 80-meter c.w. band. For maximum output in the high-frequency portion of the 80-meter c.w. band, or the 'phone band, it is necessary to make a slight adjustment of the oscillator output circuit.

The amplifier plate circuit when loaded to the normal 60 ma. by an antenna or another amplifier requires no adjustment over an extremely wide range of frequency, although a separate control is available on the panel to touch up this circuit when necessary. The plate current of the 807 is a fairly good indication of how the rest of the outfit is working. A 0-100 milliammeter is connected permanently in this circuit.

Returning to L_s , the permeability-tuned coil, we would like to point out that slight changes in value might disrupt the operation of the entire unit. For example, in one unit built up experimentally it was desired to increase the excitation for the 807. On the assumption that the grid leak, R_s , was absorbing some of the output of the 6SK7, an r.f. choke was placed in series with the leak. The excitation went up on 40 and 20 meters, but the circuit no longer passed sufficient r.f. at 3.5 Mc. to give satisfactory operation. Removing the choke permitted normal operation.

On 7 Mc. a tendency of the 807 to oscillate with the key open in oscillator keying was overcome by connecting a 20-ohm resistor in series with the screen.

Although not shown in the photograph, additional terminal strips have been made available to provide external grid bias — we believe this is a worthwhile addition, as it prevents oscillation



The oscillator tuning unit is directly behind the main tuning condenser located in the center of the panel. Note that the output link wires are run on the outside of the chassis to prevent coupling to the 6SK7 amplifier-multiplier.

in the amplifier when the oscillator is keyed — and to connect an external 600-volt plate supply for the 807 in cases where higher output is required.

While there may be no particular advantage in the key change-over arrangement, it was installed in this unit for test purposes so that the key could be switched from oscillator to amplifier under any particular set of conditions to determine whether or not keying of the oscillator was satisfactory at all times.

Frequency Drift

In an effort to make this unit compact, the power supply and all other equipment was built on the one chassis. Naturally, some particular conditions existed that may not exist in some other arrangement. For example, every experimental unit built up proved to have ample stability and low frequency drift, although there was occasionally hum modulation in the carrier and in some cases the keying was not clean. In all cases, it was found necessary to by-pass the oscillator heater right at the tube to clear up hum modulation and coupling between the input and output circuits. With the addition of this condenser, complete isolation was achieved. The output circuit can be tuned through resonance, loaded or unloaded, and there is absolutely no change in the oscillator frequency.

Frequency drift encountered in this particular unit was mostly caused by the heat radiated by the power transformer and rectifier tube. If the power supply were not contained in the cabinet, no drift compensation would be required, although the addition of drift compensation can

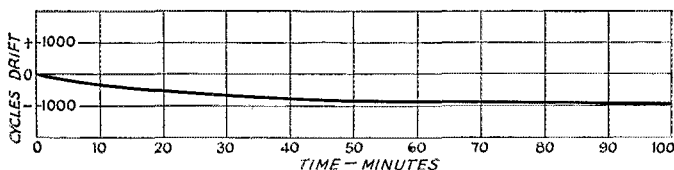


Fig. 2 — Drift characteristic of the oscillator unit, measured from a cold start. Frequency 3.5 Mc.

be an asset in any case. We found that with a $35\mu\text{fd}$. compensator the overall drift of the complete unit shown in the photograph was quite low. The accompanying curve gives the result of a careful laboratory check. It would be possible to use more compensation, but it was not deemed desirable because of the danger of overcompensation and a reversal of drift some time during operation. We are of the opinion that to have a known drift in a known direction is about the safest bet.

It is surprising how much more effective low power becomes when the frequency can be varied at will. We have been using this outfit just as shown with no additional amplification for a period of about four months at W2AMN. During that time practically the entire U. S. was worked and the performance was really remarkable. Of course it doesn't pay to call CQ with this sort of rig; our practice was to wait for a CQ, adjust the frequency of the oscillator to coincide with that of the other station, and then call when the CQ was finished. Contacts were numerous and operation appeared to be just as satisfactory as with any 200- or 300-watt rig we ever operated. All this took place in the 40-meter band, which is pretty crowded at the present time.

Normally, the amplifier is keyed. This permits the "quiet" switch, S_1 , to be used for frequency setting. The oscillator can be turned on and the signal checked in the receiver without radiation from the transmitting antenna. Thus a lot of unnecessary disturbance is prevented. Every v.f.o. should have some arrangement by which the oscillator can be turned on and operated independently of the output amplifier so it will not cause interference during adjustments. Finding a place for the "quiet" switch seemed, at first, to be quite a problem. However, a low-capacity switch connected between the cathode and the negative return of the tuned circuit killed the oscillator and permitted everything else to remain the same in the circuit insofar as current and tube temperature were concerned. One word of warning — the leads to this switch should be very short because if there is appreciable inductance in the switch circuit the oscillator will operate even though the switch is closed. If the mechanical layout demands that the oscillator tuning unit be mounted a considerable distance from the panel the switch should be operated by an extension shaft.

No effort was made to calibrate the oscillator since it was operated in conjunction with a calibrated receiver. However, we would suggest calibrating it and providing some means of checking it periodically. Our tests have shown that a unit of this type, if carefully designed and constructed, will remain in calibration indefinitely, but as a matter of precaution, even though its calibration can be relied upon the oscillator frequency should be checked in the receiver before transmission is attempted.

WWV Schedules

IMEDIATELY after the standard frequency station WWV of the National Bureau of Standards was destroyed by fire November 6th last, a temporary transmitter was established in another building and partial service was begun. The service has now been extended, although still with temporary equipment. It is on the air continuously at all times day and night, and carries the standard musical pitch and other features. The radio frequency is 5 megacycles per second.

The standard musical pitch carried by the broadcast is the frequency 440 cycles per second, corresponding to *A* above middle *C*. In addition there is a pulse every second, heard as a faint tick each second when listening to the 440 cycles. The pulse lasts 0.005 second, and provides an accurate time interval for purposes of physical measurements.

The 440-cycle tone is interrupted every five minutes for one minute in order to give the station announcement and to provide an interval for the checking of radio measurements based on the standard radio frequency. The announcement is the call letters (WWV) in telegraphic code.

The accuracy of the 5-megacycle frequency, and of the 440-cycle standard pitch as transmitted, is better than a part in 10,000,000. The time interval marked by the pulse every second is accurate to 0.000,01 second. The 1-minute, 4-minute, and 5-minute intervals marked by the beginning and ending of the announcement periods are accurate to a part in 10,000,000. The beginnings of the announcement periods are so synchronized with the basic time service of the U. S. Naval Observatory that they mark accurately the hour and the successive 5-minute periods; this adjustment does not have the extreme accuracy of the time intervals, but is within a small fraction of a second.

★ NEW APPARATUS ★

NEW CODE PRACTICE OSCILLATOR

A NOVELTY in code-practice oscillators is introduced by Airadio, Inc., 2 Selleck St., Stamford, Conn. The unit consists of a compact crystal r.f. oscillator whose signal may be picked up on the station receiver. Output on any amateur-band frequency may be obtained by plugging in appropriate crystal and plate coil. An adjustable antenna coupling condenser and resonance indicator are provided so that the unit may be used as a transmitter with an output of 1.5 watts.

Tube, crystal, coil and key are included in the unit which operates directly from standard 115-volt a.c. or d.c. lines.

Eleventh A.R.R.L. Sweepstakes Results

Scores Reach All-time High—Three Operators Top 100,000 Points!

BY J. A. MOSKEY,* WIJMY

PERHAPS the best thing that may be said of the Eleventh ARRL Sweepstakes Contest held during two week-ends last November is that enthusiasm was probably at a higher pitch than in any amateur radio operating competition of recent years. Space does not permit us to quote the numerous expressions of approval voiced by the contest-minded fellows (and gals too!) who spent many hours of enjoyable participation in an SS highlighted by shattered records and new accomplishments. However, the figures speak for themselves. Look at those scores! Bigger than ever, they represent skill in operating attained only by that characteristic determination of the radio amateur to get the most out of what he has to work with.

1388 entries were received from participants who submitted 1114 c.w. logs and 274 'phone logs. The extent to which performances of past years were bettered is indicated in the observation that 42 c.w. operators made final scores of more than 70,000 points as against 27 in the 1939 shindig. Among the 'phones, 27 totals over 20,000 were received compared with 21 in the previous SS.

Winners

All of the League's 64 active Sections were represented in this Sweepstakes. Handsome certificate awards are being made to 64 c.w. operators and to 59 of the 'phone gang. A list of the winners in each of the classifications is included in this report along with as much information as we have available on transmitter line-ups, type frequency control employed, receivers, and bands used. Making for greater flexibility in operation and the ability to snare those rare sections by sliding right up alongside, the use of variable frequency

* Asst. to the Communications Mgr.

oscillator rigs seems to have been a "must" in the majority of cases where outstanding scores were piled up by leading SS'ers. With competition becoming much keener each year, contest hounds must keep right on their toes to stay in the running these days. The winners in the Eleventh ARRL Sweepstakes certainly had plenty of "what it takes." To them we extend hearty congratulations. Nifty going, gang!

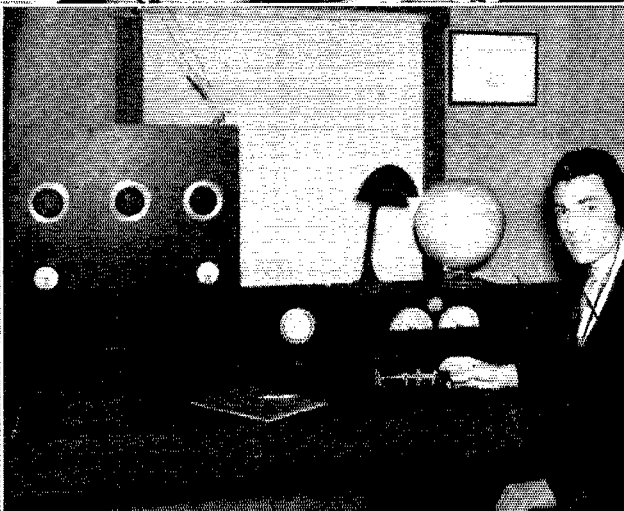
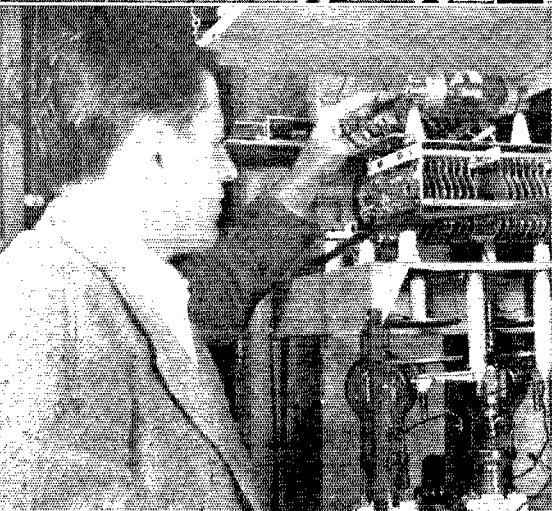
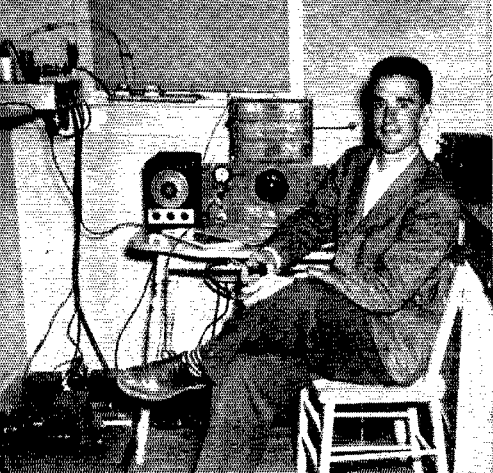
Leading C.W. Scorers

That man Mathis did it again! Yep, W3BES went over the top to the tune of 113,848 and set an all-time high by working 737 stations (No, that's no printer's error. We said 737!) in 62 sections. We're still staying awake nights trying to figure out how he does it! Some people say he just isn't human, but the cold figures tell the story. It must be that his efficiency is about 99.9%. At any rate, Jerry deserves a mighty big hand for a piece of operating we don't have adjectives powerful enough to describe!! Trailing along behind W3BES we find that old SS veteran, W9FS, with a fancy 108,963 points, amassed by contacting 703 stations in 62 sections. We note Bert also took second place in the previous contest and is apparently set on letting nothing budge him from that enviable position. Congrats, Mistuh Brown. Following hot on the trail of W9FS, we find W8JIN also in the six-digit bracket. Operator James W. Ringland took third place with 107,803 — an even 700 contacts with 62 sections.

Following the "big three" with scores over 70,000 were W2GSA, 97,417; W2IOP, 97,350; W3DGM, 93,930; W8HGW, 92,110; W9BRD, 89,365; W9VDY, 88,988; W2HHF, 88,970; W6QAP, 88,273; W9RQM, 88,195; W8OKC, 87,885; W9ASO, 87,653; W1TS, 87,575; W8NLQ,

Upper left: W2IOP, N.Y.C.-L.I. c.w. winner. Upper center: W9BRD, Illinois c.w. winner. Upper right: W5KC, La. c.w. winner. Lower center: W3BES, national high scorer, holder all-time SS record and Frankford R.C. gavels!





Upper left: W6QAP, Arizona c.w. winner. Upper right: W9FS, Ky. c.w. winner, second national high scorer. Lower left: W6HJT, Santa Clara Valley c.w. winner. Lower right: W2GSA, N. N. J. c.w. winner.

85,845; W9ZRP, 84,785; W6ITY, 84,420; W6IDZ, 83,223; W6PCE, 82,373; W3GDM, 82,045; W5KC, 81,763; W6IOJ, 81,763; W9YFV, 81,750; W2JAE, 81,554; W3GKO, 80,700; W9CRK, 80,600; W3HFD, 80,314; W9DIR, 78,908; W1RY, 77,165; W9VKF/9, 77,035; W6NIK, 76,415; W9CWW, 75,020; W9UTB, 73,588; W8KUN, 73,316; W3IWM, 73,200; W9YCR, 73,160; W5AAN, 72,600; W9ERU, 72,198; W3EEW, 71,920; W9GFF, 71,700; W6HJT, 71,631; W5WG, 71,025; W9MUX, 70,615; W2MEL, 70,395.

Leading the parade in number of contacts was W3BES with 737 QSO's — an average of 18.4 per hour. This is an unprecedented record and represents some pretty fast stepping! Also above 700 were W9FS, 703 (17.5 per hour), and W8JLN, 700. In the 600-or-over class we find W2IOP, 672; W6IDZ, 663; W2GSA, 631; W2JAE, 618; W3DGM, 607; W8HGW, 604; W8OKC, 600. Twenty-eight other stations turned in logs showing 500 or more contacts.

Sections Worked

The banner for working all sections goes this time to a 'phone participant. Paul Edwards, W9NDA, worked 'em all, the only entrant to do so. FB and congratulations, OM.

All but one section was snagged by W6ITH on 'phone, and on c.w. by W2MAP, W2ZA, W3AGV, W6HJT, W6LDZ (W6HZT opr.), W6ITY, W6PCE, W8GD, W8IFT, W9DIR, W9ERU, W9VDY.

Each of the following worked 62 sections on c.w. — W1TS, W2GSA, W2HHF, W3BES, W3DGM, W3EEW, W3FRY, W5KC, W6IOJ, W6NIK, W6QAP, W8BTI, W8JLN, W8SFV, W9ASO, W9BQJ, W9CRK, W9CWW, W9FS, W9GY, W9RQM, W9VKF/9, W9YCR, W9YWQ (W9UUM opr.), and W9ZRP. In most cases the sections missed were P. I. and Vermont.

'Phone Highs

W6ITH remains on top for the fifth consecutive year as high SS 'phone man with a total of

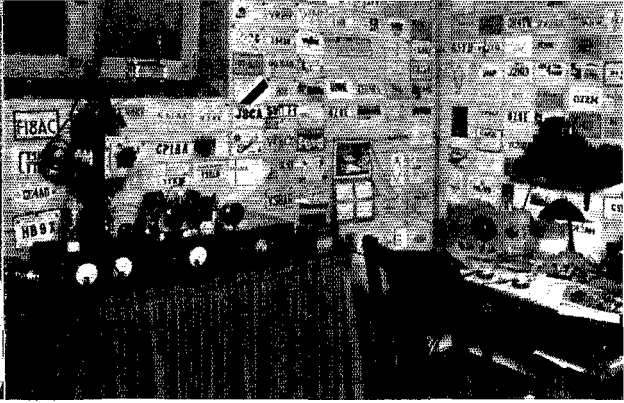
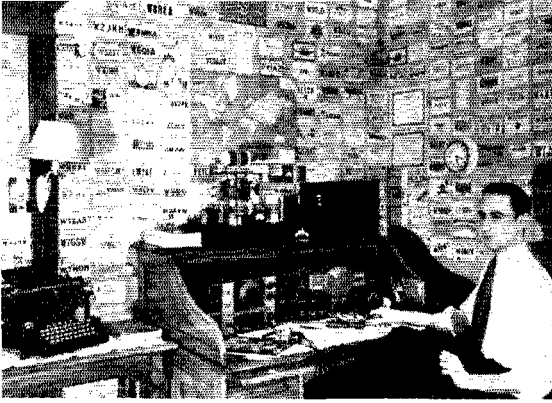
WINNERS, ELEVENTH A.R.R.L. SWEEPSTAKES CONTEST

Radiotelegraph

Section	Winner	Call	Transmitter Line-Up	Type Osc. (E.C.O. or C.C.)	Receiver	Bands Used
E. Penna.	Gerry Mathis	W3BES	6SK7-6V6-807-812's	e.c.o.	NC101X	3.5, 7, 14
Md.-Del.-D. C.	Arthur Q. Tool, Jr.	W3FQZ	6L6G-807-809's; 6L6-807-811	Both	—	3.5, 7
S. N. J.	Grier Miller	W3FXV	42-807	e.c.	Sky Champion	3.5, 7, 14
W. New York	Francis G. Miller	W8DZC	6SK7-6V6-6L6-T40	e.c.o.	NC101X	3.5, 7, 14
W. Penna.	W. B. Thompson	W8OKC	89-802-807-TZ40	e.c.o.	8X16	3.5, 7, 14
Illinois	Rodney Newkirk	W9BRD	24A-6L6-HY6L6GX's	e.c.o.	7-tube super	3.5, 7, 14
Indiana	Ray Miles	W9KBL	6SK7-6V6-6L6-T40	e.c.o.	Sky Challenger	3.5, 7
Kentucky	Bert Brown	W9FS	6V6-807-813	e.c.o.	RME69 & DB20	3.5, 7, 14
Michigan	Theodore Gersten	W8JVI	6V6-6L6-807's	e.c.o.	Sky Challenger	3.5, 7, 14
Ohio	James W. Ringland	W8JIN	E.c.o.-6L6-807-HK54	e.c.o.	HQ120X	3.5, 7, 14
Wisconsin	R. C. Schmidt	W9VDY	E.c.o.-807-35T	e.c.o.	Superhet	3.5, 7, 14
No. Dakota	Carlyle R. Norman	W9ZOU	Meissner Signal Shifter-HK54's	e.c.o.	8X23	7, 14
So. Dakota	Paul Range	W9GCW	6N7-6L6G's	v.f.o.	—	—
No. Minn.	C. William Davies	W9YCR	6SK7-6SJ7-807-808	e.c.o.	RME69D	3.5, 7, 14
So. Minn.	L. A. Morrow	W9VKF	6K7-6L6-6L6-6L6-814	e.c.o.	HQ120X	3.5, 7, 14
Arkansas	Lester Woosley	W5EIJ	47-46's	e.c.	8X24	7
Louisiana	Vincent L. Rosso	W8KC	E.c.o.-NTX30-100TH	e.c.o.	NC101X	3.5, 7, 14
Mississippi	Fred L. Ford	W5AVF	6L6-6L6's	e.c.	NC81X & pre.	7, 14
Tennessee	M. N. McCoy	W4FCF	—	—	—	—
E. New York	Elbert L. Taylor	W2EWD	47-47-809-809's	e.c.	Sky Chief	3.5, 7, 14
N. Y. C. & L. I.	Larry LeKashman	W2IOP	Meissner Signal Shifter-814	e.c.o.	AR77	3.5, 7, 14
N. N. J.	Bob Morris	W2GSA	Meissner Signal Shifter-803	e.c.o.	—	3.5, 7, 14
Iowa	J. H. Buck	W9ZDS	6SK7-6V6-RK39-HK24	e.c.o.	10-tube super	7, 14
Kansas	Charles A. Pine	W9CWW	802-807-814	Both	NC101X	7, 14
Missouri	Clarence L. Arundale	W9GBJ	2A5-2A5's-T20-35T	e.c.	8X16	7, 14
Nebraska	Charles L. Hansen	W9ASO	6SK7-6L6-100TH	e.c.o.	NC100X	7, 14
Conn.	E. R. Fraser	W1KQY	Meissner Signal Shifter-809's	e.c.o.	NC101X	3.5, 7, 14
Maine	Ernest L. Bracy, Jr.	W1BFA	6L6-6F6-807-HF100's; 6L6-6L6-TZ40	Both	NC101X	3.5, 7, 14
E. Mass.	Roger F. Hathaway	W1RY	59-6L6-808	—	HRO	3.5, 7, 14, 28
W. Mass.	Ernest E. Curry	W1KZS	6L6G-812	e.c.	8X17	3.5, 7
N. H.	Dorothy W. Evans	W1FTJ	HY61-RK47	e.c.	—	—
R. I.	Raymond A. Hurlburt	W1LWA	6SK7-807-809	e.c.o.	Sky Chief	3.5, 7, 14
Alaska	Arthur B. McBride	K7GOM	802-809	e.c.	RME69	7, 14
Idaho	Richard W. Mieke	W7IY	6L6-807	e.c.	NC44	7, 14
Montana	Elmer Briden	W7BSU	—	e.c.o.	—	3.5, 7, 14, 28
Oregon	Ermund A. Zochert, Jr.	W7ECI	802/6J5-807-T40's	Both	—	3.5, 7, 14
Washington	John Gruble	W7RT	Meissner Signal Shifter-811	e.c.o.	NC101X	7, 14
Hawaii	Katashi Nose	K6CGK	E.c.o.-HK54	e.c.o.	FB7 & pre.	7, 14
Nevada	Dana D. Little	W6RWX	6L6-807-TZ40	—	—	3.5, 7, 14
Santa Clara V.	Cameron G. Pierce	W6HJT	6SK7-6V6-6N7-6N7-813	e.c.o.	—	3.5, 7, 14
East Bay	John Woerner	W6NQG	—	—	—	3.5, 7, 14
San Francisco	H. G. Lorets	W6GWW	6K7-6V6-807-50T-HK354	Both	Comet Pro	7, 14
Sacramento V.	Orion M. Arnold	W6PAR	RK39-HK54	Both	RME69	3.5, 7, 14
Philippines	L. A. Mason	KA1AK	—	—	—	7, 14
San Joaquin V.	Myron E. Ferguson	W6PYG	58-6F6G-6F6G-6L6G's	e.c.o.	7 tube super	7, 14
No. Carolina	William A. White	W4ERG	41-41-6L6G	e.c.	—	3.5, 7, 14
So. Carolina	Gus Browning	W4BPD	860; 852; 150T	—	—	3.5, 7, 14
Virginia	W. R. Shuler	W8IWM	6SK7-6L6-807-HY51Z	e.c.o.	—	3.5, 7, 14
West Va.	Hobart Burkhamer	W8KWI	V.f.o.-807-T55	v.f.o.	PR15	3.5, 7, 14
Colorado	E. F. Miller	W9WTW	E.c.o.-6L6-809's-T55's	e.c.o.	—	3.5, 7, 14
Utah-Wyo.	Everett E. Young	W7HEM	6L6-6L6's	e.c.	8X25	3.5, 7, 14
Alabama	Nelson S. Brooks	W4EDJ	6L6-807; 6L6-RK39-T55	e.c.o.	8X25	7, 14

Left: W8JIN, Ohio c.w. winner, third national high scorer. Right: W8OKC, W. Pa. c.w. winner.





Left: W9VDY, Wisconsin c.w. winner. Right: W9ASO, Nebraska c.w. winner.

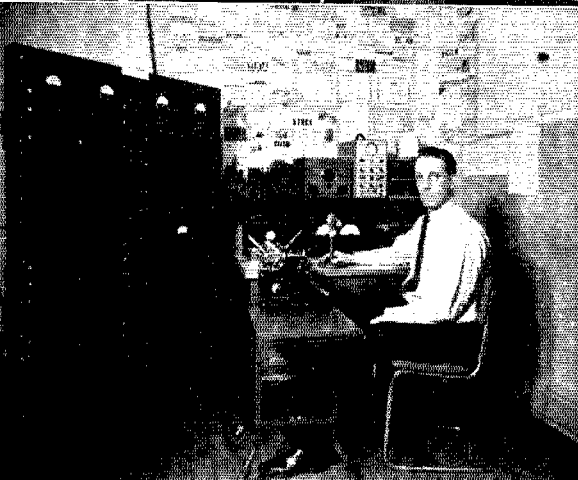
Section	Winner	Call	Transmitter Line-Up	Type Osc. (E.C.O. or C.C.)	Receiver	Bands Used
E. Florida	Paul L. Burgess, Jr.	W4ERU	6L6-6L6-809-HY40Z's	e.c.o.	—	3.5, 7, 14
W. Florida	George S. Eggart, Jr.	W4EPT	6F6-T55; 6F6-6L6-807's	e.c.o.	NC101X	3.5, 7, 14
Georgia	Reginald R. Cain, Jr.	W4CYC/4	6SK7-6V6G-6L6-807-TZ40	e.c.o.	—	3.5, 7, 14
West Indies	Kenneth P. Billings	W2NBF/K4	Meissner Signal Shifter-6L6-HK54	e.c.o.	NC101X	14
Los Angeles	Stanley Carr	W6IDZ	E.c.o.-HK24-HK54-HK254's- HK354's	e.c.o.	—	7, 14
Arizona	Bud Keller	W6QAP	X-E.C.-807-35T	e.c.o.	NC101X	7, 14
San Diego	R. Apostle	W6TFY	36-42-6L6-T20-352	e.c.o.	Super	7, 14
No. Texas	C. W. Tittle	W5AAN	Meissner Signal Shifter-35T	e.c.o.	—	3.5, 14
Oklahoma	Lyle M. Smithers	W5LW	802-807-100TH	e.c.o.	Howard 437	3.5, 7, 14
So. Texas	Bruno M. Wojcik	W5CWW	6F6-6L6-807-T125	e.c.o.	HRO	7, 14
New Mexico	Sheldon H. Dike	W5HAG	6L6-HK24	e.c.	—	7, 14

CLUB SCORES

Club	Score	C.W. Winner	Phone Winner
Frankford Radio Club (Phila.)	1,028,787	W3BES	—
Greater Cincinnati Amateur Radio Ass'n	936,752	W9FS	W8NDN
Milwaukee Radio Amateurs' Club	442,917	W9VDY	W9ESJ
York Radio Club (Ill.)	332,937	W9YFV	W9NAB
New Haven Amateur Radio Ass'n (Conn.)	255,233	W1KQY	W1GDC
Northern Nassau Wireless Ass'n (N. Y.)	202,821	W2AJJ	W2HYJ
Cahokia Amateur Radio Club (Ill.)	192,625	W9GFF	W9OAW
Twin City Bug Twiddlers (Mpls.)	185,236	W9NCS	—
North Newark Amateur Radio Club (N. J.)	177,268	W2LXI	—
Westlake Amateur Radio Ass'n (Ohio)	170,822	W8HGW	—
Wisconsin Valley Radio Ass'n	162,672	W9RQM	W9ZTO
Southtown Amateur Radio Ass'n (Chgo.)	151,514	W9MGN	—
Chester Radio Club (Pa.)	143,705	W3DGM	—
Columbia University Radio Club	141,368	W2HHF	—
Tri-Town Amateur Radio Club (Chgo.)	118,649	W9DUX	W9MWJ
Western Nebraska Radio Amateurs	108,987	W9MGV	W9KQX
Queens Radio Amateurs (N. Y.)	106,476	W2LPJ	W2LGS
Narragansett Ass'n of Amateur Radio Operators (R. I.)	104,889	W1LWA	—
Hi-Q Radio Club (Lynn, Mass.)	95,289	W1HY	W1HA
San Joaquin Radio Club (Calif.)	90,348	W6BVM	—
Stanford University Radio Club	87,126	W6HJT	W6YX
Dayton Amateur Radio Ass'n (Ohio)	84,974	W8CED	W8TPC
Maui Amateur Radio Club (Hawaii)	78,659	K6CGK	—
South Jersey Radio Ass'n (N. J.)	78,268	W3HDJ	—
York Road Radio Club (Phila.)	78,268	W3EEW	—
Elmira Amateur Radio Ass'n (N. Y.)	70,722	W8DZC	—
Cuyahoga Radio Ass'n (Ohio)	69,168	W8ROX	—
Parkway Radio Ass'n (Mass.)	64,500	W1MDV	W1IXL
Central Illinois Amateur Radio Club	41,885	W9CEO	W9QWM
Hamfesters' Radio Club (Chgo.)	37,850	W9FAQ	—
Lowell Radio Operators Club (Mass.)	37,439	W1KMY	W1QM
Mike and Key Club of Santa Monica (Calif.)	34,414	W6VB	—
Advance Radio Club (La.)	31,948	W5HNW	W5IRO
Associated Amateur Radio Operators of Denver (Colo.)	31,293	W9CAA	W9BQO
Bridgeport Amateur Radio Ass'n (Conn.)	30,152	W1APA	—
Lebanon Valley Radio Ass'n (Pa.)	26,959	W3HZK	—
Providence Radio Ass'n (R. I.)	24,621	W1MEK	—
Dells Region Radio Club (Wis.)	24,000	W9RBI	W9HHR
Chair City Radio Club (Mass.)	12,474	W1DCH	—
Campus Radio Club (Idaho)	7,298	W7IY	W7FER
Starved Rock Radio Club (Ill.)	3,832	W9NGG	—

Radiotelephone

Section	Winner	Call	Transmitter Line-Up	Type Osc. (E.C.O. or C.C.)	Receiver	Bands Used	
Md.-Del.-D. C.	Arthur W. Plummer	W3EQK	-----	-----	-----	-----	
	S. N. J.	A. E. Williams	W3HDJ	6J7-6L6-802-TZ40-HK254's	e.c.o.	SX23/DM36	3.9, 14, 28
	W. N. Y.	Bruce L. Kelley	W8ACY	810's	-----	HQ120X	3.9, 14
W. Penna.	Norman R. Gillin	W8HMJ	89-6F6-807	e.c.o.	Zenith	3.9	
	Illinois	Paul L. Edwards	W9NDA	Meissner Signal Shifter-813-HK254's	e.c.o.	HQ120X	3.9, 14
Indiana	Russell M. Price	W9GWL	Meissner Signal Shifter-807-HY51Z's	e.c.o.	S-20	1.75, 3.9	
Kentucky	W. E. Leatherman	W9YQN	802-807-807-T40's-T125's	e.c.o.	-----	3.9, 14, 28	
Michigan	Ralph Horian	W8EMP	50T's; 242A	e.c.	-----	1.75, 3.9, 14	
Ohio	Norman Holloway	W8QUL	E.c.o.-807-HK254-HK354's; e.c.o.-809's-100TH's	e.c.o.	-----	3.9, 14	
Wisconsin	C. E. Smith	W9ZTO	Meissner Signal Shifter-807-35T-250TH's	e.c.o.	HRO	3.9, 14, 28	
No. Dakota	Don Beaudine	W9RPJ	HY60-6L6G's-RK47-T40's	e.c.o.	Silver 5D	3.9, 14, 28	
So. Dakota	Ernest C. Mohler	W9ADJ	6N7-6L6's-TZ40-T200; T21-T21-TZ40-TZ40's	e.c.	-----	1.75, 3.9, 14, 28	
No. Minn.	Marvin B. Millett	W9RIL	6A6-807-TZ20-T55's	e.c.	-----	3.9, 14	
So. Minn.	R. G. Richardson	W9ZDM	-----	-----	-----	3.9	
Arkansas	Jessie J. Hart	W5HWK	6N7G-807-809's	e.c.	-----	1.75, 28	
Louisiana	Charles L. Kelley	W5IRO	E.c.o.-T21-TZ40-T40-TW150	e.c.o.	HRO	1.75, 28	
Tennessee	William R. Owens	W4DUS	-----	-----	-----	3.9, 14	
E. New York	Samuel P. Nixdorff	W2MEC	100TH's	-----	-----	-----	
N. Y. C. & V. I.	George P. Maerklie	W2HAW	6L6-T55-HK54-HK254's	e.c.	RME69	3.9	
N. N. J.	James A. Wotton	W2JUJ	802-807-35T-100TH's	e.c.o.	HRO	3.9, 14, 28	
Iowa	Milton S. Miller	W9TJA	Meissner Signal Shifter-6L6-812's	e.c.o.	HQ120X	3.9, 14, 28	
Kansas	George E. Jaus	W9PNX	Meissner Signal Shifter-T40-TZ40's	e.c.o.	RME9d-RME510X	3.9, 14, 28	
Missouri	Dow B. Summers	W9KOH	6L6-6L6-RK39's-RK63	e.c.	SX28	1.75, 28	
Nebraska	Dean W. Hagemester	W9KQX	-----	-----	-----	1.75, 3.9, 14, 28	
Connecticut	Frederick M. Dingwall	WIGDC	6V6-6L6-807-852's	-----	Comet Pro	3.9, 14	
Maine	Francis J. Gordon	W1LOA	6F6-6L6G-807-T20's	Both	-----	3.9, 14, 28	
E. Mass.	Dana W. Atchley, Jr.	W1HKK	Meissner Signal Shifter-807-100TH-RK38's	e.c.o.	HQ120X	1.75, 3.9, 14, 28	
W. Mass.	Albert H. LaFleur	W1MCF	6A6-T20-801's	e.c.	-----	14	
N. H.	H. V. Cushing	W1HJI	6F6-6L6-814	-----	Howard 460	3.9, 14, 28	
R. I.	Willard D. Cook	W1JFG	6L6-6L6-T65-810's	-----	-----	14	
Vermont	M. B. Forbes	W1KTB	-----	-----	-----	-----	
Alaska	James G. Sherry	K7GNN	42-807-T55's	e.c.	-----	3.9, 14	
Idaho	J. V. Durant	W7FER	41-6L6G-T21-35T	e.c.o.	S20R	28	
Montana	R. P. Roberts	W7CYP	6F6-807-813	-----	SX17	14, 28	
Oregon	Sidney S. Williams	W7GUX	E.c.o.-6L6-HK54	-----	NC44	3.9, 14, 28	
Washington	S. J. Rankin	W7DQX	6L6-6L6-35T-100TH	-----	-----	3.9, 14	
Nevada	Frank L. Long, Jr.	W6GSB	E.c.o.-6A6-807-HK51's	e.c.o.	-----	3.9, 14, 28	
Santa Clara V.	Oswald G. Villard, Jr.	W6YX	-----	-----	-----	3.9, 14, 28	
East Bay	D. Reginald Tibbetts	W6ITH	6J5GT-6V6GT-807-814-808's	-----	Super Pro	1.75, 3.9, 14, 28	
San Francisco	R. D. Zehn	W6BFX	6L6-HK24-35T's	e.c.	PR15	1.75, 14	
Sacramento V.	Emil Malek	W6GVM	100TH's	-----	RME69-DB20	3.9, 14, 28	
Philippines	F. O. Smith	KA7FS	-----	-----	-----	-----	
San Joaquin V.	Peter K. Onnigian	W6QMH	6L6-6L6-809	e.c.o.	-----	1.75, 3.9, 14, 28	
No. Carolina	W. J. Wortman	W4CYB	RK25-807-T55-T125's	-----	-----	3.9, 14	
So. Carolina	C. W. Jackson	W4DAM	-----	-----	-----	3.9	
Virginia	P. B. White	W3FQP	250TH's	-----	-----	3.9, 14	
West Va.	J. E. Hoffer, Jr.	W8CWY	6C5-6L6-6L6-T40's-852's	e.c.	Homebuilt	3.9, 14	
Colorado	James H. Goss	W9ZLX	6L6-807-T40's	-----	RME9DS	1.75, 3.9, 14, 28	
Utah-Wyo.	Chester R. Ashby	W6DTB	807-RK20-812's	-----	SX16	3.9, 14, 28	
Alabama	E. C. Atkerson	W4ECI	E.c.o.-T21-814-TW150's	e.c.o.	-----	3.9, 14, 28	
W. Florida	W. R. Staggs	W4FWY	T55's	-----	-----	28	
Georgia	Wm. E. Lanford	W4EGT	807-812-100TH's	e.c.	NC101X	3.9, 14	
West Indies	Felix V. Rodriguez	K4FKC	42-807-HK254-HK354's	-----	HRO	3.9, 14, 28	
Los Angeles	Don C. Wallace	W6AM	Vari-X-6A6-HY6L6GX's-250TH-300T's	e.c.	-----	1.75, 3.9, 14, 28	
Arizona	E. M. Griffith	W6PQQ	E.c.o.-6L6's-T55's	e.c.o.	-----	3.9, 14, 28	
San Diego	Ralph H. Culbertson	W6CHV	6SK7-6V6-6L6-6L6-807-HF100; 6SK7-6V6-802-211; 6SK7-6V6-46-211	e.c.o.	Superhet	1.75, 3.9, 14, 28	
No. Texas	A. B. Dobbs	W5FJP	6L6-809-T55	e.c.	-----	14	
Oklahoma	Clyde Steward	W5HXX	802-807-812's-100TH's	e.c.o.	-----	3.9, 14	
So. Texas	W. T. Caswell, Jr.	W5BB	6A6-807-TZ20's-HK254's	e.c.	NC101X	3.9, 14, 28	
New Mexico	Leonard A. Smoll	W5GGX	6L6-HY51-35T's	e.c.	-----	3.9, 14, 28	



Upper left: W4ECI, Alabama 'phone winner, fourth national high 'phone scorer. Upper right: W6ITH, national high scorer on 'phone. Lower left: W9NDA, only station to work all sections in Eleventh SS, 'phone winner in Illinois. Lower right: W9YQN, Kentucky 'phone winner and second national high.

52,542 and knocked off 417 contacts in 63 sections. Reg is to be commended for a dandy performance. Certainly he knows the meaning of the word "proficiency" when it comes to radiophone operating! A new threat to W6ITH's position is W9YQN who came up from eighth in the previous Sweepstakes to second place with 363 contacts in 59 sections for 42,539 points. Seventh last time, W5BB pulled up to third high in the 'phone group and scored 40,504 — 331 stations, 61 sections. Next in line with scores over 20,000 came the following: W4ECI, 38,763; W9NDA, 37,504; W4FLS, 33,855; W6QMH, 33,289; W6DTB, 31,860; W1HKK, 31,293; W7HEY, 30,745; W9KQX, 27,043; W9PNX, 26,100; W8QUL, 25,810; W6GSB, 25,650; W9ZVX, 25,025; W9ZTO, 24,640; W6CHV, 23,513; W9ZLX, 23,313; W5IRO, 22,700; W3HDJ, 22,410; W8EMP, 22,040; W9KOH, 21,988; W9OMG, 21,564; W6AM, 21,369; W1IXL, 20,972; W8JAH, 20,776; W5FH, 20,295.

Twenty 'phones worked 200 or more stations. W6ITH led in number of contacts with his 417. Right behind him was W3HDJ with 415 contacts. W6QMH worked 405. Next in order are W9YQN 363, W4ECI 336, W5BB 332, W9NDA 293, W7HEY 280, W4FLS 279, W6DTB 270, W1HKK 258, W9KOH 239, W5IRO 227,

W6GSB 225, W8QUL 224, W9ZTO 224, W1IXL 214, W6AM 211, W9ZLX 207, W9OMG 204.

Clubs

Bettering their score of the Tenth SS by more than 28,000 points, the Frankford Radio Club of Philadelphia finished the race in the club competition with 1,028,787 and again wins another gavel with engraved sterling silver band offered to the group which submitted the highest aggregate score of members. That gang really means business. We wonder what their meetings will sound like when all the boys have gavels! Three cheers to you, Frankford. The Greater Cincinnati Amateur Radio Ass'n. was second among the clubs with 936,752. A consistent contender for club awards, the Milwaukee Radio Amateur's Club stepped into third place with 442,917. Certificates are also being awarded to the high participants (c.w. and 'phone) in each club turning in three or more entries. A tabulation showing the relative standing of all the groups participating and the calls of individual winners is presented to give a complete picture of club participation.

The Eleventh ARRL Sweepstakes was without question one of the greatest amateur radio operating activities ever held.

(Complete Scores on page 82)



ARMY-AMATEUR RADIO SYSTEM ACTIVITIES

THE Secretary of War issued the following special message to all amateur radio operators coincident with the annual observance of Army Day on April 6, 1941:

To All Amateurs:

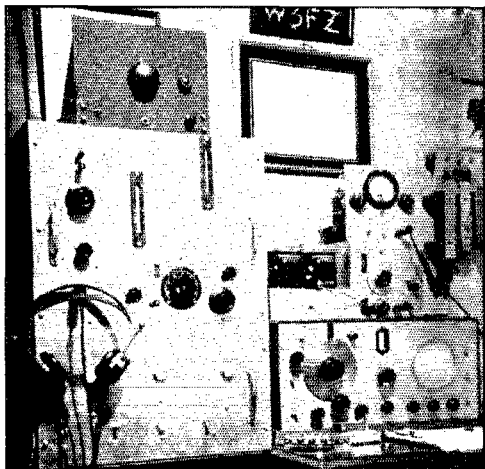
Incident to the annual observance of Army Day, I am pleased to acknowledge the important work that American amateur radio operators, particularly those affiliated with the Army Amateur Radio System, are doing in building the national defense structure.

Many amateur radio operators are in the military service at the present time. A large number also have volunteered their services as instructors to teach radio code and theory in their communities. Many are helping to train interested young men to qualify as radio operators for the expanding army.

The ramifications of our armed forces require a host of skilled radio operators and technicians. I am confident that, as in the past, the amateur radio operator will do his part in building up an impregnable defense for our country.

HENRY L. STIMSON
The Secretary of War

This message was first transmitted from Army Amateur Net Control Station, WLM-W3CXL, Washington, on 3497.5 kc. and 6990 kc. at 7:00 p.m., E.S.T., Monday, April 7, 1941. Other AARS stations were requested to rebroadcast this mes-



Army amateur station W3FZ-WLMP, operated by D. S. Young, Bethesda, Md., with the freq. measuring gear shown gives the gang accurate frequency checks.

sage on the various amateur bands for reception by all amateur radio operators. Within a short time the amateur frequency bands were almost covered by Army-amateur and other amateur stations transmitting the message on both c.w. and 'phone. Incidentally, this was a successful test of how quickly information could be disseminated by amateur radio stations.

ARMY QUESTIONNAIRE

THE distribution of the W.D. OCSigO Form No. 170, questionnaire to all licensed amateur radio stations in the United States, was completed by April 15th in all corps areas. The excellent cooperative spirit and the interest of the average radio amateur in voluntarily accomplishing this questionnaire for national defense purposes were indicated when a preliminary survey showed more than 75% returns during the first few weeks. It is hoped that all questionnaires will be returned before May 15th so that the necessary coding and tabulation work can be initiated without delay. One copy of the questionnaire is being retained in the respective Corps Area Signal Offices and the other copy is forwarded to the Chief Signal Officer, Washington, where the compilation work will be centralized.

ARMY NET MONITORING STATION W3FZ/WLMP

W3FZ/WLMP, owned and operated by Dean S. Young, 1100 Garfield Street, Bethesda, Md., is the Army Net Monitoring Station. Mr. Young built most of the equipment illustrated. Frequency measurements are made using a 1000-ke. "A"-cut crystal which is held to better than 0.1° Centigrade as the basic frequency control. 100-ke. and 10-ke. locked oscillators and amplifiers, variable heterodyne oscillator and audio-frequency mixing circuits are all incorporated in the control unit, including a direct-reading audio-frequency meter. Mr. Young first zero-beats a signal in the receiver and then measures the resultant beat note against a standard check point. Accuracies better than 0.001% are obtained in the 3500- to 4000-ke. band. Amateur band edges or any multiple of 100 kc. or 10 kc. can be checked to an accuracy of almost one part in a million or better. W3FZ/WLMP uses this equipment mainly for measuring frequencies of AARS stations operating on the special 3497.5- and 6990-ke. frequencies to assure compliance with the specified frequency tolerances.



HINTS AND KINKS FOR THE EXPERIMENTER



BALANCED INDUCTIVE COUPLING FOR U.H.F.

INDUCTIVE coupling between the stages of u.h.f. transmitters has the advantage of reducing interstage capacities without the complications of link coupling. It is particularly useful in coupling from the output of a single-ended stage to the grids of a push-pull amplifier or a push-push doubler.

In its usual form, a coil, which is approximately self-resonant, is used on the plate circuit of the driver. The push-pull grid coil of the following amplifier is divided into two equal sections, one on each side of the driver plate coil, as shown in Fig. 1A. One of the difficulties which is almost always encountered with this arrangement is that of obtaining symmetrical drive to the grids of the amplifier or doubler. The reason for this is the unbalance caused by the additional coupling path through the capacity which exists between the plate end of the plate winding and the section of the grid winding coupled to that end of the coil (end connected to grid No. 1 in Fig. 1A). A similar capacity to balance this does not exist between the top end of L_1 and the other half of L_2 .

An effective method of overcoming this discrepancy is to make L_1 in the form of a spiral winding as shown in Fig. 1B. Capacity coupling to either side of L_2 is then made equal. While such a winding might be rather difficult to make for the lower frequencies, a winding for the higher frequencies is extremely simple, since only a few turns are required. The coil may be wound with No. 14 or No. 12 wire so as to be self-supporting. It is not at all difficult to wind the wire by hand into a flat coil and then spread out the turns. To reduce capacity coupling to either side as much as possible, the plate should be connected to the outside turn as shown at C. This arrangement also results in a more compact assembly.

— Milton Mix, W1IPL.

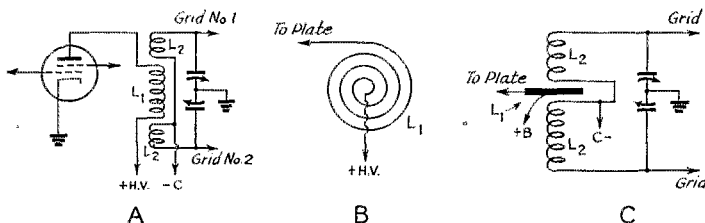


Fig. 1—A spiral plate winding is used by W1IPL to obtain balanced inductive coupling. A—Usual arrangement. B—Helical plate winding. C—Coupling arrangement with helical plate coil.

HINTS ON DRILLING TUBING AND ROD

THE drilling of lateral holes through metal tubing or rod may turn out to be quite a problem unless the job is properly tackled. It is still more difficult to drill several holes and keep them in the same plane. It is hoped that the suggestions which follow will help to simplify the task a bit.

The tubing should first be clamped horizontally in a vise, or be supported firmly by other means, over a flat surface. A square is then placed with one side resting on the flat surface and the other pressed against the side of the rod or tubing as shown in Fig. 2. With the square held firmly against both surfaces, the wall of the tubing is scratched as the square is drawn along its length.

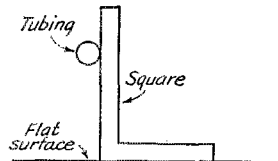


Fig. 2—Marking line for spotting holes to be drilled in tubing or rod.

The scratch will be perfectly aligned even though the flat base is not parallel with the tubing or tilted at any angle in respect to it. The only important point is that the base must be flat.

The points at which holes are to be drilled are then marked with a center punch along this line. The punch marks should be made rather deep so that the side of the tubing may be flattened very slightly with a file without obliterating them. This flattening will prevent creeping of the drill when the holes are started.

The first hole must be drilled carefully by eye. When it is finished, a machine screw or a piece of wire fitting the hole is inserted. This will provide a "sight" by which the remainder of the holes may be lined up while they are being drilled.

— Vernon Chambers, W1JEQ.

SIMPLIFIED I.C.W. OPERATION

THE kink on simplified i.c.w. operation for u.h.f. rigs which appeared in March *QST* is fine business. But I have obtained such fine results with my kink that I couldn't resist writing about it.

For i.c.w. operation, I simply connect a conventional high-frequency buzzer in series with the microphone winding. Even though the resistance of the microphone winding is a few hundred ohms, I have had no trouble in getting the buzzer to key well with only 2 or 3 volts. A 4.5-volt "C" battery works best. The audio output with this arrangement is very high. Reports have been very complimentary. Only a few parts are required for this system and the tone can be varied over a wide range.

— Michael A. Ziniuk, W8PZL.

SOLDERING TIP FOR TIGHT PLACES

It's sometimes a bit hard to get the tip of a soldering iron into some closely-crowded spot without unsoldering something by accident just trying to solder in the connection. I had an old tip for the iron, too badly worn to be much good,

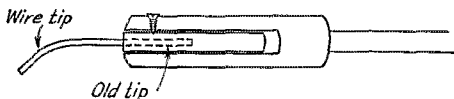


Fig. 3 — Small soldering-iron tip for tight places.

so cut it off so that it was just the right length to fit the iron barrel. Then I drilled a hole in it about an inch deep lengthwise. The hole should be just large enough to provide a tight fit when a piece of No. 8 or No. 10 copper wire is jammed into it. The end of the wire was flattened just a bit, and presto — a soldering iron tip which may be bent around corners or worked into the most congested spots without any trouble. (See Fig. 3.) With either No. 8 or No. 10 wire the length of the piece is determined by how much can be used and still get enough heat at the end to be of any value. For most jobs it needs to be about one and one-half inches long. — Dayton Warner, W9IBC.

OPERATION FROM THREE-WIRE POWER LINES

WHEN a heavy load is thrown on the line in the average home, it is sometimes noticed that whereas about half the lights in the house grow dimmer, the other half become noticeably brighter. Most hams with high-power rigs take advantage of this effect by connecting their plate supplies to one socket in the house, and then connecting their filament transformers to a socket at which the voltage rises when the plate load goes on.

The explanation is deceptively simple. The pole transformer which steps the distribution voltage (2200 volts) down to the normal 110

volts, has two secondaries which are normally connected in series (Fig. 4A), and a wire is run from the center-tap, along with the two outside wires, into the house. Normally, one half of the lights are connected from one of the outside wires to the common, and the other half from the other outside wire to the common. Loads requiring 220 volts, such as electric stoves, can be connected across the two outside wires.

The advantage of the system arises from the fact that as the lighting loads become balanced, there is no longer any necessity for current to flow in the common connection, and accordingly, in Fig. 4B, this wire has been drawn in with a dotted line. Under these conditions, the lighting load is effectively transmitted at 220 volts, and a saving in copper naturally results. The purpose of the common wire is simply to take care of any unbalances.

What happens when a heavy load is thrown on one 110-volt circuit, when only a voltmeter is connected across the other, is shown in Figs. 4C and 4D.

In Fig. 4C, three impedances have been shown in series with each of the three lines. These impedances represent the resistances of the line wires themselves, impedances which are ordinarily negligible, but which in the case of heavy loads are responsible for the voltage drops encountered. Now since the two windings are connected in additive polarity (as they must be if any voltage is to be developed between the outside wires), we can consider instantaneous values as shown in Fig. 4D. In fact, for purposes of analysis, at any particular point in the cycle, the transformer windings may be replaced by batteries of the proper potential. It now becomes apparent from

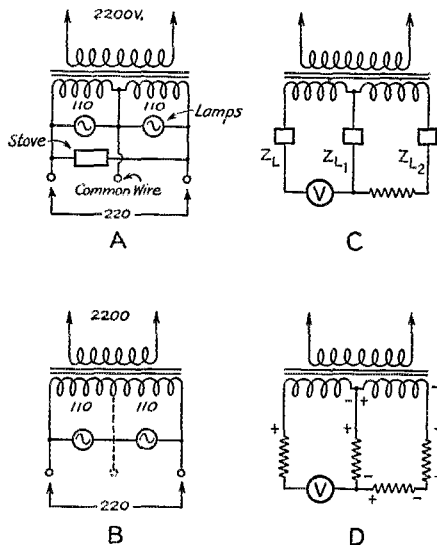


Fig. 4 — Three-wire power-line reference circuits.

an inspection of the diagram, that the voltage drop in the impedance of the common lead due to the load current flowing in the circuit which includes the heavy load is in such a direction as to produce a higher voltage at the voltmeter than that produced by the winding of the transformer itself.

It is very easy to believe, when cases of this are encountered in practice, that some mysterious action in the transformer is responsible for the results observed. This is never the case; if the voltage across one half of a transformer winding is observed when a load is drawn from the second half, it will invariably be found to drop slightly, due either to poor regulation in the transformer itself, or to voltage drop in the wires feeding the primary, or to both.

Voltage drops, produced by a combination of these last two factors, almost always occur at the terminals of ordinary distribution transformers. Hence a compensating voltage drop produced

in the common wire can be very conveniently employed to counteract this effect at the transmitter. For example, it may be used to keep a transmitter's filament voltage constant, no matter how much power is drawn from the plate side of the circuit. A very simple way to adjust the amount of compensation is to vary the load on the filament side of the circuit. This can be done by connecting any receivers, monitors, lamps, etc., to the same outlet plug from which is drawn the filament power. Referring again to Fig. 4B, it is seen that as the loads on the two halves of the circuit become more equal, the current in the common wire is decreased, and hence the magnitude of the compensating voltage.

Whereas the best solution of the voltage regulation problem is obviously the installation of lines with negligible drop, those of the gang who have to put up with things as they are may find the above information of use.

— Oswald G. Villard, Jr., W1DMV.

Code Proficiency Notes

THE WIAW transmissions of known texts on three of the six practice schedules per week makes possible a direct comparison of one's fist and the tape sending. To listen and attempt to superimpose one's own sending on the same copy is to learn good sending by a process of instantaneous comparisons and speedy adjustment and correction of faults. One unconsciously gets the swing of perfect rhythmic spacing and proportioning of characters if he is fortunate enough to hear and copy a great deal of tape sending.

Acquiring advanced code proficiency is essentially a matter of practice. The battle is half won

when you as an operator unconsciously establish a mental standard for coordination of your sending impulses and recognition of characters in reception. To listen and copy any clean-cut tape or automatic transmission is recommended. After initial memorization of characters about one third of one's practice should be in sending work. Sending ability is reflected back quickly into increased code receiving speeds.

Comparisons of one's fist and automatic transmission are made with little trouble using the list of WIAW sending-practice subjects. Before the WIAW run which gives about ten minute's practice at each speed, get out the proper QST article to follow. An audio oscillator can be

WIAW SENDING-PRACTICE SUBJECTS

Sun.—Tues.—Thurs., May 22nd to July 1st. From May '41 QST

Start	End
*May 22. 1st par., p. 33.	1st par., p. 86.
*May 25. 1st par., p. 86. Then p. 37.	3rd par., 2nd col., p. 38.
*May 27. 3rd par., 2nd col., p. 38.	On p. 82.
*May 29. <i>The QSL-25</i> , p. 40, box.	1st par., 2nd col., p. 42.
*June 1. 1st par., 2nd col., p. 42 to end WWV. Then p. 45.	Near end p. 45.
June 3. <i>WLID</i> , p. 27, May QST.	Middle 2nd col., p. 28.
June 5. <i>It Seems to Us</i> , p. 7.	Two pars. of p. 10.
June 8. <i>Keying the CO</i> , 2nd par., p. 10.	In 2nd par., p. 13.
June 10. <i>Grid-Block Keying</i> , p. 13. <i>Improved ECO</i> , p. 14.	1st new par., p. 16.
June 12. 1st new par., p. 16. <i>Strays</i> , p. 74; <i>WWV</i> , etc., p. 78.	P. 78.
June 15. <i>In the Services</i> , pp. 18, 19, 70. <i>25 Years Ago</i> , p. 70.	P. 70.
June 17. 112-Mc. Station, p. 20.	P. 22.
June 19. <i>56-Mc. Arrays</i> , p. 23.	<i>The Month in Canada</i> , 3rd par., p. 26.
June 22. <i>Code Proficiency Program</i> , p. 40.	P. 64.
June 24. <i>Fist-Tape Comparisons, Advance Sending</i> , p. 64; <i>Convention</i> , p. 66; <i>Books — Code Table</i> , p. 68.	P. 68.
June 26. <i>On the Ultra-Highs</i> , p. 33.	112 Mc., p. 35.
June 29. <i>112 Mc. and Up</i> , pp. 35, 82; <i>Operating News</i> , p. 45.	2nd col. (N. Z.)
July 1. <i>Hints and Kinks</i> , pp. 42-60. <i>Michigan Emergency Council</i> , p. 50.	P. 50.

* April issue.

connected to one earphone and a telegraph key, with the receiver output connected to the other headphone. Just a buzzer-battery keyed combination with the automatic transmission properly tuned in will make a comparison of your Sunday-best sending with tape transmission possible. Your own ear can tell you how your fist can be "adjusted" better than any observer. Try it!

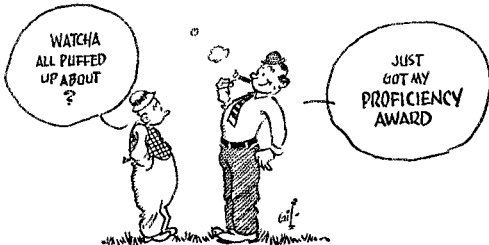
The practice is sent nightly except Friday from W1AW starting 9:45 P.M. EST (6:45 P.M. PST) using 1762, 3825, 7150, 14,253, 28,510, and 58,970 kcs. Approximately 10 minutes' practice is sent at progressive speeds of 15-20-25-30-35 words per minute. Besides this special practice material ARRL official messages "to all radio amateurs" are sent by tape at 8:30 P.M. and midnight EST at one of the three lower speeds, giving opportunity for additional practice. Opportunity for getting the League's Code Proficiency Certificate Award or to try out for a silver endorsement sticker (for demonstrating increases from the original word speed certified) will be given in two June qualifying runs, as follows:

June 1st (Sun.), 1:30 P.M. EST. (Text at 1:45 P.M. EST.)
 June 17th (Tues.), 9:45 P.M. EST. (Text at 10 P.M. EST.)

ARRL aims to extend code proficiency certificate recognition at some speed above government license requirements to every FCC amateur licensee. By your participation you help the League demonstrate the training values inherent in amateur radio operating. Are you in on this defense program? Don't rest until you have qualified for one of our code proficiency awards.

Practice copying the W1AW runs; get into amateur traffic work; follow some commercial press and weather skeds (see page 52, May *QST*), etc. Then on June 1st or 17th, be on hand and copy the test text at the best speed you can. Underline the *full minute* of perfect copy necessary to qualify at any speed. Tell us if you copied by ear without help except for your pencil or mill (mention which used), and if you are working for first certificate or endorsement. Send in copy and statement. We will check your paper with the official tape, then advising you of success or failure, sending any appropriate award or advices within about thirty days from the date of any *qualifying* run. Responsive to demand, the "code program" was recently expanded. Get after your "proficiency ticket" to-day if you haven't it already.

— F. E. H.



Silent Keys

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

Victor Ewart, W7COO, Evanston, Wyoming

John E. "Pop" Garvey, W8RID, ex-W8QJO, Cleveland, Ohio

Frederick G. Gottsch, W2BTF, Brooklyn, N. Y.

Dennis Lee Grimes, W4GRD, Memphis, Tenn.

Sterling E. Hess, W8FMN, Factoryville, Pa.

Emmett Johnson, W7CBA, Astoria, Oregon

Laurence E. King, W2GSM, Albany, N. Y.

Henry Lind, W2CLB, New York, N. Y.

Dr. William D. Mitchell, W9GGS, Denver, Colo.

Robert Martin Payette, W8ULI, Athens, Mich.

Willis L. Ransburg, W8NIP, E. Cleveland, Ohio

E. N. Swan, W7DUE, Portland, Oregon

Benjamin B. Swartwout, W2FRU, Port Jervis, N. Y.

Strays

The staff of *QST* extends hearty congratulations to Willard B. Cowles in receiving the Erskine M. Ross Prize of \$3,000 for the best essay on the subject, "The Prospective Development of International Law in the Western Hemisphere as affected by the Monroe Doctrine." Mr. Cowles, formerly a ham from Plainville, Conn., may be remembered as "Production Manager on *QST*'s staff many years ago. He is now special assistant to the Attorney General at Washington, D. C.

— . . . —

During an early-morning 1.9-Mc. rag-chew with W3EVH, W8MGY received a telephone call from a local b.c.l. who had heard him on his b.c. receiver. On hearing W8MGY pass along his "handle" as Ned, the listener searched through all the first names in the telephone directory until he found a *Ned* in the neighborhood who might be W8MGY. Upon running down his man, the b.c.l. popped the question (strange as it may seem), "How can I become a Ham?" — W3EVH.

— . . . —

W5JNO, who earns the money with which he buys his solder by working as a detective for the Dallas Police Department, had no trouble in remembering license plate *New York 6L6* when the car was reported stolen. Yes, the car was recovered.

★ I. A. R. U. NEWS ★

Devoted to the interests and activities of the

INTERNATIONAL AMATEUR RADIO UNION

Headquarters Society: THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

MEMBER SOCIETIES

American Radio Relay League
Asociatia Amatorilor Romani de Unde
Scurte
Associazione Radiotecnica Italiana
Burma Amateur Radio Society
Canadian Section A.R.R.L.
Ceskoslovenski Amatérni Vyslaci
Deutscher Amateur Sende-und-Empfangs
Dienst
Eesti Raadio Amatooride Ühing
Experimental Radio Society of Egypt
Experimenterende Danske Radioamatører
Federation des Emetteurs Belges
Irish Radio Transmitters Society
日本アマチュア無線聯盟 Japan

Lietuvos Trumpjuju Bangu Radio Megeju
Draugija
Liga Colombiana de Radio Accionados
Liga de Amadores Brasileiros de Radio
Emissao
Liga Mexicana de Radio Experimentadores
Magyar Rövidhullamu Amatörök Országos
Fegyverszete
Manchoukuo Amateur Radio League
Nederlandsche Vereeniging voor Internationaal Radioamateurisme
Nederlandsch-Indische Vereeniging Voor
Internationaal Radioamateurisme
Newfoundland Amateur Radio Association
New Zealand Association of Radio Transmitters

Norsk Radio Relæ Liga
Polski Zwiasek Krotkotalowcow
Radio Club Argentino
Radio Club de Cuba
Radio Club Venezolano
Radio Society of Great Britain
Rede dos Emissores Portugueses
Reseau Luxembourgeois des Amateurs d'Ondes Courtes
South African Radio Relay League
Suomen Radioamatööriliitto r.y.
Sveriges Sändareamatörer
Union de Radioemiseurs Españoles
Union-Schweiz Kurzwellen Amateurs
Wireless Institute of Australia

CALENDAR

IN REPORTING briefly on the status of its member-societies, now 37 in number, the 26th Calendar of the Union, dated December, 1940, strikes a somewhat more optimistic note. To quote, "This arises not because the international situation as a whole is improved, but because the several member-societies have for the greater part displayed the commendable determination to continue activities even in countries actively at war."

The Union bids welcome to its newest member, the *Liga de Amadores Brasileiros de Radio Emissao* (Brazil), affiliated as a result of the unanimous adoption of Proposal No. 49. The L.A.B.R.E. is one of the oldest and best-known amateur organizations on the South American continent. It is entirely non-commercial, the only amateur organization recognized officially in Brazil, and covers the whole country. All licensed amateurs in Brazil are compulsory members. "QTC" is the society's official organ.

Proposal No. 50 recommends the admission into membership of the *Radio Club Uruguayo*, which if voted affirmatively will make a total of 5 South American member-societies — three of them added within the past year.

SPAIN

DESPITE numerous attempts, the newly reorganized U.R.E. has not been able to have the transmitting ban lifted for amateur licenses. Secretary Cordova points out that there has been no definite refusal, but rather the matter is still involved in official red tape. Amateurs continue paying a fee for transmitting licenses and have salvaged much of the equipment they possessed before the civil war. "U.R.E.," the society's official

organ, has not resumed publication due to restrictions on the consumption of paper.

Due to the ban on transmitting the society's membership has fallen off somewhat, but there are still a good many faithful amateurs on the roster. QSL service is very limited, but is performed periodically. U.R.E. has by no means given up hope for the eventual official approval of transmitting activity, and continues in contact with all concerned.

NEW ZEALAND

A RADIO EMERGENCY CORPS is selecting ZL amateurs, who are being granted permission to retain their transmitting equipment, to act as permanent emergency stations in coöperation with the country's home-defense system. "Break-In" says that it is also proposed to build a number of portable stations in various districts for communication supplementary to the fixed units. Local club groups of the N.Z.A.R.T. are holding classes in operating and maintenance of equipment to ensure a high class of personnel being available to man these defense stations.

GREAT BRITAIN

DESPITE handicaps attendant to operating under wartime conditions, the R.S.G.B. has shown much progress in the past year, ending 1940 in a strong financial position and with a growth in membership. New members average forty per month. It is to the recognition of the amateurs on active service, whence come most of the new members, that Secretary Clarricoats attributes the *Society's* success — where others in similar positions have fallen backward or closed down completely. A grand example, OM's!

The *Society* begins 1941 with several new offi-

cers: Alfred Gay, G6NF, as president, succeeding A. E. Watts, G6UN; E. L. Gardiner as executive vice-president; and J. W. Mathews, G6LL, as honorary editor.

Contact with communications authorities continues to be good, and there is a bright outlook for post-war amateur radio in England. Over eleven hundred amateurs in military service have proved the value of amateur training again and again.

25 YEARS AGO THIS MONTH

AS THE first summer of its life approached, the editor of *QST* was worrying whether he should try to continue through the summer or fold up; he complained that his *QST* income curve had taken "a droop to beat all previous droops a mile." Because of static, the fellows were forcibly slacked up on operating, but do they lose their interest in amateur radio? He decided to chance it, get out a June issue and see the result, but he warned, "If you have not paid your annual dues, get someone to loan you a dollar quick and QSR."

The leading technical article, the first of many *QST*-published papers delivered before the Radio Club of America, was "Wireless and the Aeroplane," by L. J. Lesh. It was chiefly devoted to the description of an eight-bladed 24" fan mounted above the pilot's head on a Curtiss pusher, belted to a 1/4-kw. 500-cycle generator. In tests, a DX of several miles was covered while traveling 45 m.p.h. at heights varying from 100 to 600 feet. Nice going!

Static is so bad (and so many hams are taking summer jobs on the Great Lakes) that Trunk Line E has closed down until September. But 2FH reports working 8NH for half an hour and 9TC for ten minutes, remarkable work for May. Harold C. Bowen's special-license station IZF, 425 meters, has a new 1/2-kw. Hytone and has worked 90 miles. Gustave Werner, a member at Lynn, Mass., sends baseball scores daily by arrangement with the *Lynn News*; he has a reliable range of 30 miles. But John P. Gaty's station can work 85 miles to 3AFA at any time of the day, and has worked 110 miles, messages on freak nights being copied from Nebraska and Georgia — which remarkable results the editor certifies from a personal visit. 8AEH has installed a new loose coupler of much smaller dimensions and immediately his receiving range went up; he strongly advocates the use of a small loose coupler for short waves, with a large one for longer waves. In correspondence, Reverend A. J. Manning, 8JZ, proposes that owners of the more efficient stations give detailed descriptions of them, for mutual help. He has worked ten states, maximum DX nearly 1000 miles, and his descrip-

tion of his own station shows that he knows precisely what he is doing.

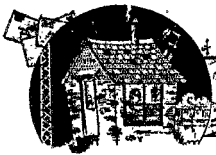
3TQ praises 8VX, W. T. Fraser of Buffalo (later an ARRL director), for having got up a printed post-card signal report which gave him his first intimation that he could be heard 400 miles when he thought his range was 75. This is apparently the first QSL card. The new Query Department settles down to business and one of its first customers is L. C. Herndon of Portsmouth, Va., now FCC inspector at Seattle. Four questions he asked, too. Ham-ads show a lad in Illinois named Warner trying to swap a 133-cycle motor for a wavemeter and getting no takers rapidly. Lindley Winsor of Bakersfield asks about the theory of Captain (later Rear Admiral) Bullard and the editor explains a remarkable ionosphere: "Captain Bullard's theory assumes the earth to be a large conductive surface and above it, a second surface with the intervening atmosphere as a dielectric. The height of the conductive surface above the earth depends considerably on the temperature. The higher the conductive surface is above the earth, the less is the capacity of the condenser; consequently, the electric waves held between the two surfaces of different distances apart, depend upon the temperature. With the higher temperature of daylight, the signals should be correspondingly weaker than when the conducting surfaces are nearer together as at night when the temperature falls. The conducting surfaces being nearer together and the energy concentrated in a small space, makes the intensity of the signals greater."

— K. B. W.

DX Notes

ACCORDING to a report received on reliable authority, the operation of amateur stations in American Samoa has been prohibited since July, 1940; the prohibition will remain in effect indefinitely. This means then, gang, that any station purporting to be there since KH6SHS left is just an out and out phoney, so don't waste your time and money trying to get a QSL from anybody else. . . . W8JIW knocked off KD4HHS on 14 Mc. with 20 watts. . . . W5FYZ worked KF6JEG/KG6, who wants the information passed along that he now has a supply of cards which will be sent out for all contacts with him on Canton and Jarvis, and also that he will soon be on 'phone between 0000 and 0300 G.C.T. . . . W8NBNK says there is a reward out for the QTH's of VP3TEST, EA7AV, TG9AS and TA1AL all of whom owe him cards. Can anyone help him? . . . W9BQZ reports the following worked on 14 Mc.: K5AV, K5AB, W6POS/K6, K4GPU, K5AH, K6PAH, K7DVM. . . . K5AB, K5AH, K5AP, K5AV, K4GZR, K4HEB, K4HHT, K4SO and K6CGK were raised on 14 Mc. by W9LTW with 22 watts. . . . W2GW relays the dope that ex-KE6SRA was assigned the call KC6SRA but is unable to get permission to use it at Wake; he will answer with a KE6 card from Wake to all those who failed to get one from their Johnston Island contact with him.

Notice to All New England Division Amateurs: Director Percy C. Noble, WIBVR, notifies us that the Annual Division Convention usually held in May has been postponed and will be held in conjunction with the Boston Hamfest sometime next fall.



CORRESPONDENCE FROM MEMBERS

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

SUPER-DYNAMIC PROGNOSTICATION

74 Webster Rd., Weston, Mass.

Editor, QST:

In perusing the current issue of QST I came to the article relating to Dynamic Prognostication, and was so captivated by it that I immediately set about constructing the transmitter. Upon completing it exactly according to specifications, I found that it would not work. Then I discovered that I had omitted filament and power supplies, as no mention was made of them in the article. . . .

I observed that the tube became exceedingly hot, and I was distressed at the waste of so much energy in the form of heat. After deep cogitation I hit upon a method of putting this heat to use. I obtained from an electrical supply store one of those articles which consist of two loops of wire, shaped to fit over a lamp bulb. There is a small pivot at the point of junction and on this pivot revolves a brass disk, so cut as to resemble the petals of a large daisy. These petals interrupt the light from the top of the bulb and when placed in a fireplace, under a log, simulate the flickering of flames. I placed one of these devices on the tube of the transmitter and found that it revolved at tremendous speed, impelled by the heat. To the top of the disk I affixed the motor of an old electric razor, running backwards. As I expected, the little generator produced enough current to run the transmitter, so that as soon as it started to operate I could disconnect the power supply and use it for my receiver.

For the filament supply, I use a bleeder across the generator, but I suggest that the experimenter have a first-aid kit at hand (in case of excessive bleeding).

The thought of using the same tube for receiving of course occurred to me, and I planned on snatching the bulb out of the transmitter and putting it in the receiver. Upon searching in the market for a bulb-snatcher I was unable to locate one. It seems they are no longer made, owing to the unfavorable publicity given them by a well-known lamp manufacturer.

In conclusion, may I add a few hints to the improvements which I made in the construction of the transmitter. I found the use of ice pick and scissors very inefficient in working the cardboard chassis, and evoked a better method. I procured a blow-torch and heated the ends of the shafts red-hot, and then pushed them through the chassis at the exact spot desired. I discovered that in heating one end of the shafts the other end also became exceedingly hot, and was forced to desist in my efforts and obtain my furnace gloves from the cellar. Upon returning to my operating table I found that I must inadvertently have moved the blow-torch when leaving, as the flame had burned a neat hole in the metal panel of my receiver. However, I had long contemplated installing a pilot-light on my receiver panel, and found that this hole served the purpose admirably.

I was foiled in my efforts to obtain material to line the inside of the chassis. It was Sunday morning and, musing on the problem, I was idly turning the dial of my broadcast receiver. Suddenly a voice said, "Let us pray." "Why, of course," said I, "exactly the thing, spraying." I thereupon emptied out the contents of the XYL's perfume atomizer, and replaced them with copper-sulphate from an old battery. With this I sprayed the inside of the chassis. After baking for an hour in the oven the sulphate evaporated, leaving a very satisfactory coating of copper. . . .

— G. W. Bailey, W1KH

P.S. In looking through the dictionary to settle several controversial matters in connection with the writing of this

letter, I discovered that the meaning of the word "editor" was derived from the Latin verb "edo," meaning to "give out," and "toro," meaning "bull." Did it ever strike you that way?

— GWB

CAUGHT IN THE DRAFT

Fort Monmouth, N. J.

Editor, QST:

I believe a good many of the boys would be interested to know what's going on among the drafted hams, so I decided to sit down and write a few lines.

I was inducted on Feb. 27, 1941, and then shipped to Camp Upton to be outfitted. Upon arrival we were given towels, soap, razor and brush, and assigned to a tent. We slept six to a tent and had a small bed with a mattress, pillow and case, and two sheets and four blankets. The tents were kept warm by a small coal stove.

The following day we were awakened at 6:15 A.M., which allowed us fifteen minutes to get dressed and fall out for reveille at 6:30. After this we had a half hour to wash, make our beds and clean up the tent. At seven A.M. we went for chow which consisted of cereal, milk, fruit and french toast and maple syrup. After chow we retired to our tent and awaited further orders.

At 7:45 A.M. we were taken to the processing building which outfits us. I was completely outfitted except for a jacket (called a "blouse" here). I am 6 ft. 1 in. tall and weigh 225 lbs.; perhaps that's the reason they didn't have a blouse to fit! I was very fortunate never to have had K.P. due to the fact they didn't have work clothes large enough to fit me!

After waiting three weeks I finally received my jacket. On March 28, 1941, I was one of 58 men shipped to the Signal Corps Replacement Center at Fort Monmouth, N. J. Upon arrival here we went to chow and found out the cooks here were much better than at Camp Upton. We were given an examination to find out which part of the Signal Corps we would be placed in. On March 31, 1941, we will be assigned to a company for our 12-week training period. After this we will be sent out wherever a man is needed for our particular type of work. They train men for all types of work here, such as radio, teletype, telephone, auto mechanic, clerks, etc.

At present I can't give you any information in regard to radio activities here because I have not begun to go to classes yet, but will do so as soon as such information is available. . . .

— Pvt. Sol A. Sterman, W#JW

WOTSA, OT'S?

1606 Pandora Ave., Westwood Hills, Los Angeles, Calif.

Editor, QST:

Last night W2HXI and I were having one of those nice, long 80-meter rag chews, the kind where both use break-in, and inevitably our conversation drifted around to the "good ole days." It's been known to happen before.

But this time we went in pretty deep. Bemoaned the fact that nowadays a fellow never sees his old friends on the air. Too wide a divergence of interests. Your best friend could be on 75-meter 'phone and he'd be the last one to tell you. Or he might be right on the same band with you, fiddling away with his bug, but because somebody lent him another

(Continued on page 78)



OPERATING NEWS



F. E. HANDY, WIBDI, Communications Mgr.

J. A. MOSKEY, WIJMY, Asst. to the Coms. Mgr.

Revoked! On April 22, 1941, the Federal Communications Commission adopted orders revoking the amateur radio station license for W9LMY (Mitchell, So. Dak.) and suspending the licensee's amateur operator license. Why? ". . . because licensee while engaged in the operation of his station communicated by radio with HR1AT located in a foreign country, and failed to keep a proper log, all in violation of the Commission's rules." Another amateur station license was similarly revoked because the licensee whose license had another year to run failed to file and refused to file with the FCC his response to Form 735 to establish his U. S. citizenship.

Order No. 72 *must* be observed by all amateurs. We mention the instance above just to emphasize that simple fact. We have been told that there was some cheating going on even in spite of the helpful efforts of Official Observers and other amateurs who have been busy making radio calls to any U. S. amateur heard slipping from grace to remind and caution about observance of Order 72. Some simple minded amateurs have perhaps thought they could get away with working a foreign station just by omitting its call!! With the foreign amateur logged calling and working them that proved a dead give-away though. No sensible licensee would expect to avert penalties by such a ruse. Several times in this column we have warned against answering certain D4's, CM-CO's, HK's, etc., that have been reported. *Any* W-activity constituting a foreign communication smirches the reputation of all amateurs at the same time it endangers the license of the responsible operator. Because *any* such work increases the potential danger of restriction for all amateurs, this item calls for all amateurs to be highly alert and constantly vigilant to assist in enforcing compliance of FCC's Order No. 72, as well as to avoid any carelessness or omissions of even a *single transmission* in amateur station log keeping.

Eternal vigilance . . . is the price of liberty.

To Gain Copying Ability — Write It Down. Many amateurs have just recently come to realize that writing-down ability is a too common weakness. This is to suggest quite frankly that all amateurs make a practice of *writing down* everything that comes over the air, even rag-chewing stuff! This writing-down habit, we assure you, will be translated into real progress in copying ability.

Code Proficiency progress is largely a matter

of constant practice to cultivate and develop the power to coordinate. Writing-down ability must be coordinated with the training of the faculties of hearing and understanding code signals to create useful copying ability. One chap thought his writing-down ability alone was his stumbling block on the path to certificate recognition. He made a test of setting down copy read to him from a paper and found, with surprise, that his initial speed of pencil-pushing was only about 20 w.p.m. but that he could double it with practice. Mill copy is something so to be desired that no real operator is satisfied until he can copy code accurately on a typewriter as well as with a stick. Too many amateurs are backward in essential operating-copying ability because they have never done much writing down of copy in their amateur work. So we suggest a new slogan . . . write it down.

Some time ago we mentioned that in using 'phone it was an essential and often overlooked courtesy to fellow operators to write down the remarks. The same goes for c.w. remarks. There is a difference between note making and accurate copying, too! You fellows who think you can do 15-, 14-, 20- and 25- w.p.m. C.W., do you mean that you can pick out a few words at will, or get the general drift of a conversation at those speeds, or that you can *really copy plain language text mixed with numerals with perfect accuracy* at the indicated speed?

The excellent response to the W1AW runs indicates universal amateur interest in the subject of Code Proficiency. If you have a certificate from Hq. based on this W1AW program of qualifying runs, we know that you have proved to yourself and everybody else that you have the demonstrated ability, and are not just another hot air artist. If you can't put it down in black and white and make an accurate transcription of what was sent, then you cannot call yourself an *operator* in the true sense of the word. Make a practice of writing everything down, to gain confidence and the ability to put ten on a line like a professional!

There's plenty going on to write down each of the 24 hours of the day. W1AW's schedules for code practice, and sending practice, and qualifying runs are given in a separate article so will not be repeated on this page this month. Copy on paper, *not* just in your head, and you will be surprised to see what the program will do for you. We got an informal report on some code tests conducted of new men in the service to check

operator ability reading, "Once again the traffic-handling hams came through as the best code men. . . ." The copying down type of operator training comes naturally to those who get into traffic fun and nets involving use of procedure and need for accurate writing out of texts. Real operating ability is the ability to take it on the air, through QRM, QRN, QSB, etc. It takes savvy, practice on counting the ten on a line as they come, practice in copying accurately just what is sent under whatever difficulties, practice in writing down, to make the finished operator. Amateur operating is capable of creating that superlative ability to take it as an operator that sticks with a fellow longer than results of intensive radio school courses from working and listening right on the air . . . if you will write it down.

Listen to press and W1AW runs. Satisfy your natural curiosity as to the speed you can get down on paper without errors. Send us a copy of a W1AW Qualifying Run (June 1st and 17th, see page 58). If you haven't got your recognition or

proof of what you can do for the top bracket, you are now eligible for certificate and sticker awards which we aim to extend to every licensed U. S. amateur operator. Write it down!

1941 Field Day Here. June 7th and 8th are the dates. Full detailed announcement of the Ninth ARRL Field Day appears elsewhere in this issue. Whatever you do, don't miss the F.D.! Operating afield is a barrel of fun and fraternalism, as well as an intensive training in coöperative planning and endeavor. A Field Day should involve putting up antennas and feedlines (ready-out for emergency), connecting and nursing equipment for effective operating adjustments, planning relief operating shifts so a full quota of contacts is made. Living and working together for a period in the open involves a commissary problem. A F.D. represents emergency testing of operator ability and stamina as well as that of the equipment! Get your notification under Order 73-D in to FCC early and be on deck in the 1941 F.D.

— F. E. H.

The Month in Canada

From letters received in reply to the circular sent from Headquarters, this column should make real interesting reading, not only for those of us who are still at home, but more particularly for the boys on active service, and these are the fellows we want to know more about, so it is up to each and every one of us to pass along to our old club secretary, SCM, to me, or direct to Headquarters, everything of interest to amateurs, both at home and abroad. We are all waiting anxiously for the appearance of our first column in nearly a year and a half. The results are up to each and every one, so let's put it over with a bang! For those of you who have sent along suggestions, please accept this as my acknowledgment and thanks. With the encouragement I have received, our column is bound to be a success.

73.

— Alex Reid, VE3BE

AS STATED by CGM Reid above, "The Month in Canada" column is ready to take off. The propeller is turning, the motor throbbing briskly, the landing gear straining against the brakes. The craft is in prime condition for a long and successful flight. All that is needed now is the fuel to keep it going! So send it along, fellows — send along the news and "bull" that will keep us flying fast and high and with a tank full of the latest VE doings.

Our introductory announcement on page 26 of May QST stated that we hoped to be able to centralize the news for this column through the SCM's, as in the past. It is evident now that there will be complications in doing so, for some are away from home and others are simply too busy with special labors for "paper work" of this kind. In those sections we will endeavour to locate other regular correspondents as time goes on. For example, VE3AZ has already agreed to serve in lieu of Ontario's SCM, VE3EF, since Dr. Gunn is now on active service. Quebec's SCM Morris, VE2CO, is on the job, and will, of course, receive reports for that Section. As for the rest of you fellows, until further notice send your dope to West Hartford, won't you? We'll do our best to correlate it here and print it in the column.

QUEBEC

AND now Lin Morris, 2CO, will take the floor with the news from Quebec:

IN, JZ, and Bev of CP are with the National Research Council at Ottawa. HW instructs in signals at RCNVR. LC is at Trenton. GM, EE, JS and OB are in the navy. FO is in Toronto, while 3AKO is back in Montreal. HP is stationed at Megantic, and IP is now in Montreal. 5TD flew east to attend his father's funeral; he reports meeting IO (now with RCAF) in Vancouver. OR has a junior op. GO, OU, PW & CO are instructing at McGill COTC. HO and GE are studying hard for their army commissions. CR moved to Toronto same week as his brother from there moved to Montreal.

W1KH met a number of the gang on his visit here. BE is reported to be gaining esteem as poker player. (Whatsa, Alex? — Ed.) Others on active service are: EN, FE, CD, BO, FG, LV with the air force; BU, BK, AR with the army. FE says he has met more VK's and ZL's now than he ever heard on the air.

The old noon-hour gang at Chez Yvette's has dwindled away, though the old reliables, DR, HV, FV and MU, are usually on deck. HE is married. DE just received his commission in the navy. DU is president of the Young Men's Canadian Club of Montreal. IE has taken up home movies.

Fellows, let's keep together as much as we can during these times. This column will be a great help, so please send in your news items regularly to CO so that they will be reported here.

ONTARIO

NEXT we will hear from Len Mitchell, 3AZ, who has been gathering the news from Ontario:

The Wireless Association of Ontario, Canada's oldest radio club, which has been in continuous existence since 1913, has been carrying on as usual since the outbreak of the war. Faced at that time with the necessity of deciding whether to disband "for the duration" or to carry on in spite of the war-time ban on amateur activities, the Executive decided to carry on as long as possible. It was felt that as the members could not meet "over the air," the club meetings would afford an opportunity of rag-chewing and getting together "as of yore," and also it would keep together the nucleus of an organization for post-war activities. Although the Executive has experienced more than the usual difficulty in getting suitable speakers, their efforts have been more than justified and the meetings are as well, if not better, attended than before.

Recently a new series of talks has been inaugurated for the junior amateurs. These talks are to be given each meet-

ing night before the commencement of the regular meeting so that the senior members may come at the usual time to the usual meeting, and the newer amateurs or prospective amateurs who come for the junior talk can also stay for the general meeting. The ARRL Handbook is being used as a basis for building the outline of the talks, the first of which was given on April 17th by Fred Rogers, 3IQ. It dealt with general a.c. characteristics, and each talk thereafter will deal with some other department of amateur radio practice until the whole field is covered. The main speaker at the meeting on April 17th was Mr. E. Olson of the Canadian Westinghouse Co. Ltd., who spoke on "RF Amplifiers and Converters."

In his spare moments 3IB has been teaching code and radio theory to prospective applicants for enlistment in the armed forces. IX was recently appointed to the RCAF with the rank of flying officer. CP is stationed at the Canadian Signal Training Centre at Vimy Barracks.

At the beginning of the war when the ban was put on amateur operation, one Toronto amateur received his license in the same mail as the notice cancelling it!

Hutchinson, DU, reports the following from the London (Ont.) district: AAO, ALX, AUI, KD, VT and WP are on active service with the RCAF; HG and KC on active service with RCN; AI, ALF, AQQ, CM, HZ and SD are on active service with RCCS; AQP, AQL, AQB and DU are in reserve RCCS; QC has recently changed his QRA to Fort Erie and AJH has moved to Windsor. WX has moved to London and is working in the Income Tax Department. TN is still in the barber business. AJQ still looks after his cows and chickens, and his wife in his spare moments. HI, who has been quite ill, is on the mend now; we all wish him a speedy recovery. AJE seems to have gone into hiding, as DU reports he never sees him any more although he works just across the road from DU. DU changed QRA on May 1st to 858 Lovett Street, by the way.

GENERAL

LEAVING CBC for a commission as flying officer at the No. 3 Wireless School, Winnipeg, 4SS is serving as educational officer with the RCAF and British Commonwealth Air Training Plan.

1KQ has been in England since January, a leading air-craftsman (radio) in the RCAF, his sister Isobel writes.

3QB is interested in confirming whether or not Horace Stark, 3UH, was the first VE ham casualty of the war. Does anyone have information we can pass along?

And that's the program for this month. We'll be seeing you next meeting. And in the meantime, won't you write us and tell us what's news for "The Month in Canada"? Thanks, and 73.

— C. B. D.

Hamfest Schedule

June 1, 1941, at Norfolk, Nebr.: The Annual Hamfest of the Northeast Nebraska Radio Club will be held Sunday, June 1st, at Ta Ha Zuka Park, Norfolk, Neb. Further details may be obtained from NNRC Secretary, Willis N. Drees, W9IYM, Wisner, Nebr.

June 21-22, 1941, at Panama City, Fla.: The Panama City Amateur Radio Club will hold its First Annual Hamfest June 21st and 22nd. The affair will feature several contests, and a large number of amateurs from Florida and surrounding states is expected to attend. Write C. H. Beach, W4BJF, Chairman, Panama City Radio Club, P. O. Box 713, Panama City, Fla., for additional information.

Brass Pounding' League

(March 16th-April 15th)

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
W6ROZ	126	258	1626	248	2258
W3GKO	18	51	1547	43	1659
W3BWT	86	263	942	246	1537
W6ROZ*	110	165	1090	154	1519
W4PL	21	45	1211	38	1315
W9LH	25	206	966	117	1314
W25C	28	147	1023	89	1287
W9BRD	55	118	984	104	1261
W7BBQ	65	107	928	93	1193
W6DH	146	222	612	91	1071
W6LUI	301	382	2	377	1062
W9QMD	31	27	965	13	1036
W9JMG	35	33	947	8	1023
W5DWV	59	54	866	29	1008
W6RWV	91	178	554	163	976
W9GJX	749	43	50	17	859
W6LUI*	271	293	3	290	857
W4AAO	48	42	731	36	857
W2MNT	48	53	684	40	825
W9NSU	11	2	788	0	801
W8FCN	103	123	464	55	745
W9OZN	11	10	711	15	737
W5MN	56	131	442	102	731
W9QKL	31	52	631	11	725
W8SJJ	16	7	686	4	713
W6PGB	84	207	204	200	695
W6BMC	40	11	600	5	656
W3HUM	12	159	299	153	623
W610X	13	22	558	17	610
W5CEZ	14	140	439	14	607
W5FDR	40	83	402	70	595
W2LZR	31	85	399	77	592
W5IGO	28	27	518	13	586
W6PGB*	70	93	336	87	586
W4DEP	4	51	478	37	570
W7WJ	41	21	498	9	569
W9OUD	37	81	429	20	567
W3BZX	5	10	548	0	566
W2AYJ	53	111	352	49	565
W3AOC	88	48	438	35	559
W2MLW	153	74	266	54	547
W5GFT	63	122	277	80	542
W6JW	84	160	188	105	537
W7HZI	41	16	450	14	521
W3CIZ	15	33	444	25	517
W1EPE	18	67	408	11	504
W9EKQ	7	18	468	8	501

MORE-THAN-ONE-OPERATOR STATIONS

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
KAIHR	1328	916	44	889	3177
W5OW	133	154	1282	81	1650
W3CXL	42	131	724	131	1028
W1AW	82	174	586	148	990
KAIHQ	227	172	184	150	733
W6FWJ	201	47	420	45	713
W4FCU/GFO	39	59	608	0	706
W9KXR	0	0	514	0	514

These stations "make" the B.P.L. with total of 500 or over. One hundred deliveries + Ex. Del. Credits also rate B.P.L. standing. The following one-operator stations make the B.P.L. on deliveries. Deliveries count.

W6SPB 364	W8UFH, 220	W6NRP, 153	W3HAZ, 111
W9AEJ, 350	W2KI, 219	W9UQV, 150	W6RGQ, 108
W3ZD, 322	W1AZW, 197	W6ZM, 146	W3AQN, 107
W6HG, 314	W9VDY, 196	W3CDQ, 135	W5AAJ, 103
W6RBO, 302	W2CGG, 193	W3BZE, 127	W8SCW, 103
W9VDY*, 296	W9VBQ, 191	W6ZX, 125	W5DDJ, 102
W9SEB, 276	W1LOA, 184	W5CDU, 123	W3BXE, 101
W4HHG/4, 264	W4EVJ, 181	W8GHV, 120	W2BWC, 100
W2LPJ, 249	W6IMI, 180	W4AOB, 114	W4CCJ, 100
W1MGC, 241	W8KWA, 163	W9UNJ, 112	W4DD, 100
W3JHW, 227			

More-than-one-opr.

WSCEB, 214

W8IHN/NIT/TNU/9, 140

A.A.R.S.

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
WLMW (W9QIL) 73		217	339	210	889

MORE-THAN-ONE-OPERATOR STATIONS

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
WLM (W3CXL) 322		265	2486	265	3338

A total of 500 or more or 100 deliveries + Ex. D. Cr. will put you in line for a place in the B.P.L.

* Feb.-Mar.

ARTICLE CONTEST

The article by Mr. Maurice E. Katzer, W5GTS, wins the C.D. article contest prize this month. We invite entries for this monthly contest. Regarding subject matter, we suggest that you tell about what activity you find most interesting in amateur radio. Here you will find an almost limitless variety of subjects. Perhaps you would like to write on working for code proficiency, Emergency Corps planning, traffic work, working in Section Nets, Phone and Telegraph operating procedures, holding a League appointment, working on radio club committees, organizing or running a radio club, the most interesting band or type of ham activity, or some other subject near to your heart.

Each month we will print the most interesting and valuable article received. Please mark your contribution "for the C.D. contest." Prize winners may select a bound *Handbook, QST* Binder and League Emblem, six logs, eight pads radiogram blanks, DX Map and three pads, or any other combination of A.R.R.L. supplies of equivalent value. Try your luck!

Let's Improve Our Fists

BY MAURICE E. KATZER,
W5GTS*

I LISTENED to some commercial stations for a couple of hours, and then I turned to the forty-meter band. Wow! What a mess! I had never noticed it before. I suppose that one tends to get used to any kind of sending, no matter how sloppy it is. I did not notice the terrible fists on the ham bands until I listened to some good fists. The difference is amazing. Any similarity between the average ham's fist and a good one is — well it just is not.

A general effort should be made by all amateurs to improve their fists. Naturally, the only way to improve one's fist is by practice, practice, and practice. One must, however, be extremely careful while he practices. Yes, practice makes perfect, but it also makes bad habits worse. One will tend to make the same mistakes over and over again if not careful. Directed practice is best. Practice with a friend, one who can tell good code when he hears it, and will not be afraid to tell you that your sending is sloppy. He can point out your mistakes, and then you know what needs correcting. Bad sending habits are usually harder to break than bad personal habits. You may be conscious of your bad personal habits, but you can never be sure of your sending habits unless someone tells you about them. That is where constructive criticism comes into the picture. Constructive criticism, listening to good fists, practice and patience are the builders of good fists.

You may think that your fist is good because no one has told you that it is bad. Have you ever told anyone that his fist was bad? Probably not. How many times have you had a QSO with a newcomer who gave the eternal excuse that he cannot copy you on account of the QRM? You probably decided that he was a lid and that he cannot copy your code. He probably could not copy your code. But did you ever stop to think that maybe it is you and not he that is at fault? Good code is easy to copy, bad code is difficult; very difficult for the beginner. An old-timer may copy you 100% but he can probably copy anything. A beginner may copy twenty words per minute from a good fist, but can not copy ten words per minute from a bad one! We have public enemies in our ham bands, and they should be exposed.

Public enemy number one is usually unaware of his faults. He is the one with the "swing" on his c.w. Swing is all right in a dance band, but it has no place in a ham band. Code should be regular, precise, and even machine-like. The fellow who does not realize that he has a swing on his code should be told about it. The fellow who has rhythm in his

* 1418 N. Greenwood Ave., Fort Smith, Arkansas.

code and boasts about it, should be, well —. The only way to eliminate swing is to make a deliberate effort to destroy it. Let's save our rhythm for the dance halls, not ham bands.

Public enemy number two is the butcher. Either poor or inconsistent spacing is his offence. He either runs words together, tears them apart, or — even worse — uses a combination of the two offences. His code reads like this, "We llo glge ssth at that isab fallh er e." Can you read it? He may even butcher the symbols themselves. His dots are usually all right, but his dashes — oooh! They are either too long or too short, or even both; worse if it is both. The receiver has to guess whether he is receiving dots that are too long or dashes that are too short — he usually guesses wrong.

Public enemy number three is the bug. The bug is a machine, and like every other machine ever conceived by man, it must be in proper adjustment, and it must be operated correctly before it is of much use. The bug was invented as a boon to the sender, but it became a bad headache to the receiver. The two greatest faults of the bug are not at all due to its mechanical nature. The worst one is that the operator will try to operate it too fast. He thinks that he is a big-shot because he sends at breakneck speed. Those who listen to him give him other names. The other great offender at the bug is the individual who sets his dots twice as fast as his speed. Have you ever listened to an operator sending fifteen words per minute and his dots set for forty-word-per minute speed? You know how it sounds. This usually always results in too many dots.

Let us all make a conscientious effort to improve our sending abilities. Get out your old buzzer or your audio oscillator, and listen to your fist. It's ten to one that you will be surprised or ashamed, or maybe both.

Cheyenne Emergency

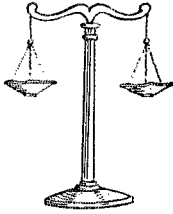
IT NEVER occurred to the S.C.M. when W7HDS was appointed E.C. for Cheyenne, Wyo., that within a month she would be called upon to set in motion the newly formed A.E.C. group there. In fact, I could easily imagine a communications emergency at quite a few other places before settling on the largest city of our state, representing a population of nearly 25,000 persons, an airline and railroad terminal and the capital of Wyoming. Nevertheless, Easter morning found the city besieged by a spring blizzard which unloaded such a great amount of heavy freezing snow on the lines and poles of the telephone services that one by one, lines west, north, east and south gave way under its weight. The telephone office in Cheyenne immediately contacted W7HDS asking her to contact their Denver office if possible. W7HRM was delegated to work 40-meter c.w. W71MJ took over on 75-meter 'phone while W7HDS tried the 20-meter 'phone band in their efforts to establish contact with Denver. With the aid of W8QUL and W9CAW the messages were put through and the outlet established. The time required for the first message to get through was something short of an hour. Later, another message filed at Cheyenne for Denver was delivered and answered within ten minutes.

The telephone people in both Denver and Cheyenne were very pleased, and high praise was extended the participants by the state superintendent at Cheyenne. Prior to all this on April 3rd, W7HDS was interviewed over the Cheyenne radio station KFBC and told what is being accomplished by the A.E.C., and described the plans for the Red Cross A.R.R.L. Test scheduled for April 4th, 5th and 6th. It can happen here and sometimes does, so it's best to be ready for it!

— HENRY L. SCHROEDER, S.C.M., Utah-Wyo.

WHEN TO TRY FOR WAR

Days	E.S.T., p.m.	Amateur Band Monitored	WAR Frequency
Tues. & Wed.	7:00-7:45	3500-3900 kc. (c.w.)	4020 kc.
Tues. & Wed.	7:45-8:00	3900-4000 kc. ('phone)	4020 kc.
Saturday	7:00-8:30	3500-3900 kc. (c.w.)	4020 kc.
Saturday	8:30-9:00	3900-4000 kc. ('phone)	4020 kc.
Mon. to Sat.	9:00-10:00	7000-7300 kc. (c.w.)	6990 kc.



IF YOU READ this page a year ago (the issue of May 1940, to be exact), you may recall some of the hundred and one reasons why a receiver is apt to have dead spots at high frequencies. At low frequencies many of these difficulties disappear, but some receivers may have dead spots even in the broadcast band. These may be due to defects such as improper shielding of unused coils, for instance.

When a receiver will not pick up a signal at certain frequencies, many operators assume that there are no signals there. Maybe there are plenty of signals. Maybe the trouble is in the receiver. The test for this is similar to the one described last month for checking RF stage performance. You will recall that in that test, the procedure was to operate the receiver on MVC, with no antenna, and with enough gain to hear the "rushing noise" in the speaker. Under these conditions, killing the first RF stage by touching the grid connection of the first RF tube should cause a reduction in noise. Since the ratio of noise "before and after" is a measure of the RF stage gain, this test may be used to check for dead spots by repeating it at different frequencies. In practice, it is merely necessary to tune slowly through the range of the receiver, tapping the grid cap, and looking for frequencies where this tapping does not cause a noise variation.

A communication receiver should have plenty of gain. When using a crystal filter at maximum selectivity, the attenuation of the sidebands causes an apparent reduction in the strength of the signal, making it desirable to use more gain. Aging of the tubes will cause a gradual loss of sensitivity, so that extra gain is needed in order to get reasonable tube life. For both of these reasons, the set should have a lot more gain than is needed for ordinary work with new tubes. Many amateurs condemn as "noisy" any receiver with this reserve sensitivity because there is so much noise in the speaker when the gain is turned up to maximum. The answer to that one is "Don't turn the gain to maximum unless you need it". That is what the gain control is there for. We think you will agree that it is much better to turn down the gain when not needed, than not to have gain when you *do* need it.

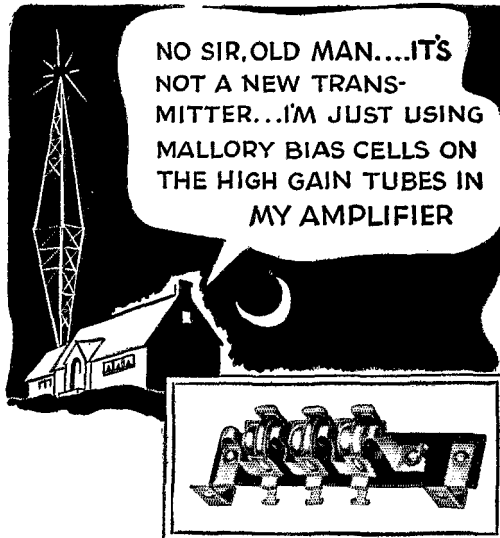
Checking a receiver for images is a rather obvious procedure. The main trick is to make sure that you do not blame the receiver for harmonics in the transmitter (as many amateurs do). It is not difficult to tell them apart, as an example will show. Suppose that you tune in a signal at 14 MC on a receiver having an IF frequency of 475 KC. Since the image of the signal will be separated from it by twice the IF frequency, it can be found by retuning the receiver to either 13.05 MC or 14.95 MC. In most cases you will find the image at the lower frequency. If you use enough gain you will probably be able to find an image, though if the receiver is as good as the NC-200 the image will be at least 30 db weaker than the signal, even at the worst frequencies (10 meters).

Transmitter harmonics are, of course, an even multiple of the fundamental frequency. In the example given above, a spurious signal found at 28 MC should be blamed on the transmitter. It could not possibly be an image.

This finishes our series of three pages on receiver testing without laboratory equipment. We are reprinting them in the form of a small booklet which will be sent to anyone requesting it without charge.

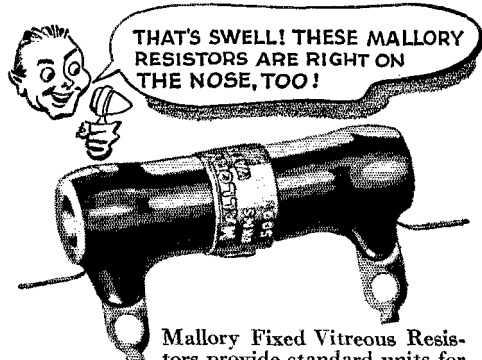
JACK IVERS





BETTER PHONE QUALITY

Ground the cathodes of the high-gain tubes in your speech amplifier. Stop audio degeneration, lower hum-level and improve audio quality. Bias your voltage amplifier tubes with Mallory Grid Bias Cells. They cost less than resistors and condensers required to give anywhere near equal performance.



Mallory Fixed Vitreous Resistors provide standard units for all transmitter and receiver applications. They may be depended upon for long and efficient service . . . resistance to humidity and resistance to permanent change under extreme overloads.

P. R. MALLORY & CO., Inc.
INDIANAPOLIS INDIANA
 Cable Address—PELMALLO

Use
P.R.MALLORY & CO. Inc.
MALLORY
 APPROVED
 PRECISION PRODUCTS

Signal Corps Memo

IN MILITARY communications all modes of contact have to be utilized simultaneously as efficiently as possible. In planning operations the weight and cost of equipment must be considered. The number of channels possible depends on the width of frequency band required for a given channel and the number of frequencies or wires available. The requirements for essential accuracy are severe. The following memorandum on message handling by c.w. vs. 'phone, quoted from an official Signal Corps memorandum may be of interest, indicating as it does the fields of dependence and suitability of the two modes for messages of tactical value that must be relayed and recorded for study or reference, or utilized when personal instructions between stations in direct contact are to be handled. We quote:

"The matter of radiotelegraphy versus radiotelephony for handling messages is similar in comparison with the use of telegraphy and wire telephony, respectively. In general, it can be stated that the radio or wire telegraph method is used for record communications. That is, to handle third party messages (destined to persons other than the two operators on the circuit) requires that the text be recorded and later transcribed for delivery through other agencies (by messenger, telephone, telegraph or other radio channels).

"Telephony . . . whether by radio or wire, involves person to person conversation and the communication normally is not recorded. It is used mainly in military, as well as in some civilian operations, as a command channel of communication; that is for the discussion and issuance of verbal instructions between two commanders or similar agents.

"Amateur radiotelephone station operators do not function in capacities similar to radiotelephone operators employed at police radio stations, airways control towers, commercial air lines, etc. Traffic handled by amateur radio stations, whether they are radiotelegraph (CW) or radiotelephone (Phone) stations . . . requires recording by the receiving operator for further handling or delivery. In view of the fact that few radio amateurs are expert shorthand stenographers, and because of the many repetitions required and the need of using phonetic spelling to accurately record messages sent by voice, it actually takes less time to handle traffic accurately by telegraph than by voice.

"The cost of a radiotelephone transmitter is almost twice that of a radiotelegraph set of the same power output rating."

ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below:

(The list gives the Sections, closing date for receipt of nominating petitions for Section Manager, the name of the present incumbent and the date of expiration of his term of office. This notice supersedes previous notices.)

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the different Sections in response to our previous notices, the closing dates for receipt of nominating petitions are set ahead to the dates given herewith. In the absence of nominating petitions from Members of a section, the incumbent continues to hold his official position and carry on the work of the Section subject, of course, to the filing of proper nominating petitions and the holding of an election by ballot or as may be necessary. Petitions must be in West Hartford on or before noon of the dates specified.

Section	Closing Date	Present SCM	Present Term of Office Ends
Philippines	June 2, 1941	George L. Rickard	Oct. 15, 1938
Kentucky	June 2, 1941	Darrell A. Downard	Apr. 15, 1940
Vermont	June 2, 1941	Clifton G. Parker	Feb. 15, 1941
Western Florida	June 2, 1941	Oscar Cederstrom	Apr. 15, 1941
New Mexico	June 2, 1941	Dr. Hilton W. Gillett	Apr. 15, 1941
No. Minnesota	June 2, 1941	Edwin Wicklund	June 15, 1941
No. Texas	June 2, 1941	Lee Hughes	June 15, 1941
Sacramento Valley	June 2, 1941	Vincent N. Feldhausen	June 15, 1941
North Dakota	June 2, 1941	Anton C. Theodos	June 14, 1941
Hawaii	June 16, 1941	Francis T. Blatt	Feb. 23, 1941
So. New Jersey	June 16, 1941	Lester H. Allen	June 22, 1941
Iowa	June 16, 1941	L. B. Vennard	July 3, 1941
San Francisco	June 16, 1941	Kenneth E. Hughes	July 5, 1941
So. Carolina	Aug. 15, 1941	Ted Ferguson	Aug. 25, 1941
Eastern Penna.	Aug. 15, 1941	Jerry Mathis	Aug. 23, 1941
Md.-Del.-D. C.	Sept. 2, 1941	Hermann E. Hobbs	Sept. 17, 1941

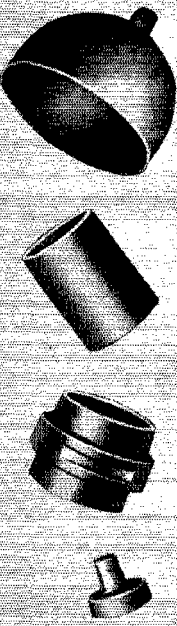
1. You are hereby notified that an election for an A.R.R.L. Section Communications Manager for the next two-year term of office is about to be held in each of these Sections in accordance with the provisions of the By-Laws.

2. The elections will take place in the different Sections immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The Ballots mailed

YOU CANNOT OVERLOAD

Speer

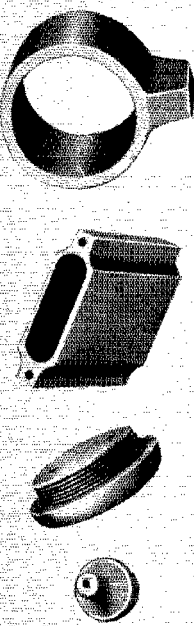
GRAPHITE ANODES



No matter how you slam on the voltage, SPEER Graphite Anodes can take it. Of all anode materials, graphite is the only one that heat cannot fuse — cannot even soften or warp. No matter how hot SPEER Graphite Anodes get, they cannot blow. Think how that increases the service life of transmitting and power tubes!

Besides being literally heat-proof, graphite has many times the relative heat dissipating value of any other anode material. As a result, tubes with SPEER Graphite Anodes can handle more power.

For these reasons and others equally important to tube users, SPEER Graphite Anodes are used by many of the leading tube manufacturers. Write us for a list of them and for a copy of the SPEER Anode Booklet.



SPEER CARBON CO.

ST. MARYS, PA.



Yesterday... Today ...and Tomorrow



Our yesterday goes back 27 years. At that time, The ALLEN D. CARDWELL MANUFACTURING CORPORATION pioneered the now standard method of condenser construction: the use of metal endplates and grounded rotors, and the supporting of the stator by means of small insulation strips instead of bushings. This was the original "low loss" condenser.

Though the passing of years has proved the merit of this early, basic patented design, its evolution is a splendid example of CARDWELL product development.

Today, literally hundreds of thousands of our units are being employed in practically every type of communications equipment from the lowest power amateur transmitters to the highly complex controls of frequency checking devices.

And while our production facilities are now taxed by tremendous and ever increasing demands, our engineers remain steadfastly at their task, constantly striving for further improvement.

Tomorrow, The ALLEN D. CARDWELL MANUFACTURING CORPORATION will be geared to serve you as never before.

**THE ALLEN D. CARDWELL
MANUFACTURING CORPORATION**
83 PROSPECT STREET • BROOKLYN NEW YORK

from Headquarters will list in alphabetical sequence the names of all eligible candidates nominated for the position by A.R.R.L. members residing in the Sections concerned. Ballots will be mailed to members as of the closing dates specified above, for receipt of nominating petitions.

3. Nominating petitions from the Sections named are hereby solicited. Five or more A.R.R.L. members residing in any Section have the privilege of nominating any member of the League as candidate for Section Manager. The following form for nomination is suggested:

(Place and date)
Communications Manager, A.R.R.L.
38 La Salle Road, West Hartford, Conn.
We, the undersigned members of the A.R.R.L. residing in the Section of the Division hereby nominate as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Five or more signatures of A.R.R.L. members are required.)
The candidates and five or more signers must be League members in good standing or the petition will be thrown out as invalid. Each candidate must have been a licensed amateur operator for at least two years and similarly, a member of the League for at least one continuous year, immediately prior to his nomination or the petition will likewise be invalidated. The complete name, address, and station call of the candidate should be included. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the closing date given for receipt of nominating petitions. There is no limit to the number of petitions that may be filed, but no member shall sign more than one.

4. Members are urged to take initiative immediately, filing petitions for the officials of each Section listed above. This is your opportunity to put the man of your choice in office to carry on the work of the organization in your Section.

— F. E. Handy, Communications Manager

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed in a number of Sections, as provided in our Constitution and By-Laws, electing the following officials, the term of office starting on the date given.

North Carolina	W. J. Wortman, W4CYB	Mar. 18, 1941
Rhode Island	Clayton C. Gordon, W1HRC	Apr. 18, 1941
N.Y.C.-L.I.	E. L. Baunach, W2AZV	Apr. 22, 1941

In the Nebraska Section of the Midwest Division, Mr. Harold Bennett, W9WKP and Mr. Royal E. Olmsted, W9POB, were nominated. Mr. Bennett received 45 votes and Mr. Olmsted received 39 votes. Mr. Bennett's term of office began April 15, 1941.

Meet the S.C.M.'s

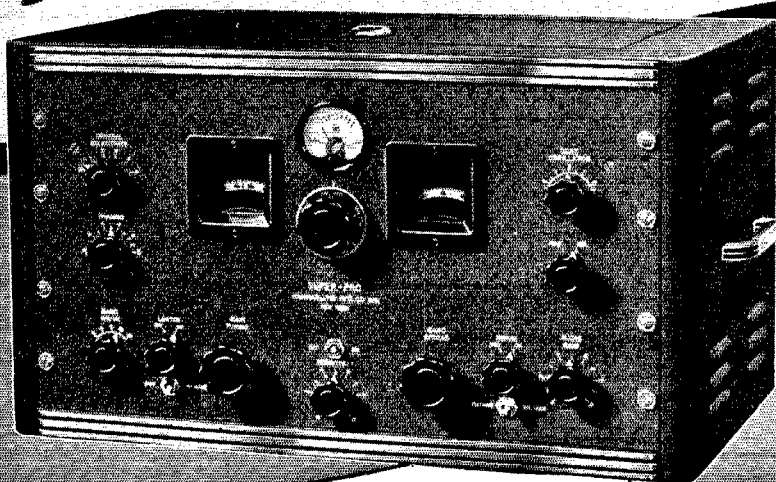


Mario de la Torre, CM20P

One of the youngest S.C.M.'s in the A.R.R.L. field organization is CM20P of the West Indies Section. He recently reached his twentieth birthday and has been a ham since he was a little shaver back in 1931. Active on 7, 14 and 28 Mc., his lay-out includes a 6L6C-TZ40-203A c.c. transmitter, SX16 and homebuilt t.r.f. receivers. S.C.M. de la Torre holds the distinction of having received a medallion in the 1938 Copying Bee and won the award for his section in the Second A.R.R.L. QSO Party. He is O.R.S. and a member of the Radio Club de Cuba. During the 1932 Santiago disaster he assisted in emergency work done at CM8BY. CM20P's other diversions are bicycle riding, swimming and tennis. He is at present preparing for entrance to the University of Havana where he will study law.

THE

Professional's
CHOICE!



PROFESSIONALS who choose "Super Pro" receivers for national defense, newspaper work and short wave rebroadcasting know they can count on them to come through at critical times. Years of association with the "Super Pro" have led them to consider it first no matter how difficult the job may be. There is great satisfaction in selecting a "Super Pro" for it is not limited to one type of service. Its great flexibility makes it readily adaptable to almost any operating condition. In addition to its many other features, the variable IF band width provides the best possible quality reproduction under any given conditions of interference.

Write Dept. Q6 for 16-page "Super Pro" booklet

**SUPER
PRO**

*series
"200"*

H A M M A R L U N D

THE HAMMARLUND MFG. CO., INC., 424 WEST 33RD STREET, NEW YORK CITY, N. Y.

MORE FOR YOUR MONEY
WHEN YOU SPECIFY
C-D CAPACITORS WITH
**HIDDEN
EXTRAS**

YOUR CAPACITOR DOLLAR buys more when you invest in C-D's. You get those *hidden extras* that distinguish the Cornell-Dubilier capacitor from all the rest. Extra stamina, extra dependability, extra long life — extra *value* through and through at no extra cost. Amateurs who know Cornell-Dubilier know the "reason why" of these *extras*—it's Cornell-Dubilier experience... thirty-one years of capacitor specialization. You can rely on C-D's every time to give you more for your money.

send for new catalog no. 185a

GET THESE ADVANTAGES
AT NO EXTRA COST IN C-D
DRY ELECTROLYTIC
TYPE BR

- hermetically sealed
- vented
- polarity clearly indicated
- extremely versatile—will fit into most cramped chassis



Get the extras AND YOU GET THE
TOPS IN CAPACITOR
PERFORMANCE!



CORNELL-DUBILIER
ELECTRIC CORPORATION
1013 HAMILTON BLVD. • SO. PLAINFIELD, N. J.

BRIEFS

In the 1.75-Mc. W.A.S. Party held in February, W9YYZ worked 308 stations in 40 states for a score of 61,600 points. This information was inadvertently omitted from the high scores listed on page 70 of April *QST*.

— . . . —

W9YJS has become Missouri's first "radio fire chief." The title was bestowed on him and a gold badge presented by the State Chief of the Fire Underwriters Patrol for the part played through the activities of W9YJS's station in stimulating fire prevention activities in Kansas City to such an extent that the city won a place of honor in the inter-chamber fire waste contest in 1940 after a poor showing the previous year.

— . . . —

A quite pronounced interest in amateur radio was created in the vicinity of Amarillo, Texas, due to the recent emergency there. The public schools were among the first to desire a better acquaintance with radio in general. Culminating a three-day series of addresses by commercial and broadcast representatives, Hal Sparks, W5HZZ, explained amateur radio, its history, study for preparation in obtaining license, difference and relative merits of radiotelegraphy and radiotelephony, the value of knowing how to handle traffic and how it played such a major part in Amarillo's recent ice storm. There was much interest in W5HZZ's talk as evidenced by the numerous questions put forth by both students and teachers.

— . . . —

We quote from a letter written by W9UQT, Secretary of the Central Illinois Amateur Radio Club: "Message blanks are going to be sent to Camp Forrest, Tenn., for the boys to use who are down there from our community. We think the blanks will make it easier for W4HHG. He sure is doing a yeoman job in handling practically all the traffic in the Camp. . . . That means a lot to us because about a hundred of the lads from this neck of the woods are in Camp Forrest." The idea of clubs furnishing blanks to amateur friends now operating from military camps is a very splendid gesture and one which should help considerably to increase the flow of traffic from trainees.

WOULD YOU BELIEVE IT?

ELMO T. WINDBAG FOR YOU

RADIO DEALERS IN WEST BUMP, UTAH, REPLACED 12,462 GASSY RECEIVING TUBES FOLLOWING THE RECENT MAYORALTY CAMPAIGN IN THAT CITY.

UMSAY UFFSTAY EHAY IDKAY ?

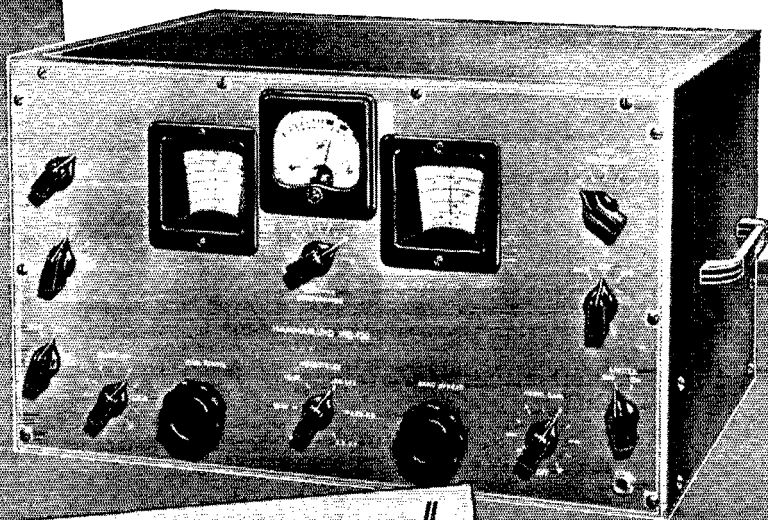
LITTLE PERCY POPOVER, AGED 1½, CAN COPY CODE IN PIG-LATIN, UPSIDE-DOWN, WITH ONE EYE CLOSED AT 35 PER.

THUNDERBOLTS ARE SAID TO KEEP BETTER IN VACUUM JARS THAN IN THE OLD-FASHION TYPE USED BY BEN FRANKLIN IN HIS KITE EXPERIMENTS.

Get-Nick

WHERE PERFORMANCE COUNTS!

THE "HQ-120-X" is widely used in amateur stations owned and operated by men who, during their work day, are designing and developing commercial equipment. These engineers are *real* critics when they are buying receivers for their own use. With them it's performance above all else. Craftsmanship and engineering have been combined to make the "HQ-120-X" a receiver which anyone would be proud to own. No corners were cut in its design. Inductive and capacitive trimming are employed in the R.F. circuits to assure perfect alignment, maximum image rejection — low noise level. Go over the "HQ-120-X" carefully — try it in your own shack — you will agree it's a fine performer. Write for 16-page technical booklet.



Use the "HQ-120-X"

HAMMARLUND MFG. CO., INC.
424 West 33rd St., New York City
Please send 16 page "HQ-120-X" booklet.

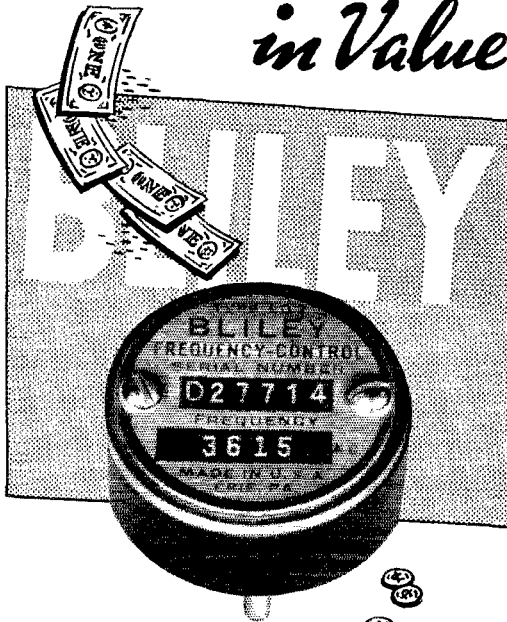
Name.....
Address.....
City.....State.....

Q6

H A M M A R L U N D

EXPORT OFFICE: 100 VARICK STREET NEW YORK CITY

Dollars More
in Value



OFTEN MEAN BUT
A Few Cents More IN COST

Your price for Bliley Crystal Units could be reduced. Savings can be brought about through simplifying or eliminating certain manufacturing processes and design refinements.

Our engineers would not, however, approve such a procedure. Knowing the facts, you also would not approve. The answer is simple; those "extra" operations and attentions to details determine the final quality of the finished crystal, yet the cost is but little more.

Dollars more in performance value for a few cents more in price will always be good purchasing economy. Bliley Crystal Units are your best buy because they are precision-made for maximum value rather than produced for minimum cost. Your distributor has your copy of circular A-8, describing Bliley amateur crystals — ask for it.

BLILEY ELECTRIC CO.
UNION STATION BUILDING ERIE, PA.

Single Side-Band Receiving

(Continued from page 17)

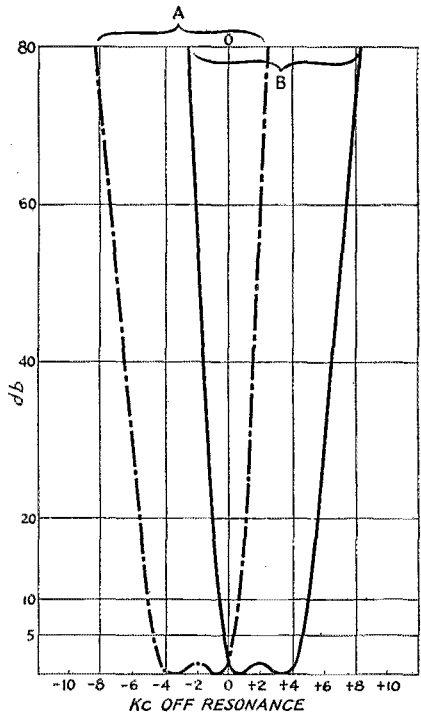


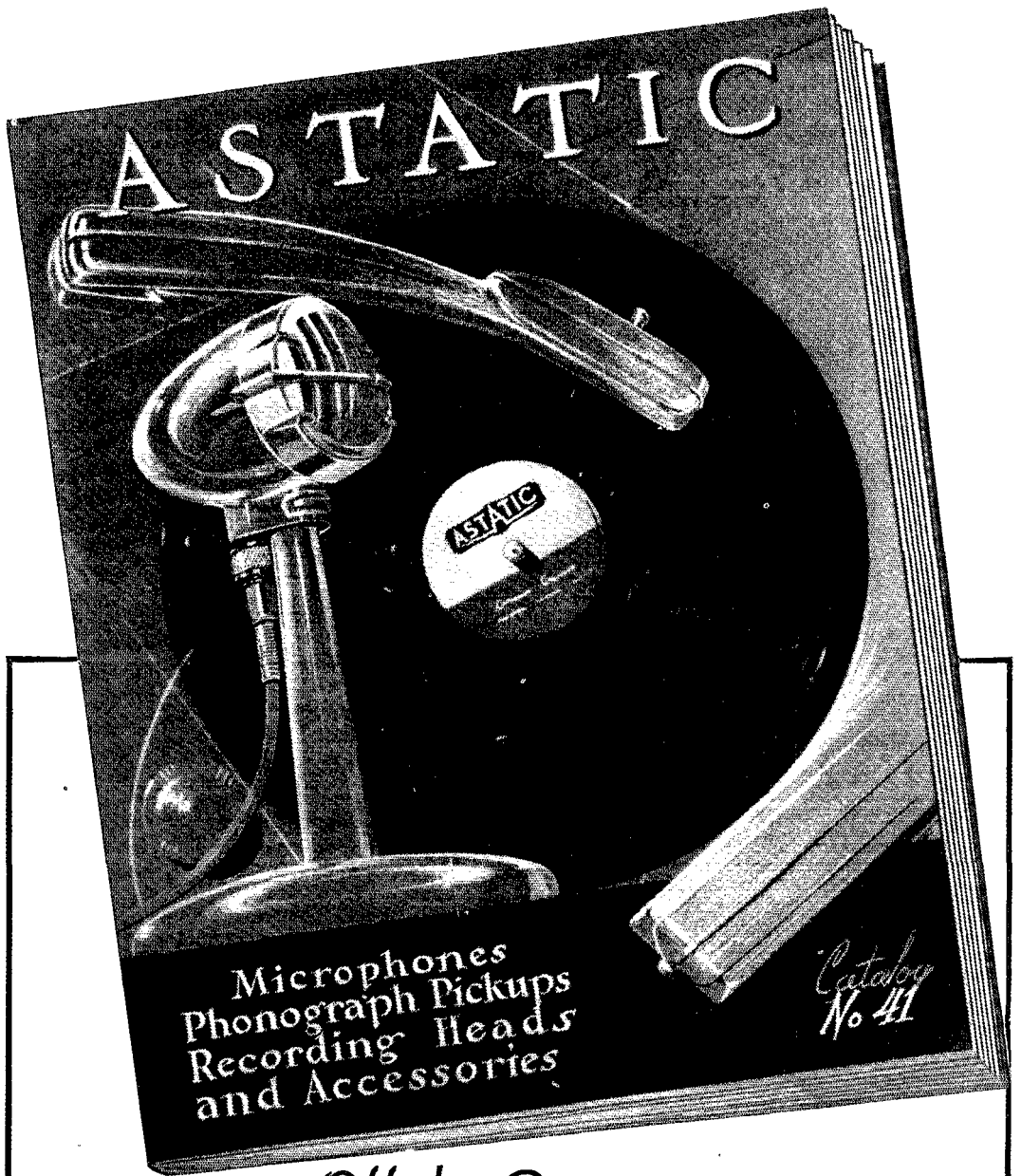
Fig. 3 — Selectivity characteristic of the band-pass amplifier in the unit shown in the photographs. The carrier is placed at one edge of the pass-band. The dashed curve is the solid curve shifted, by selecting the appropriate crystal oscillator, to pass the lower side band. This curve was taken at 455 kc. and includes the selectivity of the part of the regular receiver i.f. in use.

two crystal-controlled oscillators, to the single side-band accepted by the 50-kc. amplifier.

It is obvious that to be useful any system of heterodyne rejection must be rapid in operation, suppressing all the interference that it is capable of suppressing under the particular receiving conditions in a minimum of operating time. The selectable single side-band system satisfies these conditions. It is fast and it is effective.

★ New Receiving Tubes ★

KENRAD announces two new receiving tubes, the 6AH7GT and the 12AH7GT. Identical except for heater ratings, these octal-base tubes are twin triodes with separate cathodes, designed for converter and audio applications. Each triode section has a maximum plate-voltage rating of 300 and plate dissipation of 2.5 watts. At normal operating plate voltage of 250, the recommended biasing voltage is 16. The tubes have an amplification factor of 16 and transconductance of 2400 umhos. Normal plate current is 12 ma. Pins 1, 2 and 3 and 5, 4 and 6 are, respectively, connected to the grid, cathode and plate of each triode section. Heater connections are to pins 7 and 8.

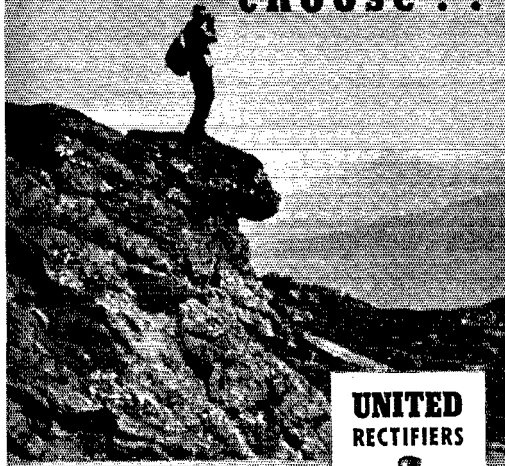


Off the Press in June, Astatic 1941

Catalogs will be available to visitors at the Radio Parts National Trade Show and for Astatic customers and friends everywhere. See your Radio Parts Jobber or write direct.

THE ASTATIC CORPORATION
YOUNGSTOWN, OHIO

Observing individuals choose . .



The real thinkers of the engineering fraternity are predominant users of UNITED rectifier tubes. The familiar styling of these famous tubes is now a hallmark of professional wisdom.

Others, with a change here and a change there, come and go. Those "in the know" steadfastly insist on UNITED.

1. **TWO TYPES TO CHOOSE FROM**—Unshielded and shielded—each has specific advantages.
2. **GREAT SAVING IN TIME DELAY**—10 seconds initial or routine—this quality of the 966 places it in a class by itself.
3. **FULLY SHIELDED CONSTRUCTION**—For certain applications where shielding is important, type 966A is the uncompromised solution.
4. **NO EXCESS MERCURY**—966 and 966A have measured mercury content, preventing harmful amalgams and costly time delay.
5. **LONG AND SATISFACTORY LIFE**—is not merely predicted, it is a matter of history.

Types illustrated interchange with 866 and 866A. Write for technical data covering these and larger types 972, 972A and 975A.

UNITED RECTIFIERS



966A \$1.50

966 \$1.20



RATINGS (both types)

Filament
2.5 volts, 5 amps.
Peak inverse
10,000 volts
Plate current
1.0 amp. peak
.25 amps. average
Tube voltage drop
10 volts average

UNITED ELECTRONICS COMPANY

42 SPRING
STREET

NEWARK,
NEW JERSEY

Field Day

(Continued from page 27)

simultaneously operated transmitters used at any time in the contest period by any entrant. All units or set-ups constituting a score group are placed under the call and control of one licensee who has made the required advance notification meeting FCC requirements and who is responsible for accuracy of all logs and records.

Design your station equipment, especially exciters and receivers, for portability, connection to battery or emergency supply quickly if power fails and necessity arises. Don't deny yourself the ability and pleasure to set up in any location when radio links to agencies served by amateurs in the public interest may be needed. Surprisingly efficient and useful equipment may be operated from vibrator-type, genemotor, and battery power supplies. Gas-electric emergency power units for 300 watts or more are not as expensive as they used to be. Hundreds of amateurs have built their own very inexpensively following directions from page 26 of November, 1937, *QST* or had Dodge generator frames rewound for 110 v.a.c. by local industrial training schools for just the cost of materials.

The only purpose of the scoring system is to make it interesting to see how our work measures up with others who go afield. Group planned Field Days are interesting, constructive, and good fun. If you cannot be with a group, aim to check in for a few contacts with an *individual* set up. Prove emergency readiness on these dates by participation! Here's luck, and we're looking for your report.

— F. E. H.

An Inexpensive Exciter

(Continued from page 18)

condition. Start with the plates of the neutralizing condensers screwed up tight and then back off a full three turns on each condenser. This places the neutralizing capacities at approximately the correct values. Condenser C_5 is then rotated through resonance, which will be indicated by a kick in the grid current. Adjust the neutralizing condensers in small steps, turning both screws in the same direction and the same amount each time, until the grid current remains stationary when C_5 is rotated. This indicates complete neutralization. Retune the grid circuit after neutralization so that maximum excitation will be secured. It is also a good idea to recheck the coupling between L_4 and L_5 as described above, since neutralizing will change the load on the driver somewhat.

Plate voltage may now be applied to the amplifier. With the plate tank tuned to resonance the plate current should fall to 20 or 25 ma. A load such as an antenna or feeder system, or a 10-watt lamp used as a dummy antenna, may be connected and the coupling adjusted until the plate current reaches the full-load value of 60 ma. It is possible that the tube will stand more than this, but 60 ma. represents a safe limit. The grid current will fall off to 10 ma. or so when the amplifier is loaded.

The transmitter output may be fed into any

W5CXH 1939 winner Hiram P. Maxim Award as most outstanding radio amateur

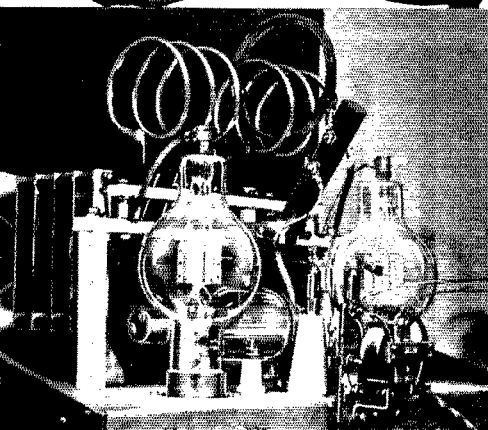
...another Eimac user

The transmitter shown has just been placed on the air by W6OGZ and W5CXH operating jointly. The final amplifier consists of a pair of Eimac 100TH's and an Eimac Vacuum Tank Condenser in the tank circuit.



"...the 100TH's in my rig work as well on 5 meters as they do on 160"... says Dawkins Espy W5CXH

The list of achievements by W5CXH is long enough to fill this page. Reference to the August, 1940 issue of QST will give you a fair idea of his ability. The point here is that intelligent use of high quality equipment almost inevitably brings outstanding results. The choice of Eimac tubes and VC condensers by W5CXH is corroborating evidence of the oft' repeated statement that "Eimac tubes are first choice among the leading radio amateurs." Selecting equipment of this calibre is surely the first step you can make toward outstanding achievements in radio.



Follow the Leaders to

Eimac
TUBES

General Electric-McCullough, Inc.
San Bruno, California

EIMAC REPRESENTATIVES

California, Nevada
HERB BECKER, 1530 W.
104th St., Los Angeles, Cal.

Wash., Ore., Idaho, Mont.
GENERAL SALES CO.,
Verner O. Jensen, 2605-07
Second Ave., Seattle, Wash.

Colo., Wyo., New Mexico,
Arizona, Utah
RICHARD A. HYDE, 4253
Quitman St., Denver, Colo.

Ohio, Mich., Ky., Ind., Minn.,
Mo., Kan., Neb., Iowa
PEEL SALES ENGINEER-
ING CO., E. R. Peel, 154
E. Erie St., Chicago, Ill.

N. Y., N. J., Penn., Md., Del.,
Dist. of Col., Maine, N. H.
R. I., Conn., Mass.
ADOLPH SCHWARTZ,
14726 Elm Ave., Flushing,
New York.

Texas, La., Okla., Ark.
J. EARL SMITH, 2821 Liv-
Oak St., Dallas, Texas.

Chicago, Illinois, Wisconsin
G. G. RYAN, 549 W.
Washington Blvd., Chicago,
Ill.

N. Caro., S. Caro., Georgia
Tenn., Flor., Ala., Miss.
JAMES MILLAR, 316 Ninth
St. N. E., Atlanta, Georgia

Export Agents:

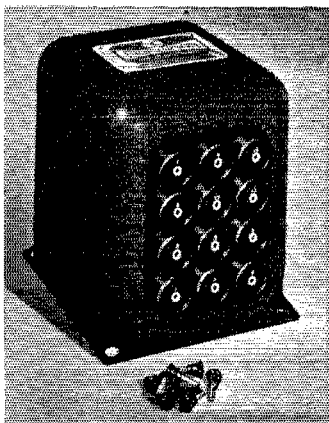
Frazar & Co., Ltd., 301 Clay St., San Francisco

Enjoy Multi-Match Economy

Tube changes will not obsolete Thordarson Multi-Match Modulation Transformers—they are made to fit new tube characteristics.

These transformers will match all Class B plate loads from 2000 to 20,000 ohms to any Class C load from 3000 to 15,000 ohms.

Switchboard plug-in terminal board permits quick, accurate matching of tube loads.



Compound filled cases give complete protection from atmospheric conditions.

It is traditional for amateurs to use Thordarson transformers; amateurs know Thordarson's built-in safety margin gives longer operating life, freedom from chatter, and quiet efficient transfer of audio power from modulator to modulated stage.

Ask to see these transformers at your Thordarson Distributor today!

THORDARSON

ELEC. MFG. CO.

500 WEST HURON STREET

CHICAGO

ILLINOIS

TRANSFORMER SPECIALISTS SINCE 1895

type of antenna providing an appropriate matching or tuning system is used. Systems employing a two-wire non-resonant line may be coupled directly to the output coil without tuning.

At the recommended input, 21 watts (60 ma. at 350 volts), the output as measured in a dummy antenna is something over 10 watts. For modulating the transmitter 100 per cent, an audio power output from the modulator of about 11 watts is required. The modulator output transformer must match an impedance of 5833 ohms (modulated amplifier plate voltage divided by modulated amplifier plate current expressed in amperes). A 6000-ohm output winding will be close enough to provide a satisfactory match.

A.R.R.L. HEADQUARTERS OPERATORS

W1AW, A.R.R.L. Headquarters:
Hal Bubb, "Hal," Stn. Eng. and Chief Opr.
George Hart, "Geo," 2nd Opr. See others, below.

The following calls and personal signs belong to members of the A.R.R.L. Headquarters gang:

W1AL, J. J. Lamb, "jim"
W1BAW, R. T. Beaudin, "rb"
W1BDI, F. E. Handy, "fh"
W1CBD, C. B. de Soto, "de"
W1DF, George Grammer, "gg"
W1EH, K. B. Warner, "ken"
W1GS, F. C. Beekley, "beek"
W1INF, A.R.R.L. Headquarters Operators Club
W1JEQ, Vernon Chambers, "vc"
W1JFN, A. L. Budlong, "bud"
W1JMY, Joseph A. Moskey, "joe"
W1JPE, Byron Goodman, "by"
W1JTD, Hal Bubb, "hal"
W1LVQ, L. John Huntoon, "jh"
W1MFA, Harold K. Isham, "hi"
W1SZ, C. C. Rodimon, "rod"
W1TS, Don Mix, "don"
W1UE, E. L. Battey, "ev"
W3AMR, George Hart, "geo"
W9NFL, J. R. Buckler, "jeem"

Correspondence Dept.

(Continued from page 62)

crystal he is now 50 kc. further down in the mire. For all the good he is to you there he might as well be in the upper jungles of Peru with the Wenner-Gren Expedition. You'd have just as good a chance of working him.

So we opined that something ought to be done about it. (Where have I heard that one before?) Perhaps the powers that be would give us one night a year, maybe on 160, where all the real grey-bearded old-timers could drag out their quenched gaps, syncs and spark coils and really open up for a rally. Like the parades these guys have with 1909 Minervas and 1911 Locomobiles and Jack Benny Maxwells. Just wind 'em up and spin 'em, for the benefit of the Young Squirts and also so we could get that heady exhilaration that ozone used to give us.

Well, we dinged that as impractical, as much fun as it might be. But we *did* work around to something much more practical, of infinite simplicity and with real possibilities.

Why not set aside, by mutual agreement, some section of either the 40- or 80-meter band—perhaps both—where real old timers could count on finding their pals? Maybe just 5 kc. would do it. The only requirements to bust in and start talkin' to be, say, 15 years on the ham bands. Call it the Old Timers' Club. Say, wouldn't it be something if you knew you could tune to a certain spot on the band any night and run into men like 9RR, 2OM, 8BDA, 4FT, 6ZAC, 5KC, 5ZA, 3ZO and a thousand others!

SEND FOR THIS FREE BOOK

Our latest issue, with illustrations, descriptions and lowest prices on thousands of bargains. Sets, parts, supplies and accessories of all the better makes. No ham should be without his NEWARK CATALOG. It's FREE!
WRITE TODAY!

DISPLAY YOUR CALL LETTERS

Your call letters in GOLD ... on your ham shack door or auto window ... will look mighty fine!

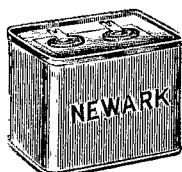
10c

Big, shadowed decalcomania letters nearly 2" high. Send dime for yours today. Don't forget to give your call letters.

THE BEST AND NEWEST AMATEUR RADIO PRODUCTS FROM ALL LEADING MANUFACTURERS

Always IN STOCK FOR IMMEDIATE DELIVERY

OIL FILLED — OIL IMPREGNATED FILTER CONDENSERS



AS LOW AS **59c**

Thousands now in use by "hams" who are still wondering how we can sell such dependable

quality condensers at such low prices. No compromise with quality. Made by a leading manufacturer and GUARANTEED at rated voltages.

Mfd.	Volts DC.	Size	Price
1	1000	5 x 3 3/4 x 1 1/2	\$.59
18.3	1000		2.15
4.4	1500	5 x 3 3/4 x 1 1/2	1.50
2	2000	4 3/4 x 3 3/4 x 1 3/4	1.50
8	2000	5 x 3 3/4 x 3 3/4	2.75
4	3000	5 x 3 3/4 x 3 3/4	3.75

HALLICRAFTERS

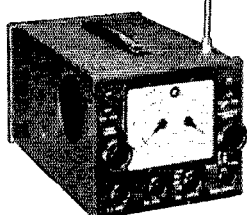
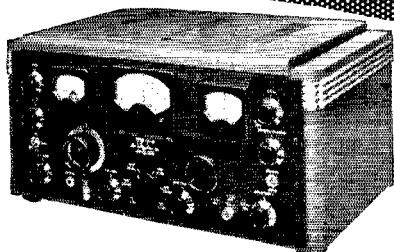
SX-28

Complete **\$159.50**

less speaker

\$15.95 Down

\$12.68 per month for 12 months



SPEAKERS FOR SX-28 Regular PM 23 speaker in cabinet. \$12.00
Hallicrafters Jensen bass-reflex enclosure. 30" high, 16" deep, 22 1/2" wide. \$29.50
Hallicrafters Jensen bass-reflex enclosure. 23 1/2" high, 10 1/2" deep, 17 1/2" wide. \$19.50

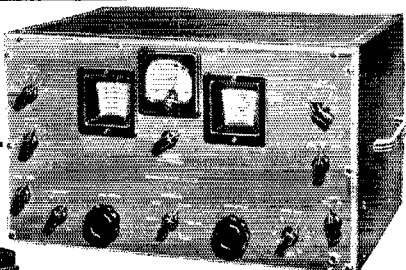
hallicrafters S-29

PORTABLE COMMUNICATIONS RECEIVER

Complete with Tubes, Battery and Speaker. **\$59.50**
\$5.95 Down — \$7.10 per Month for 8 Months

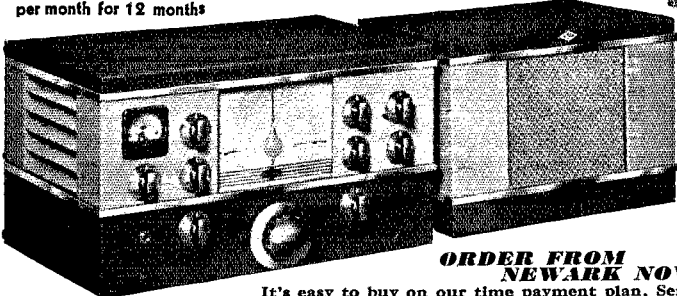
HAMMARLUND HQ 120 X

Cash price **\$138** complete
\$13.80 Down and **\$10.25** per month for 12 months



NATIONAL NC-200

\$14.75 Down, **\$11.73** per month for 12 months



ORDER FROM NEWARK NOW

Cash price **\$147.50** complete

It's easy to buy on our time payment plan. Send \$5.00 down payment and credit references with your order. We ship at once when credit is O.K. Pay balance, plus 6% carrying charge, at \$5.00 per month.

HIGH VOLTAGE POWER TRANSFORMERS

Newark's larger volume of amateur business makes this unmatched value possible. Made by one of the largest transformer manufacturers. These husky transformers have a place in every Ham Rig. Guaranteed. As illustrated.

Choice of Two Filament Types

No. 4149 — 600-0-600 V. — 200 Ma. Filaments: 7.5 V.C.T.-3A. — 5.0 V.C.T.-3A — 2.5 V.C.T.-10 A. Wt. 8 1/2 lbs. **\$2.85**

No. 4240 — 600-0-600 V. — 200 M.A. Filaments: 6.3 V.-4 A. — 6.3 V.-3 A. — 5.0 V.-3 A. Wt. 8 1/2 lbs. **\$2.85**



NEWARK

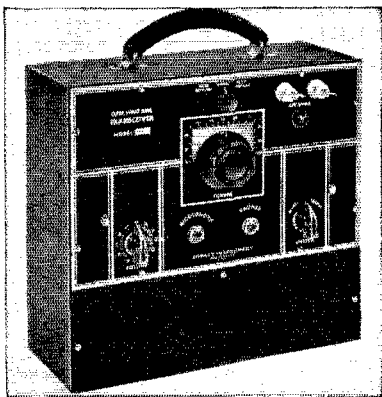
Electric Company
323 W. MADISON ST.
Dept. Q CHICAGO, ILL.

Go 2½ Meters For FUN or EMERGENCY

ABBOTT DK-3

ULTRA HIGH FREQUENCY
112 to 116 mc. (2½ meters) TRANSCEIVER

For PORTABLE . . . MOBILE and
FIXED STATION OPERATION



"FB" reports about this new ABBOTT DK-3 radio-telephone transmitter and receiver keep pouring in. Exceptional results from this extremely LOW PRICED unit. Range varies from 2 to 30 miles depending upon terrain. Ideal for emergency communication.

★ For BATTERY OPERATION—Three 45-volt B batteries (Eveready No. 482 or Burgess M30) and four 1½-volt batteries (Eveready No. 742 or Burgess 4FH).

★ For 110-volt AC OPERATION—Use AC power supply giving 135 to 180 volts DC output. Variable inductive coupling permits use of most standard antennas.

★ INDUCTIVE ANTENNA COUPLING—Variable antenna coupling knob on front panel permits maximum power in transmit position and enables flexible receiver control for both weak and powerful signals.

★ ONLY TWO INEXPENSIVE TUBES—6G6G as Audio Amplifier (receive) or as Modulator (transmit); 6J5GT as Super Regenerative Detector (receive) or as Oscillator (transmit).

★ SIMPLE CONTROL—One volume control, with on-off switch, for both receive and transmit; microphone and headphone jacks; special variable antenna coupling knob; ceramic antenna insulators; transmit and receive switch; large easy-tuning knob.

★ ANTENNA—Two pieces of copper or aluminum tubing approximately 17" long or an adjustable vertical antenna, required for portable operation.

★ MICROPHONES and HEADPHONES—Will operate with any single button 200 ohm carbon mike and any standard headphones. Hand sets should incorporate 200 ohm mike and high impedance phone.

★ SELF-CONTAINED—Complete in compact, grey wrinkle finish, metal carrying case with sturdy leather handle. Removable back panel for easy access. Size 11" long x 11" high x 4½" deep. Shipping weight, 11 lbs.

DK-3—List price, less tubes and batteries. . . \$29.50
(Subject to usual amateur discount)

SEE THE DK-3 AT LEADING DISTRIBUTORS
or write for Bulletin 101

ABBOTT INSTRUMENT, INC.

51 VESEY STREET NEW YORK, N. Y.

I'm no organizer. But maybe somebody else can see some good in this idea. Let's spread it out and take a look at it. What do you creaky old men say?

— Bill Lippman, W6SN/WLYI

BLIND DATE

State Division of Forestry, King City, Calif.

Editor, QST:

I quite agree with Ethel Smith, W7FWB. The YL's should make themselves known, but I am not so sure that "they would tell."

I am a key twitcher and I find that nearly every time I connect with a YL she will let me call her "OB" or "OM" for the entire QSO, then when it is time to sign off with the usual 73 she will suddenly announce my error as if it were my fault.

I not only agree with W7FWB in that the YL's should get together, but also that the YL's and the OM's get together in a life partnership in order that not only one but both could go crazy together in peaceful bliss.

However, I never did go for a blind date. Key twitching is as blind as a bat, tonsil busting only a little better. I think I will wait for television.

— A. E. Moorhead, Jr., W6AW

Strays

W3FQH, secretary of the Western Maryland Amateur Radio Club, unable to attend a meeting because he had been drafted, made a recording of his report on the minutes and financial standing which was played at the meeting. — W3AQV.

In Walt Disney's "Baggage Busters," Goofy is able to copy the following message from a telegraph sounder which gives out pure oscillator tones and does nothing but repeat CQ's: "See that magician's trunk is put on train No. 4." Wow! — ex-W9AYY.

"In March QST, you published the story of the tower that I built.

"Several Sundays ago, we had a 65-m.p.h. gale and it blew the tower over. It lifted one of the cement legs right out of the ground, so realize that I should have set it deeper in concrete as W2JRG suggests in the April issue.

"As the tower did not break anywhere until it hit the house next door, I feel that the rest of the design was sound.

"Of course, I hate to tell you about the failure of my dream child, but feel it would be unfair to our readers not to warn them against such a flimsy foundation." — W9JWC.

WIAPA, faced with the problem of carrying his portable 112-Mc. beam through hotel lobbies and such without attracting too much attention, licked it in a novel way. The three-element beam plus supports folds into a package that just fits nicely into his golf bag with the hood pulled over it. When there isn't any snow on the ground, he doesn't attract much attention!

The new G. E. Flamenol insulated wire for light and power circuits is excellent for transmitter wiring, especially for the high-current filament circuits. The insulation, which is thin enough to make a compact job possible, may be obtained in a variety of colors. The wire skins easily and is pre-tinned for ready soldering. — W9TZL.

HOW MANY OF THESE Do YOUR Tubes Give You?

1—Low Driving Power—Fewer Stages

2—Easy Frequency-multiplication

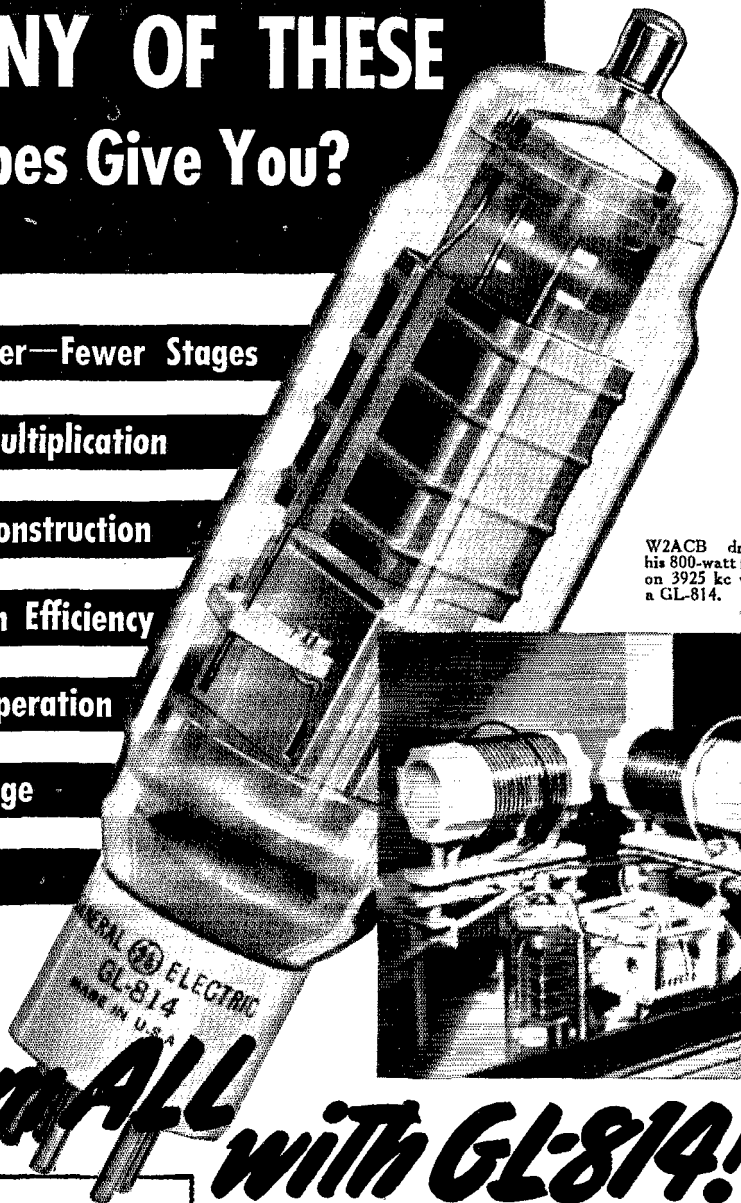
3—More Compact Construction

4—High Output—High Efficiency

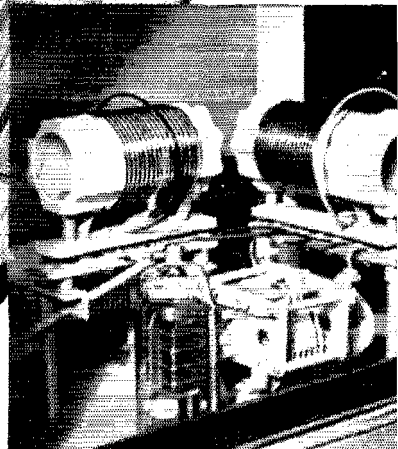
5—High-frequency Operation

6—Quick Band Change

7—No Neutralizing



W2ACB drives his 800-watt final on 3925 kc with a GL-814.



Get Them ALL with GL-814!

GL-814—BEAM-POWER TETRODE ICAS* RATINGS

Fil. Volts. . . . 10 Fil. Amp. . . . 3.25

	Class C Telegraph	Class C Telephone	
		Plate Mod.	Grid Mod.
Plate Volts	1500	1250	1500
Plate Milliamp	150	144	60
Driving Power, Watts . .	1.5	3.2	4.2
Output Power, Watts . .	160	130	35

*Intermittent Commercial and Amateur Service

For the low-power man who wants to step up a notch or the high-power man who wants greater flexibility in his rig, the GL-814 deserves plenty of consideration. GL-814's high power-sensitivity puts you up to 160 watts (cw) with only 1.5 watts driving power. As a frequency multiplier it's great. Band switching becomes a snap. By cutting out intermediate stages you cut down on equipment required, and on transmitter size. And there's no neutralizing to worry about. Figure how GL-814's can do a job for you . . . then see or write your G-E dealer. Try G.E. and measure the difference! General Electric, Schenectady, N. Y.

GL-814 - - \$17.50

GENERAL  ELECTRIC

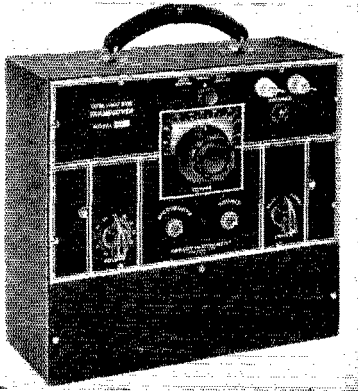
**WHERE you buy it
can be just as important
as WHAT you buy!**

The purchase of radio gear is not a cut and dried transaction. Generally a fellow wants to know a few things that the manufacturer's literature hasn't cleared up in his mind. He wants assurance that the job he is buying will do what he wants it to do. He wants assurance that he will be satisfied.

**I PROMISE YOU ALL OF THAT . . .
and MORE**

**Let me tell you all about this
New ABBOTT DK-3
PORTABLE — MOBILE —
FIXED STATION
TRANSCEIVER**

**that you are hearing so often on
the
2½ METER BAND**



It's an UNUSUALLY LOW PRICED radiophone transmitter and receiver with special Variable Antenna Coupling that permits use of maximum power while transmitting, and enables flexible receiver control.

Effective range is from 2 to 30 miles depending upon terrain. It is self contained in a compact, grey wrinkle finish, metal carrying case with a sturdy leather handle. Size 11" x 11" x 4½" deep. Shipping weight, 11 lbs. The back panel is removable for easy access.

Net price, less batteries and tubes \$17.35

I cannot tell you all the desirable features in this ad. Mail a card today and I'll forward everything by return mail.

Bob Henry
W9ARA

BUTLER
MISSOURI

Strays

Conditions for DX on "80" appear to have been hot this spring. W1JZD and W4TM have been reported S7-8 on 75 'phone from St. Heliers, New Zealand. Does it make your mouth water?

Anyone who has built the Rice "Variarm" e.c.o. unit described in QST for January and who has had trouble with buffer oscillation in the middle of the 7-Mc. band can eliminate it by shunting the buffer grid-circuit choke with a 100-μfd. mica condenser. — W3GFZ.

A.R.R.L. Sweepstakes

(Continued from page 64)

SCORES

(Scores are grouped by Divisions and Sections. . . . The operator of the station first listed in each Section is winner for that Section. . . . Asterisks denote stations not entered in contest, reporting to assure that stations they worked get credit. . . . The number of sections and number of stations worked by each participant are given following the score. . . . Likewise the "power factor" used in computing points in each score is indicated by the letter A or B. . . . A indicates power up to and including 100 watts (multiplier of 1.25). B indicates over 100 watts (multiplier of 1). . . . The total operating time to the nearest hour is given for each station and is the last figure following the score. . . . Example of listings: W3BES 113848-62-737-A-40, or, Final Score 113848, number of sections 62, number of stations 737, power factor of 1.25, total operating time 40 hours. . . .)

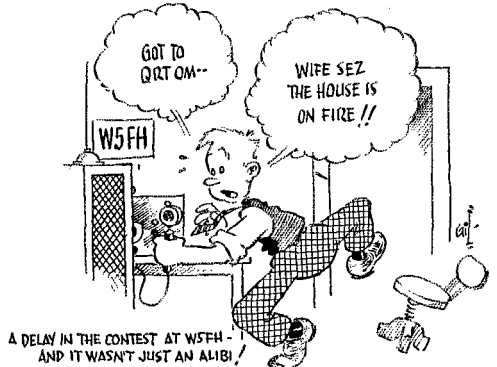
ATLANTIC DIVISION

E. Pennsylvania

W3BES 113848-62-737-A-40
W3DGM 93930-62-607-A-37
W3GCM 82945-61-538-A-37
W3GKO 80700-60-538-A-40
W3HFD 30314-59-547-A-40
W3EEW 71920-62-484-A-37
W3HLZ 67135-58-484-A-40
W3FLH 65260-58-450-A-39
W3GHD 62930-61-412-A-37
W3FRY 62920-62-404-A-37
W3IKW/S 62495-58-431-A-40
W3KT 61991-61-407-A-38
W3HYT 60783-58-423-A- -
W3DPU 58290-58-402-A-34
W3HXA 57565-58-398-A-37
W3BXE 56000-56-401-A-39
W3CRW 55970-58-386-A-39
W3GDI 54658-55-298-A-35
W3GET 54435-57-382-A-13
W8SPV 53630-62-346-A-40
W3HRW 53000-50-427-A-36
W3FGB* 51744-56-462-B-39
W3HPE 50588-57-355-A- -
W3OHH 48538-55-353-A-29
W3HJE 47310-57-332-A-36
W3AGV 42840-63-275-A-28

W3HRP 39360-48-328-A-40
W3EUC 36250-50-364-B-40
W8RJJ 35905-43-334-A-37
W3HNQ 31607-47-273-A-36
W3EFH 31388-45-279-A-39
W3BNH 31165-46-271-A-30
W8ITW 30798-59-261-B-33
W3IMI 28290-41-276-A-33
W3ADE 23088-52-222-B-26
22440-51-176-A-32
W3JOW 20588-45-184-A-39
W3EWR 18480-40-231-B-35
W8FXX 17716-43-206-B-25
W3GQW 17250-40-178-A-26
W3IDQ 16500-33-201-A-26
15588-29-215-A-21
W3HFO 13650-35-156-A-14
13376-44-158-B-16
W3ARK 11132-44-127-B-18
9788-29-135-A-18
9688-31-125-A-13
8225-35-94-A-15
W3GGT 8132-36-107-B-23
W8LAP 7704-36-103-B-36
W3ICB 7605-39-78-A- -
W3HCH* 6716-27-100-A-18
W3IGP 6293-31-103-B-19
W3IEG 6048-38-114-B-22

(Contd. on page 66)



★ ★ ★ ★ ★ ★

The radio amateur's handbook

THE STANDARD MANUAL OF AMATEUR
RADIO COMMUNICATION



1941

PUBLISHED BY THE
AMERICAN RADIO
RELAY LEAGUE

\$1 IN CONTINEN-
TAL U. S. A.

The *Handbook* tells the things which are needed for a comprehensive understanding of Amateur Radio. From the story of how Amateur Radio started through an outline of its wide scope of the present — from suggestions on how to learn the code through explanations of traffic-handling procedure and good operating practices — from electrical and radio fundamentals through the design, construction, and operation of amateur equipment — this book covers the subject thoroughly. It includes the latest and the best information on everything in Amateur Radio.

\$1 postpaid in Continental U.S.A.

\$1.50 elsewhere

Buckram bound edition, \$2.50

American Radio Relay League, West Hartford, Conn.

Station Activities



NEW ENGLAND DIVISION

CONNECTICUT — SCM, Frederick Ellis, Jr., W1CTI—AW's total of 990 is just 8 less than last month. Nice going, Hal and Geo.! BDI got a new 813. MEM expects to be on 112 Mc. Moving day at APA was April 15th. Gil should be back on the air by the time you read this. LOP is on 112 Mc. with a pair of 812's. CTC/1 reports that all amateur transmitters are qrt at Camp Edwards. If permission is given to resume, he will be with the boys on 3640 kc. The Conn. QSO party held April 12th and 13th went over with a bang. Activity was not quite as great as in the 1940 party, but the gang are sending in some nice reports. A summary of scores should be ready for the next issue of QST. Dish up a little dirt with your traffic reports, gang. No dirt, no column! UE has a twice weekly schedule with W2KU, Brooklyn. JPK was called in the draft. The Bristol Radio Club station, WIDHT, will soon be on air again. UK, MFM, MSJ, AYE, IFQ and JWG are on 112 Mc.

Traffic: W1AW 990 (WLMK 4) TD 190 CTI 135 JQD 114 KKS 26 BHM 17 BDI 15 MEM 13 APA 11 DGG 2 MGC 460 GB 7 KQY 49 JHN 10 CCF 283 TS 64 UE 57 KYQ 68 ITI 165 (WLGQ 20) NEQ-NCV 4 EAO 2.

MAINE — SCM, H. W. Castner, W1IE — That spring meeting of the Rockland hams was really something. W1MWW (YL) sure went to town and handled the eats. LZI took his Class A, CRP and LNI plan to cover 112 Mc. in the Portland Boys Club Marathon. LIP says they have a small rig on 7 Mc. I am receiving word that many of the boys are learning to use a mill, and that's just fine. NGV is putting up a new antenna and doing a fine job on the net. The Waterville Radio Club is now on its summer schedule of meeting every two weeks. TO is adapting his 'phone rig for c.w. also. I received a fine card from LIC at Camp Blanding, with 73 to all the Maine gang. VF, LRQ and BTY will be on Field Day at Hiram Hill. Listen for W1BTY/1. MZI moved to Brunswick. EBY and the gang are still determined to make that Emergency Net perk. They don't come any better than fellows like TO, AI and RU and a lot of others I could mention. FJP and TO are new members of the A.A.R.S. A hamfest is being planned for Rockland nearly July 1st, and some mention has been made of a big shindig contemplated for Camden. That April storm that disrupted wire services all over the State found the hams right on the job. It's a swell story, and great credit is due all the boys, including the PTN and BAV, LKP, AI, APU, AKR and many others. Did you see the editorial in the *Portland Press Herald*? KTN has gone to Schenectady, N. Y., and is working for G.E. I understand. When the PTN came on April 4th at 7:30 p.m., not one Red Cross message was handed. They'd all been sent as far as we could find, and that's very FB. GXY has a swell new auxiliary 500-watt gas-driven generator, and is ready for communication emergencies. Anyone else beside the P.A.W.A. and a few others who are PREPARED? Remember, everyone, your S.C.M. reports for May to June traffic and news go to the new S.C.M. My term expires June 7th, and I believe some plan will be made to keep the nets in operation during the summer. I know the Sea Gulf Net will carry on, and I advise everyone to keep in touch with the new S.C.M. for information on these activities. You can show no better spirit of public service than to notify the new S.C.M. that you will take E.C. appointment and insure the safety of your community. New Emergency Coordinators: MFJ, GMD and TO. New O.R.S.: MFJ, NGV and TO. Remember, the Field Day is June 7th and 8th, and you can participate in this portable work by the special F.C.C. order. GKC is still doing a lot for young prospective hams, and his shack is a regular radio schoolhouse; many have already taken the exam for Class C. I note with interest that Lieut. Fred Best, WB1G, has been called to active duty. The P.A.W.A. plan to have quite a few self-powered rigs in action on Field Day. LOA does a swell job of QSP between the Sea Gulf Net and BAV to the Pine Tree Net. Altogether this gives us very fine coverage over the State. BQL is on active N.C.R. duty. DTS has schedules with three separate forts where the boys are training, including Devens and Blanding, and is handling a lot of traffic but forgets to report. These are the things

that are a credit to all ham radio, boys, and they should be brought to public notice. There is a great increase in 56- and 112-Mc. interest. LHM is trying 56-Mc. work, and has a test with RU. I shall submit one more report before my term expires, and I wish this one to contain my sincere thanks for all the cooperation and help you boys and girls have given me during the past two years.

Traffic: W1IE 46 CEU 15 EJS 7 AI 6 GMD 32 NGV 10 KTT 22 FBJ 28 MFK 3 MFJ 4 EBY 11 GRJ 23 BTY 22 LYK 53 LKA 14 BAV 395 GXY 43 LKP 133 LNI 15 EUL 7 LOA 196 TO 17. A.A.R.S.: W1AMR 48 CFO 63 EFR 28 FAP 99 FJP 11 GE 39 GHT 20 GVS 126 IJF 123 IST 17 KOU 153 LML 127 TO 25.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, Jr., W1ALP — I want to thank all the hams in this Section who helped out in the Red Cross Test. Although we do not know the results at this writing, I think that every Chapter in this Section was taken care of, and a lot of the credit should go to the E.C.'s in each town, also, gang, to Bill, W1DTP, who spent a lot of time writing and phoning and drove about 30 miles to get one message from a Chapter that had no ham in town. On March 29th an emergency meeting was held in Boston at the Red Cross Hq's, to talk over various points on the Test. Thank you, gang, for your interest. Election of officers T9 Radio Club: Pres., HBG; Vice-Pres., FTB; Treas., IBF; Secy., MNK, Framingham Radio Club: Pres., YL; Vice-Pres., JBE; Secy., IBY; Treas., EHF; Activity Manager, IVI. MON won a 1000-watt generator donated by AHP at an A.A.R.S. meeting held at AAR with about 30 present. To all hams who handle traffic: Please send me your totals, large or small. We want them for our Section's report and to show the work done. What say? Just a card before the 18th of each month will suffice. New officers of the New England Radio Club Council: Pres., IIM; Vice-Presidents, HRC and AFD; Secy.-Treas., ALP. More new E.C.'s: HUZ, Wareham; NFQ, Foxboro; JLK, North Easton; AFQ, Harwich; BVL, Beverly; KQN, Canton; MBG, Bridgewater; LXQ, Newburyport; LBH, Essex County. AAL is now O.P.S., and HA O.R.S. JSM is new R.M. for 3.5-Mc. c.w. and KXU is new R.M. for 7 Mc. If you are interested in traffic work, look for these claps on these bands. MMM is new O.O. Any of you hams on 112 Mc. who are interested in A.A.R.S. Net, on Sunday at 8.45 a.m. and Wednesday at 6.45 p.m., call MON or QD for dope; they need more members. LYG/1 is handling traffic for Camp Edwards, down on Cape Cod; give your traffic to any A.A.R.S. member listed below. AFQ has a new emergency rig with 25 watts on 'phone. KH mailed his report from Montreal this month. HKN lost his skywire in a wind. AAR worked Worcester on 112 Mc. EHT has a schedule with Michigan, and will qsp traffic. Parkway Radio Club is getting ready for Field Day. NEZ is call of the State Guard under the control of WV. They have some fine emergency equipment. Amesbury hams on 112 Mc.: DYC, DPD, MDN and MEJ. Congrats to NHN, a new Y.L. up in Dedham on 112 Mc. MMM is now on 112 Mc. GAG has a new SX-28. NHR is new ham in Cambridge. NED is a new ham in Salem. FSK is now E.C. for Melrose. DMF is rebuilding his transmitter and receiver. ALP got back on the air again after moving. The Eastern Mass. Emergency Net is in the process of organization. Watch for further dope. JJE had to give up his job as Secy. of M.V.A.R.C. LO is having some B.C.L. trouble. LVN is building a new rig with T-40's final. The North Shore gang gave KMQ and his YL a sendoff party at LVZ's. DDB, JKR and CTR took part in maneuvers of the Mass. Wing of C.A.R. at Framingham, using 112-Mc. rigs.

Traffic: W1BDU 104 AAR 146 HEW 58 BMO 39 ZE 37 EHT 36 AGB 35 EMG 33 ZK 31 WI 18 AIDU 17 HIL 16 MZF 15 EKT 13 HX-KTE-WV 9 MDN-EAU 7 LXQ 5 MME-LZW-MMM 4 IPS-FWS-KQN-HUV 1 MQO 2 LWH 420 JSM 379 KXU 263 FSL 136 KCT 92 LYG/1 69 FDN-LPF-TF 1 DTP 2 IBF-MZP 1 CTR-ATQ 2 LXI-LGY-LRD 1 JCK 152 (WLGV 58) FWQ 82 LBY 67 LSA 50 BXC 24 MJK 19 JNU 10 LBH 5 HUP 2 EVJ 1 BNJ 8 RP 5 KH 18 DMF 2 BAP 4 LUG 1 AWA 45 LTG-MTV-LLE 1 AKS 206 (WLGQ 50) AAL 56 AFQ 4 MSK 1. (Feb.-Mar.) W1KZT 38 IPS-NAR-JNU 2) 2 1/2 AARS Net: W1BHL 11 EYR 96 LWI 80 MBS 38 MIF 50 MMY 18 MON 234 MQH 64 QD 69. Other AARS Nets: W1LPX 7 EPE 504 FGT 17 PRO 33 MAN 7 MEJ 12 TY 65 MEZ 64 AHP 263 MOJ 28 MNW 45 KYN 14 LGH 22 MLZ 11 CCL 28 DKS 63 LTS 19 JFS 48 LYZ 76 KMQ 46 MTQ 23.

WESTERN MASSACHUSETTS — SCM, William J. Barrett, W1JAH — W1BIV sez spring fever is getting him — his traffic total doesn't show it by a long shot. FOI ran

up nice total as control of A.A.R.S. 'Phone Net and liaison with 3.5-Mc. C.W. Net. Any 'phone operators interested in hearing a real snappy 'Phone Traffic Net are urged to listen in on the West. Mass. A.A.R.S. 'Phone Net on 1830 kc. AZW reports the Pittsfield Radio Club is getting set for Field Day. The Red Cross message from the Berkshire County Chapter was handled beautifully. It went from E.C. JLT to R.M. AZW, then direct to W3HUM in Washington. MIM reports Westminster's first ham, NHL, a product of the Recreation Radio Club training course. BVR finally got the HQ-120X, and is tickled with it. Perce attended a meeting of Pittsfield Radio Club. He is rebuilding to 616G-811, figuring that \$3.50 is a better price for a final than the present 15 bucks. GZL reports that the local 14- and 28-Mc. gang are holding monthly bowling matches. Among the participants are: KIU, KZU, KK, JRE, JRA, DYA, DSX, DLY and GZL. Les also reports that KK joined the benedictus recently. AJ is very active in A.A.R.S. now. BNL says he will be on again soon, after he finishes 112-Mc. job among other items. KZU reports NH, formerly of Pownal, Vt., is now in Azawam. LUA is back on after two weeks off, to move from Ashley Falls to Great Barrington. BXF is back with A.A.R.S. after absence of some years. ADF has 20 w.p.m. Code Proficiency Certificate. Addresses of NAQ and NAB were inadvertently reversed last month, so let's get 'em straight. Hi. NAQ is in Adams, and NAB in Shelburne Falls, both tying into the P.C.N.

Traffic: W1BIV 324 (WLGN 89) FOI 266 AZW 239 (WLGD 34) JAH 159 (WLGH 18) LJF 69 MIM 65 BVR 43 (WLGA 83) MJP 39 LUA 35 BXF 33 KZS 25 GZL 24 AJ 20 ADF 10.

NEW HAMPSHIRE — SCM, Mrs. Dorothy W. Evans, W1FTJ — For the Red Cross Test recently held, a partial mobilization of the New Hampshire Emergency Net was held. All chapters were assigned member stations of the N. H. Emergency Net, with one or more alternates to help cover if necessary; thus the N. H. Emergency Net gave 100% coverage for the Red Cross during these tests. However, some Chapters were not heard from in any way. However, 32 of New Hampshire's 40 Chapters were reported through to Washington, according to reports reaching your S.C.M. These reports were not complete, so the chances are that the total was somewhat higher than this. Twenty-two of the Chapters were cleared on the 3840 New Hampshire Net direct to Washington in approximately two hours; in addition, 2 Chapters were cleared direct, 5 on 1840 and 3 on 3925. Again the New Hampshire hams proved their readiness and ability to handle communications of this type, and your S.C.M. wants to take this opportunity to thank all of the hams who assisted in this Relay. W1AXP is working for WMUR, new B.C. station here. JKH has his O.R.S. renewed, and is getting FB results with rig using 6L6GX at 20 watts input. COO has rebuilt and has about 500 watts on 56 Mc. XYL of HRP is in the hospital for a serious operation. Our best wishes for her speedy recovery. LSN has been QRL on 56 Mc. IUI and LSN are trying to keep activity alive on 56 Mc. IDY has been ill, but is now ship-shape again. BST has his Class A ticket. JJD and AOQ are having a good time on 112 Mc. KCW has returned from the Arctic. MLO is QRL with NEN and N. H. A.A.R.S. Nets, but still finds time to rag-chew on 7 Mc. BWR is working part time at WFEA. AVG is on 3.9-Mc. 'phone. CNX has a new e.c.o. CFG is chief engineer at WFEA. ITF has been practicing on the mill-copying press. FYR is working at WLNH. KMH is sporting a new f.m. adapter. CUZ and XYL attended the eat-fest at Lawrence, Mass. recently. The 3.9-Mc. 'Phone Net is operating weekly on Sunday at 10 A.M. AXL is building a portable power supply for emergency work. NAJ is a new ham in Nashua. MUW attended the Framingham Hamfest. NEI is a new ham in Laconia and is very active. BHJ is back at his old QTH once more and is going to work on his beam. JDV has returned from a trip to Florida and can be found on 56 and 1.75 Mc.

Traffic: W1IDY 173 IP 112 JDP 92 GMM 82 GEY 75 BFT 70 MMG 50 KLV 23 JKH 35 FTJ 31 BFA 30 CEA 25 KIN 22 HFO 19 MLO 10 LSN 9 LIN 7.

RHODE ISLAND — SCM, Clayton C. Gordon, W1HRC — The N.A.A.R.O. have moved into new quarters at the Wansuk Post of the American Legion, and have their Field Day equipment all built and ready to use from a location at Wallum Lake. MQF has a new rig on 3.5-Mc. c.w.; it's a 6SK7 e.c.o., 6V6 dblr. and 807 final with about 40 watts. KYP has a new Defiant receiver. LWA has an 811 final on the air and devotes most of his time to traffic. Ray is now State Net control No. 3 in the A.A.R.S., and has the special

call WL GK. He originated three messages for the Red Cross during the tests. ALJ is back on the air with a 6F6 e.c.o., 6L6 dblr., 807 bfr. and an HF-100 driving a pair of 250 TH's at 900 watts on 3.5, 3.9 and 7 Mc. CJH is again active on 1.75 Mc. with a pair of 852's, BFB is on 1.75- and 28-Mc. 'phone. NES is doing a bit of work on 3.5 and 7 Mc. KRQ keeps in touch with the Westerly crowd by mail, and tells them he will be on the air with a new rig shortly from Glens Falls. FOV has rebuilt his rig so that now he makes out on 28-Mc. 'phone. IEJ, who is working night and day, finds time to get on 1.75-Mc. 'phone, Sunday afternoons. KRF is now on 7-Mc. c.w. MOK is hitting 112 Mc. with p.p. HY615's. MEK got his QSL from Nevada. KKE, new O.R.S., has been helping me out for the last three weeks while I have been working in Pittsfield; he gathered the news for this report and is standing ready to pinch-hit where needed. I see by the papers that you have drafted me for two more years as your S.C.M. This starts me off on my seventh year in this capacity. Guess it's time to stand up and stretch a bit in the seventh inning. Seriously, folks, I am pleased to enjoy your confidence to such an extent, and shall try not to let you down. However, let us hope that before too long a time we shall see evidence of interest in this job from some of the newer hams, so that we don't allow ourselves to take too much for granted. Times and conditions change, and personnel should also change from time to time, to keep up with it. All Rhode Island Amateurs have been shocked by the loss of our very old and dear friend at Headquarters, Arthur Hebert (W1ES). He was an honorary member of the P.R.A. and never missed an opportunity to visit us in R.I. He will be missed by us all, and we shall never forget his sunny disposition and the example he set us in spreading the friendly spirit of amateur radio.

Traffic: W1LWA 352 (WL GK 19) KKE 40 INM 13 LYE 6 EOF 4 MBM 2.

VERMONT — SCM, Clifton G. Parker, W1KJG — W1NDB at Montpelier is new O.R.S. AD, AZV and CBW are new emergency coordinators in the Section and CBW also O.P.S. AD is busy converting his rig to a band-shifter for 'phone and c.w. work on 1.75, 3.5 and 7 Mc., and has changed over antenna to 1.75-Mc. half-wave center-fed. MJU is able to get in some activity on air, and has renewed O.R.S. and E.C. appointment. Many Vermont stations reported activities in the Red Cross relay, and thanks to all for their splendid cooperation. GAN is busy getting settled in new QTH at Burlington. MCQ is working on auxiliary rig for c.w. work. Vermont stations having traffic south, particularly for Vermont fellows in Army camps, can secure a good outlet via NDB, who has a schedule at midnight with W4FCG. CBW was high man for the Vermont Section in the recent N. H. QSO party. CGV, EKY, NDB, KUY and MJU report activity in the Barre area on 112 Mc. KJG is back at home after legislative session and picking up former schedules. BJP is getting new coils for work on 1.75 Mc. JVS visited at KJG as well as ex-1QC. Burlington Amateur Radio Club reports fine meetings, and contemplated plans for Field Day and hamfest for the Section this year are under consideration. In the event sufficient stations to make it worthwhile appear, CBW advises the A.A.R.S. Net for Vermont will undoubtedly try to carry on schedules this summer and the A.A.R.L. Net on 3860 kc. will be considered along the same lines, with more definite information next month. Traffic to and from the Army camps and other centers is increasing daily, and any Vermont station who can assist will be a welcome addition to either or both of these nets. Communicate with FSV, CBW or KJG right away, please.

Traffic: W1AD 43 AEA 23 BLC 7 CBW 84 JVS 74 JVT 3 KJG 46 KWB 17 NDB 25 NDU 16 MCQ 18.

HUDSON DIVISION

EASTERN NEW YORK — SCM, Robert E. Haight, W2LU — W2KWG heads the boys with a nice traffic total. LSD handled Red Cross traffic from HXQ and MXK. LU reports many N.C.R. boys called to active duty. JRG is on 112 Mc. with 20 watts and erected a new extended vertical doublet. ACB handled Red Cross message for local area and is busy lining up activities for Field Day. KFB built new modulator which went west after the first QSO! VJ has a new 25-watt 'phone on 1.75 Mc. NJF has his 250-watt 'phone on 28 Mc. NSD reported for R.P.I. New Hams there are 3JRH/2 and 2NSM on 112 Mc. and 2LTJ. 2MAM, a new student, is getting on the air. NCG joined A.E.C. and is using Stancor 60-P. He made W.A.S. on 7 Mc.;

(Continued on page 92)

RADIO TRAINING



FOUNDED IN 1909

PORT ARTHUR COLLEGE, a non-profit-making educational institution, offers a practical radio operator's course at the lowest tuition price in its history. Each radio graduate receives two months' actual operating experience at the college's commercial broadcasting station KPAC. This station is equipped with the latest type 1000 watt high fidelity RCA transmitter — 1250 kc. — directional antenna system. KPAC operates in new modern studios located on the campus.

The college has never advertised jobs or positions in lieu of education. Today it is well known there is a shortage of radio operators in every branch of radio; therefore, we believe it is good common sense to mention that Port Arthur College is the sole radio school in America which owns a commercial broadcasting station with commercial advertising representatives in New York, Chicago, San Francisco, and many of America's leading cities, with active membership in the National Association of Broadcasters, and Broadcast Music Incorporated. Through these contacts the college receives from the broadcast industry alone a great many more calls for student radio operators than it is possible to supply.

AUTHORIZED TO TEACH RCA TEXTS
If interested, write for Bulletin R

PORT ARTHUR COLLEGE PORT ARTHUR (World-Known Port) TEXAS

QUALITY ABOVE ALL

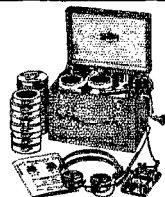
SOLAR

CAPACITORS

Write for Catalog
SOLAR MFG. CORP.
BAYONNE, N. J.

EASY TO LEARN CODE

It is easy and pleasant to learn the modern way — with an Instructograph Code Teacher. Ideal for the beginner or advanced student. Many tapes available ranging from alphabet for beginners to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready, no QRM, beats having someone send to you.



FOR SALE OR RENT
STANDARD with 10 tapes and book of instructions, A.C. motor \$24.50
With spring-wound motor \$18.50
JUNIOR with 5 tapes and book of instructions (not rented) \$13.00
RENTAL Standard with 10 tapes and book of instructions \$3.00 first month, \$2.25 each additional month. References or \$10 deposit required. All rental payments may be applied on the purchase price should you decide to buy the equipment.

Write for details today

INSTRUCTOGRAPH COMPANY

Dept. Q, 4791 Sheridan Road, Chicago, Illinois
Representative for Canada:
Radio College of Canada, 54 Bloor St. West, Toronto

(Contd. from page 88)

W80ML	5405-23	95-A-14	W8SWB	1121-13	36-A-9
W3CDY	4830-23	86-A-29	W8UXG	363-15	23-A-8
W3HHS	4608-19	97-A-22	W8JW*	209-11	19- - -
W8GV	4224-33	64-B-20	W8QM*	2- 1- 1-	1- - -
W3AKB	3220-23	56-A-6	W8BLK*	- - 68-	- - - -
W3AOC	3128-23	68-B-4	W8TWS*	- - 41-	- - - -
W3CWQ	2580-16	65-A-14			
W3IMW	2530-22	46-A-14	Phone		
W8SNZ	2150-25	86-B-5	W8ACY	14575-53	138-B-23
W8UQM	1449-19	31-A-11	W8APK	192- 8-	13-B-3
W3EON	1273-19	34-B-1	W8RYM	113- 5-	9-A-3
W3DRD	1000-16	25-A-3	W8SOT*	16- 4-	4- - -
W3AKG*	810-15	37- - -			
W3NF	792-10	33-B-7	W. Pennsylvania		
W3G8X	700-14	20-A- -	W8OKC	87885-60	600-A-40
W3FTQ*	360-10	18- - 3	W8KUN	73316-57	515-A-40
W3GRS*	195- 6-	13-A-1	W8YTI	32508-54	301-B-40
W3HDX	140- 7-	8-A- -	W8OJS	21510-45	244-B-37
W8IDA	90- 6-	6-A- -	W8RAP*	21275-44	200-A-37
W8LXD	75- 3-	10-A- 5	W8NCJ	21150-47	180-A-15
W3GYL	63- 5-	5-A- -	W8UWZ	17938-35	205-A-37
W3IUD*	2- 1-	1-B- -	W8SNW*	17264-52	166-B- -
			W8H8N*	16748-42	160-A-24
			W8RWJ	14678-38	155-A-27
			W8TOJ	10965-34	128-A-36
			W8YA	8325-37	113-B-9
			W8JMP	6552-36	91-B- -
			W8SNA	5653-34	64-A-23
			W8KVR	5478-33	86-B- -
			W8TNG	5298-26	84-A-18
			W8J8U*	5240-26	80-A- 5
			W8NUG	5062-27	75-A-15
			W8ZU	4909-33	60-A-23
			W8KXP	4814-29	83-B- 8
			W8AIW	3450-23	61-A-15
			W8NRB	2875-23	50-A-10
			W8RFR	2823-23	53-B- 7
			W8VUD	1519-15	41-A-28
			W8MTK	1225-20	25-A-11
			W8M2I*	1078-16	27-A- 6
			W8NRE*	659-17	31-A- 5
			W8T8T*	494-13	19- - -
			W8TFI	300-10	15- - -
			W8TUD*	280-10	14- - -
			W8TWT*	40- 4-	5-B- 3
			W8QVJ	- - 38-	- - - -

W8JAP	8235-37	113-B-9	W8YUJ	3938-25	63-A-19
W8KVP	6552-36	91-B- -	W8BWP	3290-28	47-A- -
W8TNG	5653-34	64-A-23	W8RBJ	1805-19	48-B-9
W8J8U*	5478-33	86-B- -	W8RDU*	32- 4-	4- - -
W8NUG	5298-26	84-A-18			
W8J8U*	5240-26	80-A- 5			
W8NUG	5062-27	75-A-15			
W8ZU	4909-33	60-A-23			
W8KXP	4814-29	83-B- 8			
W8AIW	3450-23	61-A-15			
W8NRB	2875-23	50-A-10			
W8RFR	2823-23	53-B- 7			
W8VUD	1519-15	41-A-28			
W8MTK	1225-20	25-A-11			
W8M2I*	1078-16	27-A- 6			
W8NRE*	659-17	31-A- 5			
W8T8T*	494-13	19- - -			
W8TFI	300-10	15- - -			
W8TUD*	280-10	14- - -			
W8TWT*	40- 4-	5-B- 3			
W8QVJ	- - 38-	- - - -			

Ma.-Del.-D. C.

W3FQZ	64089-59	436-A-37	W8HMJ	3938-25	63-A-19
W3FIO*	52223-61	349-A-40	W8BWP	3290-28	47-A- -
W3HQU	45264-49	373-A-39	W8RBJ	1805-19	48-B-9
W3F8P	42930-54	319-A-39	W8RDU*	32- 4-	4- - -
W3DRD	41550-60	277-A-36			
W3HQX	24375-50	195-A-22			
W3HTK	20700-46	180-A-22			
W3FDJ	20405-55	136-B-29			
W3RIF	13490-38	142-A-34			
W3LII	9075-30	120-A-35			
W3HDV	6000-30	102-B-14			
W3IRO	2850-20	57-A-23			
W3IEN	2848-34	67-A-12			
W3ABV	2282-22	42-A- 9			
W3OZ	2100-21	50-B- 5			
W3AKR	1995-21	42-A-11			
W3ILC*	1594-17	40-A- 8			
W3CDQ	1008-12	42-B- 6			
W3FFN	416-13	16-A- 5			
W3GWM	315- 9-	14-A- 7			
W3EKZ	32- 4-	4-B- 1			
W3DRE	30- 3-	4-A- 4			

Phone

W3EQK	30- 5-	6-B- 1	Phone		
W3AQV*	24- 3-	4-B- -	W8HMJ	3938-25	63-A-19
			W8BWP	3290-28	47-A- -
			W8RBJ	1805-19	48-B-9
			W8RDU*	32- 4-	4- - -

So. New Jersey

W3FXV	37102-51	291-A-40	Central Division		
W8IVI	23275-49	190-A-35	Illinois		
W3DAJ	20378-46	222-B-22	W9BRD	89385-61	586-A-40
W3TLL	19632-48	205-B-35	W9YFV	81750-60	545-A-40
W3BEI	12000-40	150-B-30	W9UTB	73588-58	508-A-40
W3HOJ	10500-35	120-A-30	W9ERU	72198-63	673-B-39
W3SJ	8600-32	110-A-22	W9GFF	71700-60	478-A-39
W3BUZ	7117-39	73-A-19	W9MUK	70615-53	498-A-40
W3GIG	3720-30	62-B-15	W9MGN	65550-60	439-A-39
W3HLV/3	3465-22	63-A- 7	W9PKW	64743-58	450-A-39
W3HAZ	3420-24	57-A-10	W9TFY	64525-53	451-A-38
W3GHR	3188-17	75-A-12	W9NST	63059-61	415-A-34
W3GCU	1552-18	35-A- 7	W9AOB	61803-59	423-A-39

Phone

W3HDJ	22410-54	415-B-32	W9DUX	61040-56	545-B-40
W3GPU	3848-26	74-B-28	W9WEN	60180-59	410-A-38
W3BVE	611-13	28-B-13	W9YWQ*	56296-62	454-B-38
			W9YTV	54130-56	388-A-40
			W9FOI	52853-54	392-A-34
			W9CY	48360-62	312-A-26
			W9QJR	39216-57	345-B-40
			W9IBC	35438-54	265-A-32
			W9NMY	35033-54	285-A-32
			W9TH	31250-50	250-A-20
			W9JO	25875-55	210-A-24
			W9FAQ	25746-43	241-A-28
			W9AGM	25573-53	193-A-32
			W9TKN	25500-48	215-A-36
			W9CKA/9	23998-56	215-B-33
			W9EUB	23000-40	241-A-17
			W9DSO	19646-47	209-B-30
			W9NQi	19635-42	189-A-20
			W9OBW	19305-39	150-A-16
			W9IYA	18620-49	152-A-33
			W9QDG	18400-48	164-A-30
			W9CEJ	17136-42	205-B-27
			W9EUL	15631-41	153-A-24
			W9IFA	14083-43	131-A-22

W. New York

W8DZC	54450-60	363-A-40	1 Two ops.,	W3HHC, W2LKK, W3EIO opr. 5 Two ops.,
W8ORU	26772-46	294-B-38	W8RAP, W8UHP, 4 Two ops.,	W8HSN, W8HGG, 8 W9UUM
W8EBR	22188-43	261-B-31	opr. 6 Starved Rock Radio Club, W9NGQ opr. 7 WK8PL opr. 8 W8YX Operators Club, six ops.,	W8SDN, W9NTC, W8SUN, W8ODV, W8LQA, W8TDW, 9 Two ops., W4AGW, W4FWP, 11 Two ops., W2JJE, W2LZC, 12 FCS staff members not eligible for awards, 13 Alma Radio Club, W8JEN opr. 14 Stanford University Radio Club, WIDMW opr. 15 Charles D. Harris opr. 16 Greensboro Radio Club, eight ops., W4CS, W4GQT, W4AIT, W4AGD, W4AEL, W4EIW, W4AJT, W4BHA, 17 W6HZT opr.
W8AQE	22145-43	206-A-40		
W8NEY	17750-50	142-A-29		
W8OCP	14000-40	142-A-29		
W8TKB	12862-42	153-B-28		
W8AN	12309-43	116-A-21		
W8UXT*	3778-39	133-B-16		
W8RKM	6875-25	110-A-11		
W8VFI	6588-31	85-A-11		
W8FYH	6548-27	97-A-21		
W8SPD	4390-22	80-A-18		
W8TXL	4225-26	66-A-28		
W8QKM/8	3768-24	79-B-13		
W8LCT	2655-18	60-A-10		
W8URS	2650-20	55-A-11		
W8DVT	2338-22	43-A-13		
W8OCY	2272-18	52-A-13		

NATIONAL DEFENSE— AGAIN TAYLOR TUBES LEAD

"Say Thin Wall—I've been supplying the power to big boys like you for years. Yes Sir! — eight years of sales leadership and real dollar and cents savings to thousands of amateur and commercial stations."

"Right you are 866, and you'll find Taylor Tubes, be it in tanks, planes or field stations, giving dependable service and performance at the same low cost. The tougher the conditions the better we like it."

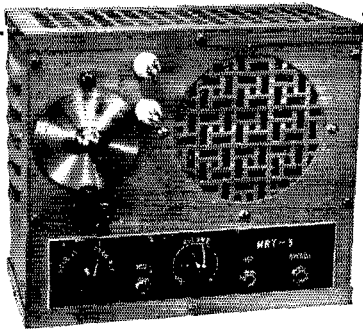


Defense orders come first—but Taylor Tubes has enlarged their manufacturing facilities assuring amateurs of continued delivery and service.

W8EA

TAYLOR TUBES, INC., 2341 WABANSIA AVE., CHICAGO, ILLINOIS

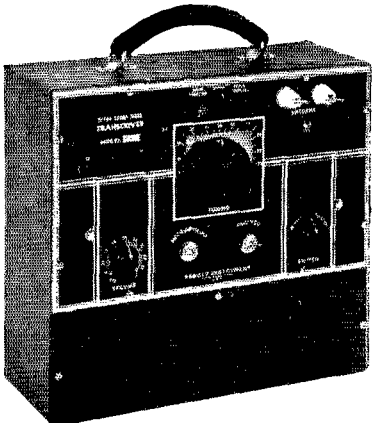
New ABBOTT 2½ Meter TRANSCEIVERS In Stock — at Terminal!



New ABBOTT MRT-3 — Net Price \$27.46

A real high-powered transceiver! 20 watts of input delivers 6 to 7 times more power than ordinary 112-116 mc. transceiver. Compact, for easy installation in any automobile.

- Tube kit; HY75, 6C5, 6V6.....\$ 4.60
- Universal Hand Microphone..... 5.38
- Battery power supply for car..... 12.61
- AC power supply for home use..... 12.45



New ABBOTT DK-3 — Net Price \$17.35

Includes many features to satisfy every requirement for truly portable 2½ meter operation. Range is 2 to 30 miles!

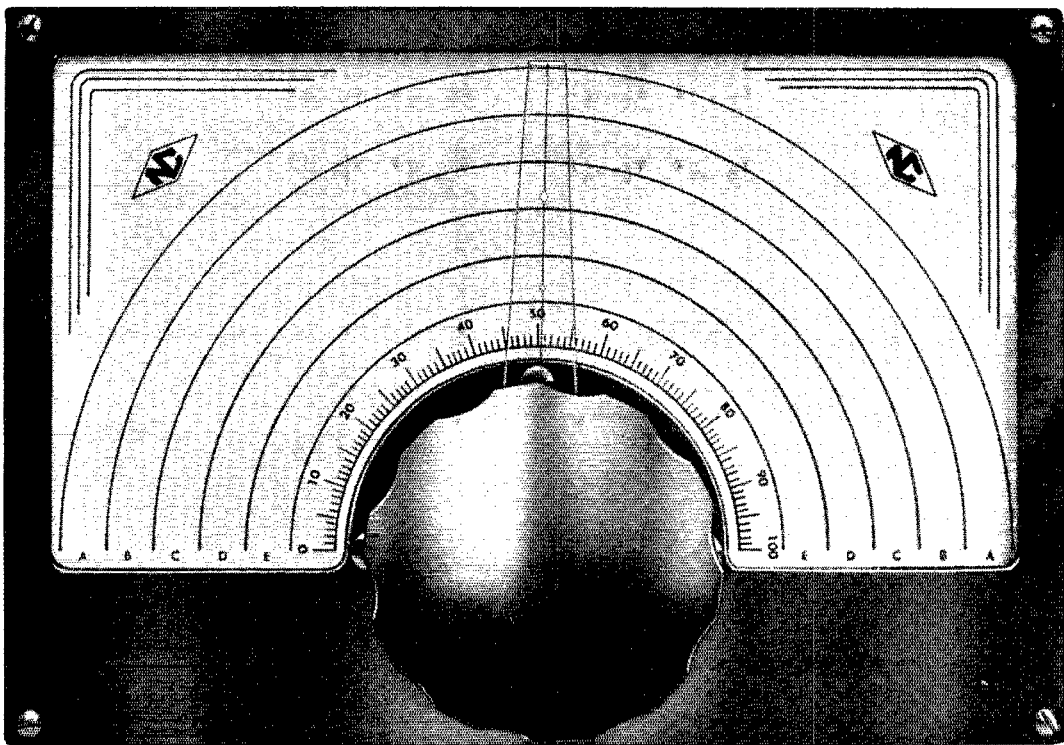
- Tube kit.....\$.96
- Handset.....\$5.88
- Battery kit..... 4.21
- Antenna..... .60

Order from this ad or visit us in
New York City

TERMINAL Radio Corp.

68 West 45th St. • 80 Cortlandt St.
2 stores in NEW YORK CITY
Vanderbilt 6-5050 • Cable: TERMRADIO

WOEFA	12857-43-151-B-32	WQZPT	2818-23-50-A-18
WOIPT	12808-47-109-A-23	WQXKU	2401-17-87-A-11
W9HLS	11000-11-125-B-35	W9HKT	748-13-23-A--
W9ABH	10850-40-110-A-24	W9BNS/9	700-12-25-A--
W9VOQ	10045-45-98-A-24	W9ILU	510-8-26-A-28
W9FIN	9950-37-108-A-22	W9EHT*	12-2-3--
W9EBX	9880-38-130-B-27	Phone	
W9ZOG	9860-34-116-A-16	W9GWL	3599-31-65-B-14
W9MWO	9509-37-103-A-21	W9EFW	2816-22-64-B-8
W9JMG	9105-39-107-A--	W9DJU	141-6-12--
W9HOV	9184-41-115-B-17	Kentucky	
W9GDI	9000-45-100-B-12	W9FS	108963-62-703-A-35
W9IVD	8130-35-117-B-20	W9ZWR	59150-58-410-A-40
W9RTA	7200-27-110-A-19	W9GTR	24725-43-230-A-31
W9UXO	7200-36-100-B-18	W9TLZ	22400-40-224-A-27
W9NVW	6510-31-86-A-13	W9OMW	16198-31-212-A-26
W9HNM	6310-36-69-A-29	W9LBX	12682-37-139-A-29
W9QBA	6038-35-69-A-12	W9ZPU	2072-14-74-B-12
W9AGV	5580-28-77-A--	W9YGR	1623-22-30-A-5
W9OD	5115-31-83-B-17	W9NYW*	766-17-18-A--
W9BWN	5040-24-85-A-16	W9UUR	310-8-17-A--
W9CEV	4906-25-79-A-14	W9JOE	125-5-11-A-4
W9IQT	4698-29-82-B-14	Phone	
W9LL	4515-28-65-A-15	W9YQN	42539-59-363-B-38
W9YDQ	4463-25-65-A-16	W9ELL	14628-16-159-B-19
W9GRB	3980-21-79-A-18	W9FVH	8050-28-115-A-30
W9VBI	3985-26-61-A--	W9ZKY*	1581-24-33-B--
W9FVU	2700-20-64-A--	W9FZM/9	260-10-13-B-1
W9ERA	2580-24-43-A-12	Michigan	
W9VLT	2400-20-49-A-11	W9JVL	52066-53-404-A-28
W9HXO	2363-15-63-A-26	W9LEC	45780-60-382-B-40
W9ENQ	2093-27-62-A-6	W9SCV	39875-55-364-B-38
W9FMP	1943-21-40-A-9	W9LPT	36099-63-230-B-36
W9JKN	1916-21-37-A-6	W9EXW	32574-61-267-B-40
W9TAL	1750-14-50-A-11	W9SDA	27140-59-231-B-27
W9MRQ	1700-17-40-A-13	W9NIA	26888-53-203-A-20
W9MSX	1653-18-35-A-8	W9KPL/8	26868-50-214-A-40
W9CEY	1503-18-35-A-16	W9VGF	21775-51-171-A-20
W9KWU	1425-10-29-A-4	W9UPH	19013-39-197-A-24
W9SXL	1372-14-49-B--	W9SOQ	18300-61-150-B-22
W9MKS	1354-11-49--	W9SWZ	13612-33-118-A-26
W9UN	1290-16-33-A--	W9VID	10842-39-140-B-22
W9CZS	1205-18-30-A-4	W9SUK	9800-28-141-A-22
W9RBR	1254-17-30-A-4	W9TRN	8604-36-120-B-35
W9END	1230-16-31-A-4	W9SPF	6105-33-75-A-12
W9NGG	1200-15-32-A--	W9DDJ	6080-38-80--
W9GAV	983-11-36-A-8	W9TWC	5880-28-84-A-10
W9FIC	870-15-23-B-7	W9AIZ	5031-23-91-A-17
W9BPU	825-11-30-A-5	W9SLW	4447-30-82-A-10
W9QMJ	785-12-55-A-13	W9SUT	3650-20-90-A-27
W9PAE	783-10-31-A-5	W9FPK	3575-26-56-A-9
W9IAH	578-11-21-A-7	W9SUU	3406-25-55-A-22
W9ARM	413-11-15-A-8	W9SSA	3375-20-68-A-11
W9TLC	338-9-15-A-2	W9TZR	3202-21-61-A-23
W9HOA*	300-10-13-A-5	W9YYA	3150-24-53-A-15
W9FKV	230-8-12-A-4	W9SSA	2530-23-110-B--
W9QLZ	210-6-14-A-3	W9UFD	1913-17-45-A-20
W9ZEM	123-7-7-A-2	W9TKW	1828-17-43-A-10
W9BIN	113-5-9-A-4	W9TRP	715-11-26-A-12
W9NAB	20-2-5-B-2	W9FSK	715-11-26-A--
W9HQH*	10-2-2-A--	W9HAN	700-14-20-A-9
W9TCK	5-1-2-A-1	W9DDU	408-12-17-B-1
W9HGQ*	2-1-1--	W9SFA	32-4-4-B-1
W9JAU	1-1-1-A--	W9TBU*	12-2-3--
Phone		W9SAD*	-- 47--
W9NDA	37501-61-293-B-40	Phone	
W9KMN	19388-55-141-A-29	W9EMP	22010-58-191-B-39
W9VPZ	10911-43-102-A-18	W9JAH	20776-53-196-B-37
W9NAB	3069-31-50-B-11	W9SFL	7372-38-100-B--
W9QWM	1180-16-30-A-6	W9SDR	7313-39-75-A-18
W9MWJ	810-9-47-B-11	W9MCB	5928-39-76-B-16
W9ICZ	600-12-25-B-7	W9QDU	3900-30-65-B-7
W9JAU	525-7-31-A--	W9SGG	2816-32-45-B-13
W9OAV	450-9-20-A-5	W9KNP	2444-26-47-B--
W9ALU	315-7-18-A-10	W9SUGZ	816-17-24-B-20
W9CHM	185-4-19-A-4	W9RSO	753-14-22-A--
W9MNR	146-3-21-A-13	W9QGZ	638-11-29-B-8
W9NSE	105-3-14-A--	W9SLW	23-3-3-A-1
W9CEO	24-2-6-B-1	Ohio	
W9SXL	20-2-5-B-1	W8IIN	107803-62-700-A-40
W9QMJ	10-2-2-A-1	W8HGW	92110-61-604-A-38
W9UQT	8-1-4-B-1	W8NLQ	85845-59-582-A-40
W9JSL*	4-1-2-A--	W8BTI	67270-62-434-A-35
W9ZYP	4-1-2-B-1	W8OYT	64050-61-420-A-35
W9BGH*	2-1-1--	W8TDN	57900-60-391-A-40
Indiana		W8FX*	51120-60-476-B--
W9KBL	50018-67-351-A-40	W8OPG	55050-60-371-A-38
W9ENH	37625-50-301-A-39	W8SLH	53200-56-385-A-40
W9NOD	33060-58-285-B-27	W8SXC	51638-64-385-A-35
W9EGQ	26265-51-210-A-26	W8ROX	48600-54-365-A-32
W9INU	21158-39-217-A-25	W8FGX	43020-60-360-B-35
W9AMM	18200-50-183-B-20	W8FVZ	42120-60-352-B-32
W9KAQ	16200-45-180-B-14	W8MOA	41250-55-302-A-38
W9GSO	8100-40-81-A-26	W8CED	36722-61-301-B--
W9ZE0	8080-40-102-B-10	W8SSL	34188-50-280-A-31
W9CNG	7850-30-102-A-15		
W9DGA	7200-32-80-A-20		
W9QLW	3273-22-60-A-23		



NEW! TYPE ACN DIAL ($\frac{7}{8}$ ACTUAL SIZE)

- Dial bezel acts as drilling template.
- Blank scales for direct calibration.
- Index holes in pointer for pricking calibration points.
- Scale removable without dismounting mechanism.
- Employs Velvet Vernier Drive Unit.
- Amateur Net Price \$2.70.

NATIONAL COMPANY, MALDEN, MASS.

DO YOUR OWN CALIBRATING

CRYSTALS by HIPOWER

The Hipower Crystal Company, one of America's oldest and largest manufacturers of precision crystal units, is able to offer the amateur and manufacturer attractive prices because of their large production and the exclusive Hipower grinding process. Whatever your crystal need may be, Hipower can supply it. Write today for full information.

HIPOWER CRYSTAL CO.

Sales Division—205 W. Wacker Drive, Chicago
Factory—2035 Charleston Street, Chicago, Ill.

RADIO COURSES

Start September

RADIO OPERATING • BROADCASTING • CODE

RADIO SERVICING • TELEVISION

• ELECTRONICS — 1 year day course; 2 years eve.

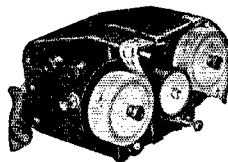
Day and Evening Classes — Booklet upon request

NEW YORK YMCA SCHOOLS

4 West 63rd Street, New York City

LEARN CODE THE WAY YOU'LL USE IT — BY HEARING IT

Type S - \$17.50



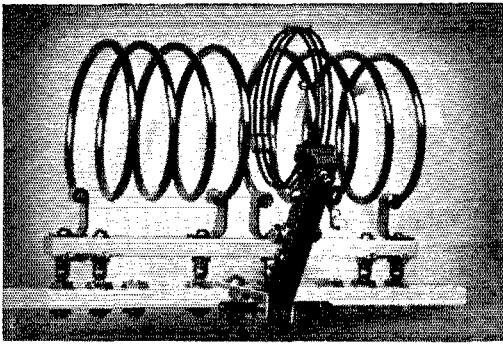
Sends from 4 to 60 words per minute. Higher speeds if desired. Complete with 10 rolls of double-perforated lesson tape of carefully selected and arranged matter for speediest results in learning code. Most compact and practical code teacher on market.

Type J - \$12.50

Sends 6 to 65 words per minute. Built-in tape perforator. Cut your own practice and message tapes. Complete with one roll of practice tape covering Alphabet, Numerals, Words to five letters; and 5 rolls of blank tape.

If your dealer can't supply you, write us

GARDINER-LEVERING CO. Haddon Heights, New Jersey, U. S. A.

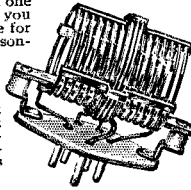


A VERSATILE 500-WATT PERFORMER!

B&W Type TVH Air Inductors are "naturals" for a wide variety of 500-watt applications. Their novel multiple-plug arrangement makes proper capacity selection automatic for the various bands.

Extreme compactness and rugged construction, combined with unusual versatility, makes the TVH one of those "most for your money" units you don't want to miss! TVH's are available for 10, 20, 40, 80 and 160 meters... all reasonably priced... all highly efficient... all worth while investigating!

● **THESE POPULAR JUNIORS** are perfect for any limited-space 75-watt job. More rugged and efficient than most larger coils of the same rating. Economically priced at \$1.00 each. See your jobber, or write for details on either TVH's or Juniors.



BARKER & WILLIAMSON

Radio Manufacturing Engineers • ARDMORE, PENNSYLVANIA

*Thriftiest...
first and last*



● That's what many "hams" say about AEROVOX Hyvol Transmitting Capacitors. Prices spell lowest first cost. Exceptional life spells lowest last cost.

Now available in still greater choice of types, including ribbed cap for extreme voltages, single-pillar terminal, etc. Popular capacities. Voltages up to 7500 v. D.C.W.

Exclusive Hyvol dielectric oil insures maintenance of effective capacity even at sub-zero operating temperatures. And that's important!

New Catalog . . .

Lists this greater choice of transmitting capacitors, as well as other types. Ask local jobber for catalog. Or write us direct.



W8LOY	33125-53-250-A-30	W9GIL	44153-58-305-A-34
W8DAE	33069-55-243-A-31	W9JUT	33770-55-307-B-31
W8BMX	33000-55-300-B-33	W9RPW	32529-53-249-A-34
W8BCE	30480-48-254-A-27	W9GWK	32156-49-264-A-29
W8BFB	27848-47-237-A-28	W9KXK	23638-53-223-B-34
W8UWU	23673-41-234-A-34	W9BSS	22763-38-240-A-31
W8RSW	20816-39-215-A-30	W9RRT	19278-51-191-B-27
W8TWP	20694-43-194-A-30	W9PZC	15375-41-150-A-23
W8GD	20533-63-163-B-22	W9RH	16080-52-145-B-20
W8S1Y	20250-45-180-A-33	W9OT	14915-38-150-A-12
W8ENA	17786-51-140-A-22	W9VWG	14076-46-153-B-29
W8AL	16060-44-148-A-37	W9GRK	11742-38-158-B-28
W8BKE	12950-37-140-A-19	W9BPR	9939-31-121-A-15
W8NSS	12920-38-136-A-40	W9VD	8405-41-103-B-21
W8OFN	12273-59-104-B--	W9DYO	8168-27-128-A--
W8SDD	11760-40-147-B-19	W9YMG	8118-41-100-B-12
W8OD	10800-36-120-A-30	W9RSR	7173-29-101-A-27
W8UYL	10030-34-118-A-32	W9SJT	5813-31-75-A-19
W8SQE	9430-41-115-B-13	W9KCY	5148-29-73-A-19
W8U1L	8726-39-91-A-16	W9RBI	4800-32-60-A-6
W8DQZ	8665-37-119-B-28	W9QYI	3870-24-65-A-24
W8LOF	8693-38-92-A-13	W9HRM	3770-29-65-B-21
W8SHD	7388-30-100-A-13	W9LDK	3543-26-55-A-12
W8RAA	7208-31-94-A-14	W9OBZ	3364-29-58-B-15
W8GQU/8	6650-35-95-B-22	W9LUC	2688-28-43-B--
W8QHV	4774-31-77-B--	W9LED	1645-14-48-A--
W8MQC	4592-41-56-B-19	W9WXD	1530-18-36-A-16
W8QZB	4590-27-84-B-12	W91VD	1200-12-51-B-12
W8JAJ	4455-22-83-A-29	W9CQO	825-11-30-A-11
W81T	4200-28-60-A-3	W9DIJ	718-14-21-A-7
W81EH	4160-26-64-A-12	W9PHU	440-11-16-A-6
W8GVL	3024-24-64-B--	W91DE	413-11-17-A-4
W8QMN	2883-22-66-B-17	W9DWI	400-10-20-B-3
W8S1F	2332-22-53-B--	W9GLD	125-5-10-A-3
W8SCU	2282-20-40-B-30	W9LAD	120-6-10-B-4
W8RIW/8	1948-19-42-A-11	W9DNO/9	75-6-6-A-5
W8MOH	1935-18-43-A-7	W9NRX	64-4-9-B-8
W8LCO	1743-17-41-A-13	W9UJM	35-2-7-A-1
W8OPH	1665-18-37-A-9	W91ZQ	10-2-2-A-2
W8RHH	1530-18-35-A-5	W9HPZ	3-1-1-A-3
W8SEN	1500-20-30-A-7		
W8QQR	1445-16-35-A-9	Phone	
W8GTA*	1272-12-53-B-11	W9ZTO	24640-55-224-B-28
W8BMK	1200-20-30-B-4	W9HRH	19080-60-161-B-35
W81LW	900-15-31-B-11	W9ESJ	10080-48-105-B-24
W8BYM*	829-17-20-A-4	W9JWT	9396-36-131-B-39
W8GYR	750-15-25-B-4	W91ZQ	500-10-20-A-11
W8JEX	720-18-21-B-6	W9YKH	416-13-18-B-3
W8KKW	704-16-22-B-5	W9OFL*	308-11-14-B--
W8THE	660-11-24-A-10	W9RGU	120-4-12-A-4
W8MFP	510-12-17-A-7	W9MPV	53-3-7-A-5
W8BCJ	494-5-41-A--	W9CYO	30-3-4-A-2
W8BEW	448-9-19-A--	W9NPH	28-1-11-A-15
W8TYX	376-7-22-A-4	W9HPZ	16-1-7-A-12
W8LWG	330-11-12-A-3		
W8ULH	275-10-11-A-5	DAKOTA DIVISION	
W8PBX	270-8-14-A--	North Dakota	
W8TLQ	210-7-13-A-9	W9ZOU	57645-61-378-A-30
W8UKI/8	158-7-9-A-5	W9AFK	20400-51-200-B-32
W8TSI*	144-8-9-B-6	W9VJH	10842-43-100-A-29
W8SQJ	96-7-11-A--	W9DM	357-11-13-A-3
W8TSF	85-5-6-A-2	Phone	
W81BM	63-5-5-A--	W9RPJ	3630-33-55-B-15
W8TAY	30-3-4-A-1		
W8QOG	24-3-4-B-1	South Dakota	
W8GER	23-3-3-A-1	W9GCV	23085-57-162-A-29
Phone		W9WUW	20010-46-175-A-35
W8QUL	25810-58-224-B-38	W91LL	1910-16-48-A-7
W8TPC	18270-58-158-B-32	W9YOB	1758-21-34-A-10
W8NND	16271-53-154-B-30	W9HKK	1265-11-48-A-12
W8QAD	10998-47-117-B-34	W9FFP	338-10-14-A-12
W81XY	5343-39-69-B-18	Phone	
W8PXP	4999-31-65-A--	W9ADJ	12576-48-131-B-20
W8ODF	4960-31-80-B--	W9DIY	348-12-15-B-5
W8NOC	4550-35-67-B-17	W9QVY*	38-3-5-A-3
W8RHG	4445-28-64-A--	W9BDF*	24-3-4--
W8KZT	3696-33-57-B-12	W9ZAT*	2-1-1--
W8MGS	3696-33-57-B-12		
W8CDR	3712-27-55-A-15	No. Minnesota	
W8PNJ	3390-24-57-A-19	W9YCR	73160-62-473-A-40
W8VBG	2703-17-80-B-22	W9JRL	37400-55-340-B-37
W8DIJ	1775-25-38-B-8	W9CFR	32984-58-300-B-40
W8QHV	1701-21-41-B--	W9LAB	21260-45-218-B--
W8BFB	1634-19-43-B-6	W9HQW	10031-25-168-A-5
W8QOC	912-19-26-B-6	W9ESC*	8000-31-104-A-18
W8OPZ	580-8-29-A-8	W90YU	7000-40-89-B-12
W8TPC	508-7-20-A-16	W9WUQ	4455-27-67-A-20
W8UNY	224-7-17-B--	W9HKT*	2704-26-54--
W8PBX	172-3-23-A--	Phone	
W8LCO	75-5-6-A-2	W9R1L	14484-51-142-B-25
W8VBS	50-1-20-A-14		
W8TYF	33-1-13-A-4	So. Minnesota	
W8SUK*	2-1-1--	W9VKF/9	77035-62-497-A-40
Wisconsin		W9BQJ	69750-62-450-A-40
W9VDM	88988-63-567-A-38	W9NCS	51773-50-355-A-38
W9RQM	88195-62-571-A-40	W9GVB	51423-58-350-A-39
W9CRK	80600-62-520-A-38	W9QDE	51300-57-363-A-40
W9DIR	78908-63-501-A-40		

(Contd. on page 84)

NEW Par-Metal Catalog

**RACKS
PANELS
CHASSIS
CABINETS**



Our New Catalog No. 41 lists over 400 metal parts for both Amateur and Commercial applications. Relay racks, enclosed racks, transmitter racks, all-purpose cabinets, rack panels, speaker cabinets, many amplifier and other foundation chassis. *Standard and De Luxe Models* for transmitters, amplifiers, public address systems, exciters, receivers, frequency meters, test equipment. **FEATURES** include: streamlined units, chromium trim, grey or black ripple finish, accurate machining for easy assembly.

Your copy **FREE** at your jobber or write us direct

PAR-METAL PRODUCTS CORPORATION

3268 — 49th STREET • LONG ISLAND CITY, NEW YORK

New
Fountain Pen Size!
RF, IF, AF Signal Generator

Self powered oscillator for:
 • All alignment
 • Trouble shooting
 • PA systems • Checking sensitivity • AVC • Antenas • 10 second locating of auto set ignition pickup
 • Host of other tests. Utterly simpler, faster, more accurate. Used by U.S. Army Signal Corps, hundreds of servicemen and organizations. Write now for leaflet.

GENERAL TEST EQUIPMENT CO.
213 E. CROSBY AVE., KENMORE, N. Y.

RADIO TECHNICIANS AND ENGINEERS WANTED

LARGE broadcasting company in East has openings for experienced radio technicians — engineers who can speak or have a knowledge of Spanish and/or Portuguese. Apply in writing, stating detailed qualifications, including photograph, to Box BC, Advertising Department, QST, West Hartford, Conn.

LEARN RADIO • TELEVISION

60-page catalog on request. Oldest, largest and best equipped in New England. New classes now forming. Write for new catalog.

MASS. RADIO SCHOOL
18 Boylston Street Boston, Massachusetts

READ CODE LIKE AN EXPERT!

Learn Quickly at Home; Get Real Speed

It's easy, fascinating, to become a good op with the NEW ALL ELECTRIC MASTER TELEPLEX CODE TEACHER to help you. Only instrument ever produced which records your sending in visible dots and dashes — then sends back to you at any speed you desire. Also sends practice work, recorded by an expert. That is why so many schools teaching code prefer Master Teleplex.



That is why thousands agree this method is surest, quickest — has taught more ops in the past few years than all other methods. We furnish Complete Course, lend you Master Teleplex, give you personal

instruction with a MONEY-BACK GUARANTEE. Low cost. Send today for booklet Q-6; no obligation.

THE "HAM" SPECIAL Standard Teleplex — a highly efficient code teacher using heavy specially prepared waxed paper tape, having two rows of perforations. Write for Free folder Q.T. 6

We are the originators of this type instrument
TELEPLEX CO. 107 Hudson St. Jersey City, N. J.

GENERAL COMMUNICATIONS CRYSTALS HOLDERS AND OVENS

Precision Made by *Bliley*

WRITE FOR CATALOG G-12
BLILEY ELECTRIC CO., ERIE, PA.

(Continued from page 85)

has a new Meissner Signal Shifter, and alternates between 3.5 and 7 Mc.

Traffic: W2KWG 165 LSD 100 LU 45 JRG 21 ACB 19. NEW YORK CITY AND LONG ISLAND — SCM, Ed. L. Baunach, W2AZV — W2DKF is now O.O. and is working for Class 1. IXZ, MEM and MZB are out for O.R.S. appointment. MWT is working for O.P.S. appointment. Every one of the fourteen Red Cross Chapters in our Section were represented during the April 4th tests. This shows what we can do when we have organized stations in the Section net. Our goal is to get every station in the Section on the net, so those of you who are not in the net should call in any night on 3710 kc. at 8:30 p.m. MT, LR, DW, DBQ or many of the regular stations who are on will be glad to give you all of the dope on regular operating. For Bronx and Manhattan all stations should get in touch with BGO; he will give you your post for A.E.C. operation. DW covers Kings County, CDF Queens County and LR Suffolk County. AZV and DBQ will give you information on Section Coverage. Let us have 100 per cent cooperation in these times and show the people and government of the U. S. A. what we can do in time of emergency. JZX is covering Mitchell Field and is handling all traffic in and out. DW is taking all traffic for Fort Hamilton. DOG, though not near Camp Upton, will take all traffic for them, but stations near the camp are wanted. Ex-8RY, 9FO is now 2NTM located at Woodside. NMG in the Bronx sends in his first report. JHB is back at his old Brooklyn QTH. ELK and AZV are having antenna trouble. DZH and FNI's antenna were put down by B.C.L.'s. BCS is working as R.I. for the U.S.N. HGO is installing a 500-watt gas generator for emergency use. IYX has notified his local draft board that he will handle traffic for selectees and regular Army men. He is looking for a 75-75-6000 volt tuning condenser. CRB has a new NC 200 and is on 14 Mc. FAQ has a new SX16 and VG a new SX24. IXQ's antenna is strung among skyscrapers in midtown Manhattan. NEM is working for his class A ticket. Official business has put a halt to AV's schedules. NIQ is getting ready for summer activities. NAZ of the Y.L.R.L. for this district is organizing a club for the purpose of self improvement, friendship and service to the community for defense preparation. AYJ is a member of the A.A.R.S. LJJ is on the A.A.R.S. 7 Mc. Net. BWC and DXO are looking for more stations to join the A.A.R.S. Southern N.Y.S. Net. LZR and SC make the B.P.L. again. MRI is looking for a schedule to handle K4, K5 and K6 traffic. BGV is getting such a kick from handling traffic that he has left 28 Mc. dx entirely. BCP gets fb results quadrupling in a tri-tet to 28 Mc. HE is looking for 7 Mc. coils to get on the air. JWE worked 40 miles on 112 Mc. with a pair of 809's using a certain rod antenna. BON has a new rig on 7 Mc. KI keeps his daily schedule with 3BWT regularly. JAU operates on 7014 kc. NDQ operates on 7240 kc. IAW is getting ready for traffic.

Traffic: W2SC 1287 (WLN 806) LZR 592 (WLN 26) AYJ 565 LJP 492 BO 416 MRL 294 KI 279 BWC 209 (WLN 47) BGV 206 AZV 133 JZX-NDQ 89 DW 87 DBQ 84 MT 82 LBI 77 LGK 74 IYX 66 GIC-MZB 58 MEM 56 EYS 45 EC 36 LYC 34 HGO-LXZ 20 NMG 17 FF 16 BGO 15 LR 14 IRC 10 CET 9 CHK 8 FLD 7 KYV 6 FAQ-JAU 5 DOG 4 NLQ 3 NHD 2 BIV 1 (Feb.-Mar. KYV 8).

NORTHERN NEW JERSEY — SCM, Ed. Gursky, Jr., W2LMN — RM's: BZJ, CGG, IYQ — PAM: LXI. Section Net Frequency 3630 kc. daily except Sunday. New appointments: ORS — NDL, NJE, 1 KFN/2. Because of long working hours which will continue indefinitely, LMN is forced to resign as S.C.M. The resignation will take effect as soon as another man can be appointed. HZR has 1 kw. emergency power. JMC is on 112 Mc. with 50 watts and reports lots of activity. LJB was elected president of the Upsala College Radio Club. The club station will soon be on 1.75 Mc. 'phone signing W2NSG. Many fellows have suggested a N.N.J. QSO Party. If enough fellows are interested, a lot of fun could be had. Ideas and suggestions should be sent to LMN. NCY has a new e.c.o. with 50-watts input. MRJ joined the 7-Mc. Net. 2KHA/9 has had his call changed to 9SAG. Art is usually on 7070 kes. and would like to see some of the local gang. CNO finished his new exciter and will soon be on 3.5 Mc., looking for traffic. LXI starts in on a new job shortly. LMN will operate in the third district on Field Day with nine or ten transmitters running simultaneously. Power will be from a two kw. gas driven generator. Operators will be CMY, CNO, IIV, IRF, ITL, IQG, JT, LMIN, LVF, MBS, NFI and a few others. ADL has been called to active duty with the Navy. HAM and

HHY have closed down their stations and are now at Ft. Dix. The Intercity Amateur Radio Club is organizing a club net on 112 Mc. 'phone. At a recent meeting of the Livingston Radio Club, the following officers were elected: Pres., FKF; Vice-Pres., JCA; Secy., Harold Rall; Treas., NRP. The North Newark Amateur Radio club has a station on the air with the call W2NSN. They are usually on 7 Mc. FDL and MKN also joined the 1.75 Mc. A.A.R.S. Net.

Traffic: W2MNT 825 (WLNW 91) MLW 547 CGG 394 NCY 178 HXI 160 JUU 119 MNO 113 IYQ 111 HCO 106 LMN 90 MRJ 36 1KFN/2 29 NJE 28 JRU 26 BNU 21 LXI 9 KSR 5 EKU-MEO 4 LJB 3 (Feb.-Mar. MAX 93 (WLNW 20)).

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — The A.A.R.S. PA1 Net is expanding rapidly. New members are W3BXE, FPG, BOP, CKD, HCT, CNZ, FJU is handling traffic after laying off for ten years. He also had the most accurate measurement for this Section in the O.O. test. GKO has joined the Frankford Radio Club and is worthy addition. Nearly all the stations reporting state they have handled a number of Red Cross messages. GQW just put the finishing touches on his emergency rig, which will be used on F.D. 8UQM is with the N.Y.A. Radio Div. EEW expects to graduate from Drexel by the time this QST is out. IJN, FRY and BES tested emergency equipment with balloon antennas, with moderate success. 8HK8 has an NC200 which he likes plenty. 3HFE did some high powered listening during the Red Cross tests. HCT received his 25 w.p.m. ticket. IAY received his Class A. GYK married off his sister and now has a brand new shack, big and bright. The Phila. Wireless Assn. expects to have many more operators for F.D. this year, including GUV of WLM, 8RKZ has a schedule with 8KCT in the Indiantown Gap Military Reservation. The E.C. and Asst. E.C.'s were taken on a tour of the Police Dept. of Phila., through the courtesy of Inspector Burns, who has taken a favorable interest in the emergency value of amateur radio. During the Red Cross tests a 56-Mc. station was installed in Red Cross Headquarters, which communicated with a mobile job in a car in front of City Hall. A 7-Mc. rig was installed in the bandstand in the plaza. The message was originated at Hq., relayed from the mobile station and sent direct to Washington from the 7-Mc. set. A return message was delivered over the same route. Elapsed time from setting up equipment to taking it down did not exceed 45 minutes. Mr. Blackwell Newhall, Chairman S.E. Pa. Chapter Red Cross, and Inspector Burns were there in person. Amateurs cooperating in the work were: W3AKB, BXE, BES, IJN, FRY, GYK, IU, BVS, AYG, GOM, GHM, FLY, DPU, HFE and JBC. Amateurs of the Frankford (Phila.) area are invited to contact Mr. Geo. D. Nicholson, W3IXU, telephone Jefferson 4064, relative to organizing an emergency radio net to work in the Frankford section. The central headquarters will be the Frankford Post 211, American Legion Home, 4527 Paul St. Amateurs interested in emergency activity contact W3BXE Asst. S.C.M. in charge of that work.

Traffic: W3GKO 1659 (WLQQ 32) 3AOC 559 (WLMB 261) 3BXE 325 3AQN 296 8RKZ 184 3FJU 219 3AKB 150 3ADE 133 8EU 111 3INH 92 3ASW 83 8ATF 56 3GKM 45 3GET 41 3GDI 40 3GQW 39 8UQM-3EEW 36 3FXZ 32 3BES 18 8HK8 17 3DRO-3HFE 16 3HCT 11 3IAY 10 3UYK 8 8SNZ 4 8DLA-8GV 1.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Hermann E. Hobbs, W3CIZ — Eppa W. Darne, Chief RM. The Washington Radio gang really went to town in the Red Cross/A.R.R.L. Test and ran up a total of well over a thousand replies. Among the most active were ZD, BWT, CDQ, HUM, CYO, JHW (formerly W8JTT/3), CXL and ECP. DRD will soon have schedules with W9DHS/4 at Ft. Benning, Ga., and W3MA/1 at Camp Edwards, Mass. DOG has e.c.o. working. The A.R.C. Radio Club met April 14th at the shack of JDP. IDK is rebuilding. DQK now has 900 watts to 810s is Md. member of T.L. "O" with GIK as alternate. EQK expects to have his 1.75- to 56-Mc. portable/portable-mobile rig in working order soon. G4IP visited EQK in early April. EUT expects to be on hand for drills and traffic in the near future, his absence being due to work and ill health. FE will QSY to 14 Mc. for the summer season. FFN will soon have a 35T on the air and is experimenting with indoor loop antenna for transmitting. OZ will be found on e.w. in the future and has canceled his O.P.S. appointment. Members of the Section should get in touch with W3WU; he has several thousand

QSL cards that are looking for their owners. Send in your self-addressed stamped envelopes and see what you will draw.

Traffic: W3CXL 1028 (WLM 3338) BWT 1537 CDQ 228 CIZ 517 CYO 33 DLC 7 DRD 6 ECP 64 CIZ 412 EQK 14 HUT 4 FE 62 FFN 127 FGR 3 FMC 2 FSP 16 GGX 1 HUM 623 JHW 430 OZ/3 10 PV 115 ZD 483.

SOUTHERN NEW JERSEY — SCM, Lester H. Allen, W3CCO — Asst. SCM and A.A.R.S. Liaison R.M., W3ZI — Regional Coördinator in Charge of Emergency Coördination, W3BAQ — R.M.'s; W3BEI, W3BYR, W3ITU — P.A.M., W3EUH. Section Net frequencies: O.P.S., 1980 kc. (Thurs., 8 p.m.); O.R.S., 3700 kc. (Tues., Thurs., Sat., 8 p.m.); O.R.S., 7280 kc. (Mon., Wed., and Fri., 8 p.m.). During the past month there have been several requests to keep all Southern New Jersey traffic nets in operation during the summer months. In past years it has been customary to close down the nets during the last week of May, for the summer. To comply with requests the following summer schedule will be arranged: O.P.S. Net will meet once weekly as usual; a change of time will be announced over the net later. O.R.S. Nets will operate twice weekly, time and days will be announced on the nets later. I sincerely hope this plan will please everyone concerned and will help keep the S.N.J. totals above zero. W3BEI, W3BYR and W3FFE have renewed O.R.S. for another year. IZT is new O.P.S. in Bridgeton. BEI now holds Class 1 0.0. rating. BAQ has renewed his E.C. appointment for another year. Ted is looking for a few more fellows who are interested in the Emergency Coördinator appointment to represent some of these towns in our Section that are not already covered. How about it fellows? Let's get behind this Emergency set-up and make S.N.J. a top notch section. If you have any questions on this emergency work please write your S.C.M. or W3BAQ, our Section Coördinator. ITS is a new recruit in the A.E.C. Supporting Division. IOK is general chairman for the Fifth Outing and hamfest of the Delaware Valley Radio Association of Trenton to be held August 10th. Charlie tells us the affair this year will be one of the greatest parties that ham radio has seen in many years. FFE is doing a little rebuilding and expects to be very active during the summer. ASQ is doing a little 28 Mc. work when not busy with the O.P.S. gang. ZI is having splendid results with his little portable rig. EED has a new 14-Mc. doublet antenna. ACC finds 56 Mc. interesting these days and only leaves it to get on O.P.S. Net. JBU has received his 20 w.p.m. award. AVJ is keeping the spirit of traffic handling much alive by active participation in both the A.A.R.S. and O.R.S. Nets; this also applies to BYR, BZX, BEI and EWK. ABS has a new traffic schedule with SBCU immediately after O.P.S. Net each Thursday evening. HAZ assisted ZI with details of the A.A.R.S. Banquet. April meeting with Dave Heilig, former Marconi Man, as guest speaker. The S.J.R.A. will hold its 25th Anniversary Banquet on June 21st. I urge the entire Section to get behind this affair and make it a big success. Let's not forget the date and plan to be there. BZX is certainly consistent with his traffic recently. He made B.P.L. again. W3VE/4 is holding daily schedules with ATF on 3.5 and 7 Mc. Plans are under way for an O.P.S. meeting to be held in Trenton with the express idea of improving net operations. AEF has started a 'phone net on 1839 kc. with the following, who are also members of the S.J.R.A.: IAS, HDN, HLY, IP, HWC, ILN, HZM, ETL, DAJ, BWI, FBZ, FEY, IZH and AEJ. CKY is a new member of the D.V.R.A. GCU is again rebuilding and expects to have a bit more power very shortly. EUH is revamping his modulator and speech amplifier. Until next month, 73.

Traffic: W3BZX 566 BYR 115 (WLVN 111) HAZ 137 ATF 120 ZI 82 AVJ 72 OQ 57 HKO 44 AQ 51 EWK 38 EUH 31 AEJ 29 BEI 24 HYT 23 DNU 19 CCO 15 ITU 14 ASQ 16 IMY 10 JBU 9 ACC 7 GHR 2 ABS 1.

WESTERN NEW YORK — SCM, Fred Chichester, W8PLA — PCN, who has been about the busiest ham in Western New York, has been forced to quit operating for the time being. Sorry to lose you, Ott. VUY and VEK are new calls in Rochester. A new ham has been added to the household of QXS. His son has just been assigned the call VVM. Nice going, Tom. The R.A.R.A. has auctioned the equipment owned by the late ABX and turned the proceeds over to his widow. DOD and DFN are moving to new QTH's. JIC has been making recordings of the 'phone boys around Rochester and surprised most of them by appearing at the April 15th meeting of the R.A.R.A. and letting them hear themselves talk. Also at the last meeting, Walter Starkens

presented his newly patented motor driven key. Mr. Starkens claims that to send the alphabet with a straight key requires 120 motions, a bug 93, and his key 63. Several of the Rochester boys already are using the new key. NCM, OQC, NVK and TKY of the N.C.R. have been called to active service. JTT/3, formerly with the W.N.Y. Section, delivered 93 Red Cross messages in Washington. The Elmira Radio Club is making great plans for Field Day this year. They will have four units in the field. USY is now located in Texas. TXB has burned up about a dozen T740's in the past few weeks. RTW's xyl will soon take the exam for a ham ticket. NYA is working in Elmira. PAL is at Ft. Bragg, N.C. RVM now sports a home-grown v.f.o. VUG is a new call near Theresa, N. Y. SVZ has fully recovered from a prolonged illness and is back on 7 Mc. NNJ, coördinator for Oneida county, reports the Red Cross chapters in that district highly pleased with the result of the recent test. JIW is doing a fine job of lining up emergency stations on 3.5 Mc. Howy has also been acting as N.C.S., in the absence of FCG. USF has been reporting into the O.R.S. Net. Batavia hams have organized a club to be known as the Batavia Radio Operators' Club and have elected the following officers: Pres., HVO; Vice-Pres., NXX, Secy., NAX; Treas., LRT; Communications Manager, CUY. The club has voted to affiliate with the ARRL. An emergency transmitter has been constructed and is now in operation and available for emergency use. Weekly meetings are held at the N. Y. State School for the Blind each Thursday evening and every Sunday at 9 A.M. a meeting is held on 3585 kc. Each member is active in amateur radio work, and several have constructed portable emergency equipment. SOW will soon be back and in W.N.Y. Net. NXX has a new NC-101X receiver. PLA is keeping daily schedules with ELK, RTX and CUY to clear traffic to and from 1.75 Mc. He is also keeping noon schedules daily with MC to clear Rochester traffic. RMR now has separate rigs for 1.75, 3.5 and 7 Mc.

Traffic: W8RZX 35 SMI 92 SBV 74 AOR 146 SFD 215 DSS 41 NTK 13 SJV 67 PCN 745 EBR 180 QXS 45 PLA 493 RTX 37 AQE 142 BHK 55 USF 11 JIW 537 BJO 173 FCG 337 UXT 35.

WESTERN PENNSYLVANIA — SCM, E. A. Krall, W8CKO — Assistant SCM, W8KWA — Chief R.M., W8NCJ; — R.M. W8TOJ — Assistant SCM in charge of Emergency Coördination, W8AVY, KWA has been appointed State Net Control for A.A.R.S. He says he is just plain busy with O.R.S. and A.A.R.S. work. MJK goes over the top again. R.M. NCJ always turns in a good report. He holds the W. Pa. O.R.S. nightly from 8:30 to 9:00 p.m. on 3750 kc. and says traffic handling on the net is increasing nicely. MOT has a new e.c.o., band switching and all. WQ is one of the reliable O.R.S. of W. Pa. PER is on the net quite regularly too. CMP is operating 3.5 and 7 Mc. PX is kept busy with Weather Bureau Net and trunk line work. RNO says he succeeded in getting his name in the papers due to O.R.S. work. He says the McKeesport A.T.A. club is discussing the possibility of an emergency powered net. OKK is reliable on W. Pa. — W. N. Y. and TL "A." JSU received a QSL from K5AX after 21 months. UWZ is O.R.S., O.B.S. and A.A.R.S. VRX is a new ham at Grove City. TWI operates YA at State College. IOH helps to keep St. Mary's on the map. AXD keeps the old rig polished up for emergency work. SNA reports that five minutes after he copied a RC message it was in Washington. HMJ is a new E.C. TTD wants QSO with Fla. and Texas for W.A.S. After many years it is good to have a report from AIG. RIS has been operating 14-Mc. 'phone. TOJ is R.M. on the early evening O.R.S. Net which operates from 6:30 until 7:00 p.m. Mon., Thurs., Fri. on 3750 kc. His report from March 19th to April 15th follows: Number of net sessions, 20. Total number of stations reporting, 100. Average number per net session, 5. Total number of messages handled, 139. Average number messages per session, 6.95. FB, Hank. Keep it up! RBC has been ordered to active duty in the N.C.R. and will be stationed at Key West, Fla., for the present. OKF has also been called by N.C.R. and will be stationed at Sitka, Alaska. Let's keep our traffic nets, both c.w. and 'phone, open all summer for relay work. We should be able to get all kinds of traffic to and from the various Army camps. We accept traffic for territorial U. S. A. or leased possessions. So, what say?

Traffic: W8KWA 457 CKO 429 MJK 302 NCJ 300 MOT 254 TOJ 215 WQ 170 PER 98 CMP 92 PX 68 RNO 63 OKK 62 JSU 56 UWZ 50 YA 49 IOH 36 VMW 35 SNA 16 HMJ-TTD 10 AIG-RIS 2.

NOTICIA

The Radio Amateur's HANDBOOK en Castellano

Ha sido puesta en circulación la edición en Castellano de "THE RADIO AMATEUR'S HANDBOOK" traducida y editada, como en años anteriores, por "REVISTA TELEGRAFICA" de Buenos Aires, la revista de radio más antigua, de mayor prestigio y circulación en todos los países de habla castellana. —

La edición original de "THE RADIO AMATEUR'S HANDBOOK" 1941 no hace más que confirmar el alto prestigio adquirido en los últimos 15 años y que lo consagra como el manual típico en las actividades de alta frecuencia y radiocomunicaciones. —

Contiene treinta y dos capítulos con amplias explicaciones sobre experiencias realizadas y consejos acertados para la construcción de estaciones completas para radioaficionados y su manejo técnico y de manipulación. —

Inicia el libro dos capítulos de historia dedicados al principiante y a continuación van cuatro capítulos sobre principios y diseños, conteniendo además los elementos básicos de la radio en una forma muy comprensiva. —

En catorce capítulos siguientes se trata la construcción y ajuste de docenas de unidades de transmisión, recepción, fuentes de energía etc. La sección antena consta de cinco capítulos en los cuales cualquier aficionado puede hallar la solución de su problema. Otros cinco capítulos se dedican a las frecuencias ultra elevadas.

La modulación de frecuencia es otro tema tratado en el HANDBOOK 1941 sin olvidar los equipos portátiles de emergencia; medición y equipos de medición; tablas de características de más de 700 válvulas etc. —

"THE RADIO AMATEUR'S HANDBOOK" es, en síntesis, el esfuerzo de un organismo como la A.R.R.L. y el resultado práctico de muchas experiencias. Las innovaciones que contiene son de mérito probado. —

La traducción en Castellano, obra de "REVISTA TELEGRAFICA," de Buenos Aires, es el complemento ideal de ese esfuerzo. Se vende a \$6 moneda argentina ó \$1.50 oro americano. —

Pedidos a la A.R.R.L., West Hartford, Conn., E. U. de N. A., y por mayor a "REVISTA TELEGRAFICA," Perú 165, Buenos Aires, Argentina.

(Contd. from page 90)

W0NYH 30740-58-213-A-34
W0QIN 15225-42-200-A-31
W0LPL 13500-36-151-A- --
W0DOB 10454-39-143-B-20
W0GNG 4182-30-59-A- --
W0VIP 3653-31-51-A-11
W0EQH 3050-20-82-A-9
W0CGK 2445-19-52-A-11
W0MCM 1233-17-31-A-8
W0TJP* 272-8-17- --
W0ZAD 225-9-10-A-3

Phone
W0ZDM 12-2-3-B- --

DELTA DIVISION

Arkansas

W5EIJ 25375-50-205-A-36
W5GWT 16720-44-152-A-36
W5DUI 16555-43-155-A-29
W5AQF 1632-24-35-B-13
W5GWD 1375-20-28-A-12
W5IRG 630-12-22-A-10
W5EGY 144-8-9-A-2
W5HY8* - - - - 61- --

Phone

W5HWK 17365-46-151-A-36
W5EGY 8569-41-106-B-13
W5FWD 6586-37-90-B-37
W5FKQ 900-18-26-B- --
W5HER* 2-1-1- --

Louisiana

W5KC 31763-62-529-A-40
W5WG 71025-60-474-A-38
W5INL 14300-44-132-A-30
W5IYL 7481-35-88-A-24
W5IKP 5851-31-77-A- --
W5JET 1860-24-33-A-9
W5BZR 832-16-26-B-8
W5HNW 672-16-21-B-7
W5HWE* 10-2-2-A- --
W5HOU* - - - - 11- --

Phone

W5IRO 23700-50-227-B-34
W5HOU 10656-48-111-B-21
W5ADJ 5403-26-104-B-22
W5HNW 2178-22-50-B-11
W5BQD 900-15-33-B-7
W5IKP 75-3-10-A- --

Mainissippi

W5AYF 59074-59-401-A-32
W5JDR 1800-20-36-A-11
W5HRX 490-7-28-A-11
W5SU/5* 192-8-12- --

Tennessee

W4FCF 27338-45-259-A-25
W4FDT* 18340-48-157-A-24
W4AYV 7523-34-89-A- --
W4HAM 113-6-8-A-3
W4DDJ* 105-7-8-B-3
W4ZZ* 40-4-5- --

Phone

W4DUS 7992-37-112-B-15
W4GGR 4263-29-75-B-26

HUDSON DIVISION

E. New York

W2EWD 44069-55-327-A-40
W2EGG 34980-55-328-B- --
W2LZO 15750-36-175-A-18
W2KFN 14700-41-144-A-34
W2LDS 14000-35-200-B-33
W2LRZ 10374-42-124-B-27
W2ISJ* 9225-30-123-A-13
W2NCG 9068-26-142-A-25
W2NIY 8938-25-143-A-18
W2LH 5440-34-65-A-29
W2MIY 5250-25-84-A-9
W2MZR 3136-28-56-B-16

W2MUH 1710-10-36-A-12
W2LLU 750-12-26-A-5
W2DIJ 405-9-18-A-2
W2LIC* 20-2-4-A-1
W2LSG 18-3-3-B-1

Phone

W2MEC 2656-34-40-B-12
W2EGG 1975-25-40-B- --

N. Y. C. & L. I.

W2IOF 97350-59-672-A-37
W2HFF 88970-62-577-A-40
W2MEL 70395-57-500-A-40
W2AYT 57320-59-392-A-35
W2IUG 56478-58-390-A-38
W2AY 53872-56-481-B-40
W2MEM 44775-60-300-A-31
W2LPI 41400-48-345-A-40
W2LYL 43325-54-322-A-36
W2KYV 30063-50-313-B-37
W2AGP 33500-45-350-B-35
W2KZP 35888-55-287-A-39
W2AOD 35606-45-317-A-37
W2NDQ 31458-56-281-B-12
W2BWC 32985-43-307-A-27
W2AEE 32195-47-375-A-29
W2KKU 28388-50-231-A-27
W2LIP 28013-54-210-A-17
W2BVG 27720-44-252-A-31
W2HGU 25630-44-233-A-34
W2AHC 25404-45-219-B-24
W2AJL 25380-54-235-B-30
W2KGN/2 20801-43-194-A-21
W2DKF 19440-45-216-B-30
W2BZS 13800-46-152-B-34
W2GGN 12943-31-167-A-29
W2MOY 10855-26-168-A-28
W2MVJ 9960-39-132-A-28
W2MVX 9380-35-137-B-13
W2EIC 9280-40-116-B-22
W2CKQ 8098-31-105-A- --
W2MXP 7600-32-95-A-12
W2MJO 7575-30-102-A-31
W2MHD 7070-28-101-A-19
W2JAU 6885-27-105-A-14
W2MZZ 6720-32-84-A-16
W2ICO 5250-30-70-A-12
W2DCW 4563-25-73-A-25
W2LKR 4515-21-86-A-24
W2KXB 4453-26-69-A-8
W2EYS 3650-20-73-A- --
W2HHD 3625-25-58-A-8
W2LUY 3225-25-65-B-12
W2DUS 3136-28-56-B-16
W2MDW 3010-28-43-A- --
W2MXB 2675-20-54-A-16
W2EC 1944-18-54-B-4
W2JB 1462-17-43-B-6
W2MCI 1256-15-34-A-6
W2ANX 1230-15-41-B-7
W2FTX 1015-14-20-A- --
W2HVR 988-19-26-B-5
W2LUT* 420-10-21-B- --
W2LKG 300-8-15-A-5
W2HGO 196-7-14-B-4
W2MHE 162-6-14- --
W2LJC 24-3-4- --
W2KVL* - - - - 127- --
W2HG* - - - - 94- --
W2LR* - - - - 68- --

Phone

W2HAW 5940-33-91-B-22
W2LHQ 4316-26-83-B-33
W2HYJ 1950-15-53-A-21
W2DKK 1300-20-33-B-7
W2LWW 650-10-33-B-11
W2KVH 495-12-17-A-4
W2LGS 410-4-41-A-17
W2LKY* 350-10-18- --
W2LUX 260-5-22-A-16
W2DOG 240-8-15-B-5
W2MIV 188-5-15-A-14
W2LZU 180-8-9-A-10

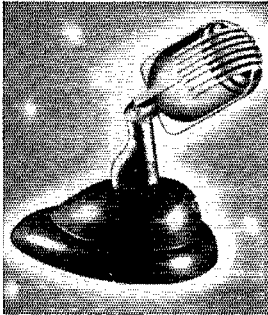
COMMERCIAL RADIO INSTITUTE

A radio training center for over twenty years. Well equipped. Excellent faculty. Practical resident courses in Radiotelegraphy, Broadcast, Servicing, Television, Aeronautical, Drafting, Mathematics, Industrial and Studio Technique. Placement. Catalog upon request. Dept. B.

38 WEST BIDDLE STREET, BALTIMORE, MARYLAND



"Uniplex" Cardioid



Shure "Stratoliner"



Shure Model 707A

Nothing like a SHURE Microphone for Communications

When you want to go on the air and get thru clearly, distinctly . . . when you want unusual day-in and day-out performance . . . choose a SHURE Microphone. You pay no premium for such fine quality. Whatever price you pay, you get the best value for your money!

The "Uniplex" gives you true cardioid uni-directional performance in a speech microphone at \$32.50 list. The "Stratoliner" Crystal gives you deluxe features usually embodied in higher priced microphones, at only \$17.50 list (without stand). And for really low cost, the Model 707A at \$9.95 list is your best bet.

Ask Your Jobber or Send for Catalog 153Q

SHURE BROTHERS

"Microphone Headquarters"

225 W. Huron St., Chicago, U.S.A.

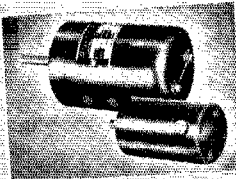


Shure Patents Allowed. Licensed under patents of the Brush Development Co.

APPROVED by the AIRLINES



... that's why you can depend on PINCOR Dynamotors! All types and sizes available. Submit your requirements.



PINCOR D. C. Motors will meet your needs. Specify them for band switching and other power supply uses.

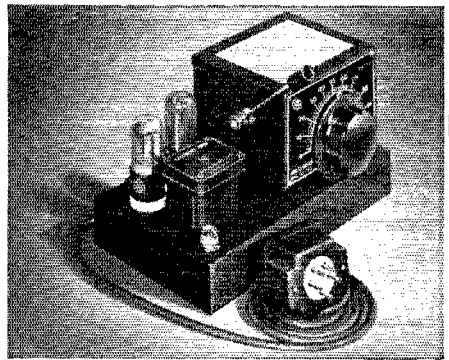
POWER SUPPLY by PINCOR



PIONEER GEN-E-MOTOR

CHICAGO, ILLINOIS

Export Address: 25 Warren Street, N. Y., N. Y.
Cable: SIMONTRICE, New York



THE RICE-VARIARM

was described in detail in a comprehensive article by Henry E. Rice, Jr., in the January issue of QST. The Millen commercial models are:

No. 90700 has fundamental oscillator frequency range of from 3500 to 3650 Kc. "Convenient-to-change" taps on amplifier and link coils provide for output on 80 or 40.

No. 90701 is the same as No. 90700 except fundamental oscillator frequency range of from 1750 to 2000 Kc., providing for output on 160 or 80.

Either model complete with GE tubes, ready to use, only \$29.50 net at your dealer's

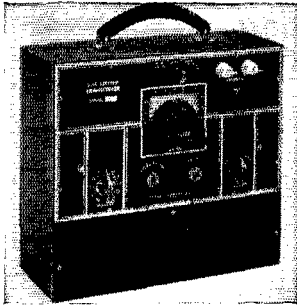
JAMES MILLEN
150 EXCHANGE ST.



MFG. CO. INC.
MALDEN, MASS.



New ABBOTT DK-3 PORTABLE-MOBILE TRANSCEIVER



for 2 1/2 METERS

Compact in size, light in weight, completely self contained... with the added feature of inductive antenna coupling. The variable antenna coupling knob on the front panel permits maximum power in transmit position and enables flexible receiver control for both weak and powerful signals.

Extremely LOW PRICED, the DK-3 requires only two inexpensive tubes; three 45-volt B batteries and one 6-volt battery. Operates with any single button 200 ohm carbon microphone and any standard headphones.

For fixed station operation, use AC power supply giving 135 to 180 volts DC output.

DK-3 — Less batteries and tubes, net to amateurs. **\$17.35**

ACCESSORIES for ABBOTT DK-3

Net to Amateurs

RCA Radiotron 6G6G.....	\$.67
HYTRON 6J5GT, ceramic base, low loss.....	.95
(or RCA 6J5GT..... 43¢)	
3 BRIGHT STAR batteries (30-33) @ \$1.05.....	3.15
1 BRIGHT STAR 6-volt battery (866).....	.70
UNIVERSAL Single button carbon microphone, Type W.....	1.75
HEADPHONES, 2000 ohms.....	1.39
UNIVERSAL HAND SET (in place of microphone and headphones).....	4.88

W2JL • W2LJA • W2PL • W2JKD • W2KWY

OUR *Best* VALUE IS OUR RECORD OF LOYAL SERVICE

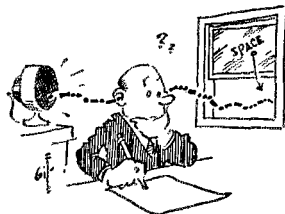
HARVEY

Radio Company of New York

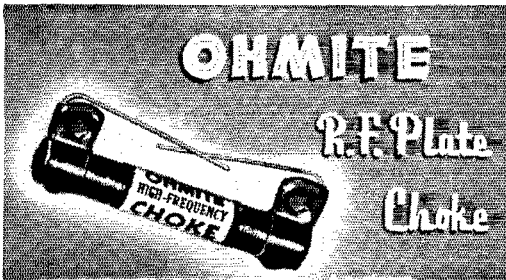
103 WEST 43rd STREET • NEW YORK, N. Y.

CABLE ADDRESS: "HARADIO"

W2KXG	175-5-14-A-10	W9SCA*	50-5-5- - -
W2JDG	108-6-9-B- -	W9REV	23-3-3-A-1
W2NGK	79-3-12-A-11	W9BCC*	8-2-2- - -
W2LZG*	6-1-3- - -		
Phone			
No. New Jersey			
W2GSA	97417-62-631-A-40	W9TJA	19373-54-145-A-28
W2JAE	81554-53-618-A-40	W9YWW	4905-31-62-A-14
W2LXI	65270-61-428-A-38	W9BAQ	4270-35-62-B-11
W2JKH	65070-54-484-A-40	W9JIS	2043-27-55-B-6
W2ZA	52101-63-413-B-40	W9ZQI	160-8-8-A-2
W2CSQ	50085-54-371-A-35	W9ZYS*	20-2-5- - -
W2KXI	47738-57-335-A-33	W9GPB*	2-1-1- - -
W2WQ	47123-81-309-A-35		
W2MBS	44525-59-343-A-35	Kansas	
W2MAP	44370-45-285-A-35	W9CWW	75020-62-430-A-40
W2MIL	43512-59-295-A-32	W9QXG	59890-53-452-A-37
W2MKT	42840-56-306-A- -	W9VBU	27019-55-197-A-12
W2LJY	42240-48-354-A-38	W9VZR	18375-49-188-B-24
W2PY	37510-44-341-B-36	W9ZOI	14265-36-163-A-30
W2BBK	34552-56-314-B-39	W9CVL	12255-43-115-A-17
W2IYQ	31160-41-304-A-37	W9LTY	10711-41-105-A-27
W2LMO	27563-42-266-A-40	W9HO	3375-27-50-A-10
W2MLD	26301-52-201-A-31	W9GTY	2820-30-48-B-5
W2EQS	21505-44-198-A-30	W9AHG	2599-21-50-A-18
W2NCI	21420-45-238-B-24	W9CGZ	370-12-21-A-10
W2LGY	19810-35-227-A-28	W9LJL*	198-9-11- - -
W2MLW	16236-44-180-B-31	W9GRU	69-5-6-A-4
W2MHJ	13200-30-177-A- -		
W2LTP	12180-42-150-B- -	Phone	
W2KRA	9240-28-132-A-19	W9PNX	26100-58-180-A-38
W2DZA	8619-30-112-B-16	W9PAH	8600-43-101-B-21
W2ILF	8588-30-117-A-30	W9FRK	585-12-20-A-5
W2MDP	8160-32-103-A-22		
W2JIEU	6500-26-102-A-14	Missouri	
W2MOJ	5940-33-92- - -	W9GJB	56425-61-370-A-37
W2MNT	4928-27-73-A-14	W9AEJ	49118-59-337-A-39
W2MEO	4680-26-73-A-6	W9YZH	42892-57-304-A-40
W2MAX	4604-29-65-A-9	W9QMD	35770-56-259-A-28
W2MMT	4410-28-63-A-14	W9DAE	34220-59-290-B-22
W2LPL	3900-24-66-A-15	W9HIC	27923-51-221-A-30
W2MRX	3625-29-50-A-11	W9BIT	23075-52-180-A- -
W2CFW	3150-21-60-A-11	W9PGI	21981-51-216-B-25
W9GKE	2832-22-52-A-20	W9GHD	20160-48-170-A-40
W2MPS	2589-19-58-A-20	W9JKI	9844-46-107-B-19
W2MRK	2225-20-45-A-6	W9KXL	7311-33-91-A-25
W2FDL	2200-20-44-A-8	W9KIK	4250-25-68-A-18
W2GNW	2115-18-51-A-19	W9YTC	4224-31-55-A-15
W2IB	2112-24-45-B-14	W9YRX	3438-25-55-A-17
W2NIG	2090-19-44-A-27	W9TDB	3380-26-52-A-9
W2KEG	1656-23-36-B-7	W9TBU	1688-18-38-A-8
W2NCY	1481-15-40-A-13	W9SOM	360-8-18-A- -
W2CW	1420-16-36-A-4		
W2GME*	882-18-25- - -	Phone	
W2JSF	600-10-24-A-8	W9KOK	21988-46-239-B-38
W2GFW	451-11-21-B-3	W9OMG	21654-54-204-B-40
W2JSE	200-8-10-A-3	W9IMF	1643-18-40-A-14
W2MKT	165-8-11-A-2	W9OJP	72-6-6- - -
W2NEN*	90-6-6-A-3		
Phone			
W2WJU	17950-50-181-B-30	Nebraska	
W2DYR	13413-51-132-B-24	W9ASO	87653-62-568-A-34
W2JTY	2912-26-56-B-20	W9ZRP	84785-62-549-A-39
W2IUU	988-19-26-B-3	W9MVG	50209-59-429-B-40
W2GE	91-7-7- - -	W9BZG	47436-59-410-B-36
		W9ZVN	46748-58-408-B-30
		W9QNP	32188-50-258-A-32
		W9ZHJ	26073-51-205-A-30
		W9QHO	16600-50-167-B-32
		W9BDQ	7830-36-93-A-22
		W9MTI	6300-36-90-B-21
		W9DGL	2835-27-53-B-12
		W9INE	2469-25-40-A- -
		W9AZT	2304-24-48-B-8
		W9LWS	158-7-10-A- -
		W9FQB	22-3-3-A-1
		Phone	
		W9KQX	27043-58-190-A-37
		W9ZYX	25025-44-230-A-31
		W9GDB	13669-45-128-A-29
		W9RKB	12314-47-131-B- -
		W9YXR	8100-39-106-B-8
		W9FBQ	50-4-5-A-5
		W9BVD	12-2-3- - -
		NEW ENGLAND DIVISION	
		Connecticut	
		W1KQY	61560-57-423-A-38
		W1FMY	46972-53-355-A-35
		W1CSY	41860-52-322-A-35
		W1APA	24500-49-200-A-20



IF YOU DON'T
GET IT DOWN ON
PAPER - THAT
AIN'T COPYIN'!



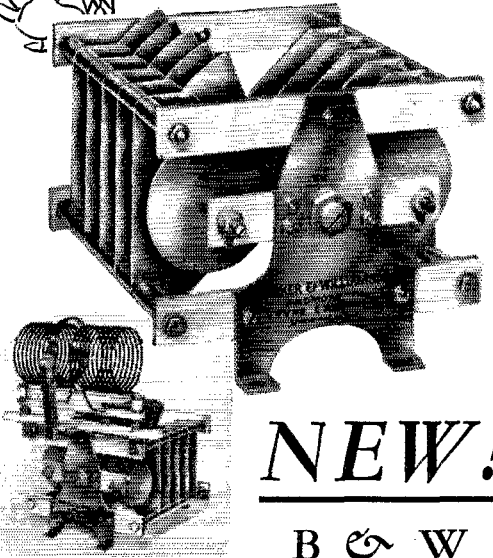
Built to Carry 1000 M.A.
 Popular Ohmite high frequency solenoid Chokes designed to avoid fundamental or harmonic resonance in the amateur bands. Single-layer wound on low power factor steatite cores — with moisture-proof coating. 5 meter choke illustrated. Larger sizes for 10, 20, 40, 80 and 160 meter bands, with non-magnetic mounting brackets. Ask your Jobber!

Send 10¢ in coin for new
 Ohmite Ohm's Law Calculator
OHMITE MANUFACTURING CO.
 4865 Flournoy St., Chicago, U.S.A.

Be Right with **OHMITE**
 RHEOSTATS • RESISTORS • TAP SWITCHES



Man Oh Man!
 HAVE I BEEN HOPING
 FOR A CONDENSER
 LIKE THIS!



NEW!

B & W

VARIABLE AIR CONDENSERS

Type CX

Check these exclusive features

- ✓ Half the length of conventional dual condensers.
- ✓ Built-in Neutralizers.
- ✓ Built-in Coil Mounting.

Here's a variable air condenser that you can't afford to overlook! Physically and electrically, it sets up entirely new standards of quality and performance. High breakdown voltages, high maximum to minimum ratios, Alsimag 196 insulation throughout, rugged construction . . . these are just a few of many additional features. It's a complete amplifier plate circuit assembly . . . the greatest improvement in variable air condensers in years!

Write Today! Complete technical information and prices are yours for the asking. Get your copy now!



E. H. Rietzke
 Pres. CREI

**• Do You Want
 A BETTER
 RADIO JOB?**

**CREI Technical Training Is Enabling More Than
 5000 Professional Radiomen to Prepare for
 Good-Paying Radio Jobs—**

Stop fooling yourself! The good jobs — the *permanent* jobs in radio don't come easy. The sure way to success is to build your future on a sound foundation of *knowledge and ability*. The ability you develop is your assurance of a steady, sure income. It can be developed now by combining your own radio experience with modern CREI advanced technical training.

THINK THIS OVER — Actual records show: ● CREI graduates, as a group, are among the highest paid in radio! ● CREI men are in more than 400 broadcasting stations! ● More than 5000 radiomen have taken this course of training! ● Employers are increasingly calling upon CREI for graduates for personnel replacements and additions!

Write for Facts Today!

Our free booklet and personal recommendations may hold the answer to your future success. In your inquiry, please state briefly your background, education, present position — and whether you are interested in Home Study or Residence School training.



Capitol Radio Engineering Institute
 Dept. Q-6, 3224 16th St. N. W., Washington, D. C.

BARKER & WILLIAMSON
 Radio Manufacturing Engineers • ARDMORE, PENNSYLVANIA



Get the Right Antenna Answers!

Send today for the 1941 edition of Premax Antenna Manual, a complete and comprehensive treatment of Antenna Design, Construction, Feeding, and use in amateur, public and commercial service. 32 pages of technical data, 51 diagrams of vertical and rotary arrays. Postpaid in U. S. for 25 cents.

Ask for new Premax 1941
Radio Antenna Catalog of
Masts and Mountings

FREE

Premax Products

Div. CHISHOLM-RYDER Co., Inc.
4137 Highland Ave., Niagara Falls, N. Y.



No. 211 Flyweight
Receiver, \$6.75

RADIO CONTROL

Get in on the thrilling new hobby — radio control of models. RCH equipment is widely and successfully used. Ask your dealer or send 10¢ for illustrated Instruction Manual.

RADIO CONTROL HEADQUARTERS, INC.
336 West 42nd Street New York City

RADIO OPERATING QUESTIONS ANSWERS

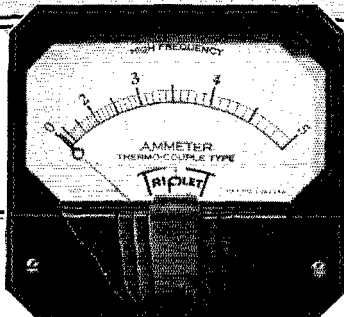
Nilson & Hornung's new edition covers all FCC commercial license exam elements. Standard handbook 20 years. \$2.50, postpaid. Money back if not satisfied and book returned in 10 days. Send check or money order . . . not cash. Free circular on request.

NILSON RADIO SCHOOL, 51 East 42nd St., New York

W1BH	20520-45-229-B-23	W1MBN	675-10-27-A-9
W1DDX	19895-46-173-A-24	W1MUM*	520-13-20--
W1KIO	18800-47-160-A-31	W1MKX	512-10-22-A-6
W1TD	17383-34-207-A-25	W1EPG*	484-11-22-B--
W1BYW	16200-48-135-A-17	W1LNN	450-10-18-A-2
W1AGT	15750-30-210-A-36	W1JYB	300-8-15-A-4
W1LBT	11760-28-169-A-22	W1LYT	40-4-5-B-2
W1LAL	9733-34-117-A-30	W1MTP*	18-3-3--
W1HIS	9435-37-102-A-15	W1KDM	2-1-1-B-1
W1JYW	8745-33-106-A-15	W1KRO*	--31--
W1DEP	5438-30-74-A-21	W1KYY*	--6--
W1LHJ	5366-27-79-A-19		
W1LTT	4500-30-60-A-10	<i>Phone</i>	
W1BHM	4153-27-77-B-8	W1HKK	31293-61-258-B-33
W1CTI	3675-21-70-A-7	W1LXL	20972-49-214-B-35
W1LZM	3650-20-73-A--	W1LNK	14796-54-137-B-31
W1KXS	3500-20-72-A-9	W1KQX	14504-49-150-B-30
W1LQK	3285-18-73-A-15	W1HOB	12558-42-150-A-36
W1MIU	2756-26-53-B-11	W1PZ	6528-34-98-B--
W1UE/1	2400-20-60-B-10	W1KTE	6300-30-84-A-33
W1MFN	1450-20-29-A-14	W1LEA	2816-22-64-B-18
W1BW	938-15-25-A-7	W1IIM	1872-18-52-B-13
W1KDO	660-12-22-A-5	W1LKM	1404-18-40-B-6
W1KFN	468-11-17-A-3	W1BLR	1260-21-30-B-7
W1LIG	286-11-13-B-7	W1ZR	875-14-25-A-11
W1MVH	240-8-12-A-5	W1QM	874-19-2-3-B-4
W1MEF*	23-3-3-A-1	W1COX	810-15-27-B-6
W1TS12	87575-62-566-A-40	W1LBH	683-14-20-A-6
W1JPE12	18290-59-155-B-19	W1HA	625-10-20-A-4
W1JFN12	9600-32-120-A--	W1INU	252-9-14-B-2
W1EH12	528-12-22-B-3	W1MRK	40-4-5--
W1LVQ12	63-5-5-A-1	W1YTT	8-2-2-B-1
W1BDI12	10-5-5-B-2		
		<i>W. Massachusetts</i>	
<i>Phone</i>		W1KZS	41850-54-310-A-39
W1GDC	9118-43-106-B-25	W1KJO	23100-30-308-A-35
W1LOP	2933-23-50-A-5	W1CGY	19345-53-148-A-29
W1GVV	270-9-15-B-3	W1RNY	10065-33-122-A-10
		W1DCH	6039-33-92-B-13
<i>Maine</i>		W1KOS	5474-29-77-A-38
W1BFA	47809-61-321-A-40	W1BIV	5460-26-106-B-12
W1GKJ	34650-45-310-A-40	W1MKR	2473-23-44-A-16
W1ASG	34210-55-316-B-40	W1BPN	1998-27-37-B-7
W1CRU	33773-57-237-A-38	W1FAA	1876-19-40-A-10
W1LHA	31600-40-318-A-36	W1AJ	1840-20-46-B-4
W1KYT	23489-43-223-A-40	W1GRK	1600-16-50-B-6
W1CPS	22512-48-235-B-37	W1LLN	975-15-26-A-9
W1LJX	16748-38-195-A-38	W1BKG	813-13-25-A-4
W1MFK	14088-35-162-A-32	W1MWN	720-18-22-A-6
W1KKB	10140-39-131-B-31	W1LJM	32-4-4--
W1CUB	7080-24-118-A-26	W1LXE*	10-2-2-A-1
W1LML	3822-22-70-A-17		
W1IUM	1800-16-45-A-20	<i>Phone</i>	
W1MQW	2266-22-52-B-30	W1MCF	10824-41-134-B-29
W1ENW	1955-17-46-A-6	W1JCI	720-15-24-B-12
W1BTY	1293-11-47-A--	W1BDV	100-4-10-A-3
		W1LDE*	2-1-1--
		<i>New Hampshire</i>	
<i>Phone</i>		W1PTJ	50820-56-363-A-36
W1LOA	8800-40-88-A-38	W1BFT	31875-51-250-A-24
W1ACW	1430-22-33-B-9	W1DMD	17745-39-182-A-18
W1DHH	138-6-12-B-4	W1P	14800-37-160-A-18
W1LWX	18-3-3--	W1PGC	14350-35-208-A-31
		W1GKY	9082-20-125-A-16
<i>E. Massachusetts</i>		W1KIN	4830-23-105-B-6
W1RY	77165-61-508-A-40	W1MMG	4200-20-85-A-12
W1KXU	59015-58-407-A-35	W1MCS	1089-13-34-A-13
W1LYG	55860-60-470-B-39	W1MDS	881-15-30-A--
W1HY	39116-57-275-B-35	W1KLV*	352-11-16--
W1HZ	38709-51-381-B-34	W1GH*	15-2-3-A--
W1BSG/1	34440-56-247-A-31		
W1EPE	33660-48-284-A-32	<i>Phone</i>	
W1JOY	32430-46-285-A-36	W1EHI	1780-20-45-B-7
W1JOX	31050-46-271-A-40	W1HRI	660-11-24-A-14
W1LWH	21367-42-203-A-19		
W1KMY	18515-46-161-A-40	<i>Rhode Island</i>	
W1MAN	17325-35-200-A-19	W1LWA	42299-43-394-A-40
W1LRO	17204-46-190-B-36	W1KOG	40180-41-393-A-38
W1LXB	12810-42-122-A-23	W1BBN	26460-54-246-B-36
W1LQQ	10580-34-125-A-21	W1KYY	22410-36-251-A-33
W1LGY	10575-30-142-A-27	W1MEK	19095-38-201-A-22
W1AQT	10320-43-120-B-13	W1CPV	18894-47-201-B-25
W1JBO	9300-30-124-A-28	W1LDL	10150-29-140-A-15
W1ABG	9158-33-111-A-1	W1KZN	5391-19-114-A-14
W1MDV	8294-29-143-B-25	W1BOY	1680-14-48-A-7
W1MQV	7522-23-132-A-24	W1MOP	280-10-14-B-9
W1MTV	6683-33-81-A-25	W1MRM	135-6-9-A-3
W1KSO	6263-30-84-A--	W1MGN*	--42--
W1KEF*	6205-34-73-A-21		
W1WV	4480-32-70-B-10	<i>Phone</i>	
W1MQR	4374-27-81-B--	W1LEG	6878-38-94-B-13
W1PH	3540-30-50-B--	W1FOV	3596-29-63-B--
W1JFX	3480-24-58-A-12		
W1MLG	2833-22-52-A-14	<i>Vermont</i>	
W1BDU*	2755-29-37-A-12	W1KTB	13640-31-176-A-15
W1GWK	2332-22-54-B-1	W1MMU	8050-28-115-A-21
W1ALP	1950-15-52-A-15	W1KXY	1720-16-43-A-7
W1RH	1853-17-55-B-12	W1MJY	1650-20-33-A-6
W1AOT	1640-16-41-A--		
W1FXB	1505-14-43-A-13	<i>NORTHWESTERN DIVISION</i>	
W1MMD	1496-19-32-A-12	<i>Alaska</i>	
W1EMG	873-13-27-A-4	K7GOM	10050-40-101-A-28
		K7GNN	8-2-2-B-1

TRIPLET THERMO AMMETERS

FROM \$4.50 UP

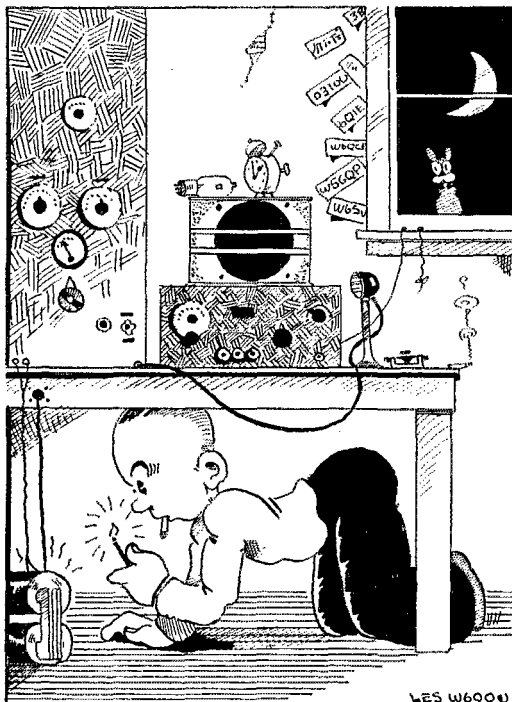


Model 446 EVERY circuit is capable of improvement when reduced to engineering standards by measuring with precision instruments. Use Triplet Thermo Ammeters to give you a truly efficient antenna circuit. (Accuracy to 2%.) Available in 2", 3", 4", 5" and 7" sizes in popular ranges. Internal or external couples.

SPECIAL PRICE REDUCTION — Dealer Prices from \$4.50. (For Model 341 internal couple 0-.5 to 0-5 amp. ranges.) Model 446, as shown above, less front illumination attachment with external couple, \$7.84 net.

WRITE FOR CATALOG Section 256 Harmon Avenue

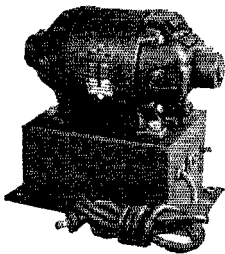
THE TRIPLET ELECTRICAL INSTRUMENT CO.
Bluffton, Ohio



LES 46900

Janette

ROTARY CONVERTERS

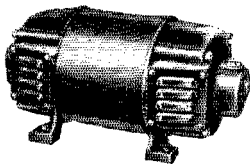


Janette Converters were the ORIGINAL machines designed and built especially for radio apparatus.

These machines progressed with the industry and have made record for economical, operation that today

such an outstanding reliable, trouble-free Janette and quality products are synonymous.

WARNING: Janette converters are being imitated — be sure Janette is stamped on the name plate. Dynamotors, generators and motor-generators are also available.



MAY WE SEND LITERATURE?

Janette Manufacturing Company
556-558 West Monroe Street Chicago, Ill. U.S.A.

LOST VOLTAGE!

This can't happen to you if you use the famous Kenyon Filament Transformer with the exclusive voltage dropping compensator! Increase your tube life, too!

Remember it's "Wise to Kenyonize." Install a Kenyon tapped primary unit T-o-d-a-y!

LOOK AT THESE PRICES AND COMPARE

T-380	5, 5.1, 5.25 V. — 8A. Net.....	\$3.60
T-387	6.3, 6.45, 6.6 V. — 8A. Net.....	2.40
T-392	7.5, 7.7, 7.9 V. — 6A. Net.....	2.55
T-385	10, 10.5, 11 V. — 10A. Net.....	4.80

General Catalog FREE on request. If your jobber cannot supply Kenyon Products — write us direct for name of nearest authorized Kenyon Distributor.

KENYON TRANSFORMER CO., Inc.

840 BARRY STREET • NEW YORK, N. Y.

Cable Address: "KENTRAN"—New York

• When others say —
 "We'll order it for you"
 We say —
 "HARRISON HAS IT!"

Despite "bottlenecks" and back-orders, our huge stock of Amateur and Industrial supplies is now the largest and most complete in our sixteen year history. More equipment, parts, and apparatus for every Radio and Electronic application than ever before!

Let HARRISON serve you—
 Economically and quickly!

2 1/2 IS HOT! Especially with the new Abbott transceivers.
 DK-3 Battery portable. \$17.35
 MRT-3 20 watt mobile/fixd 27.46

All accessories in stock at lower prices

HAMMARLUND discontinued type MTC-35-A transmitting variable condensers, .35 mmf., .171" gap.
 Former list \$6.00. SPECIAL — in original cartons, . \$2.29
 Type HF 50 mmf. balancing condensers, .030" gap.
 FB for air padders. 59c each. Three for \$1.47

300 WATT POWER SUPPLY KITS

A UTAH heavy duty supply for that 300 watt final or modulator. Delivers 1100 volts DC at up to 280 MA and 10 volts AC at 7 amps.

All parts are standard and conservatively rated. Heavy metal chassis comes with all holes drilled; black wrinkle finish to match components. Uses two 866 rectifiers. Weight 48 pounds!

HERE IS WHAT
 YOU GET —
 ALL FOR ONLY

\$13.85

Former net price, \$33.50

Husky plate transformer
 Dual filament transformer
 Swinging filter input choke
 4 mfd. 1500 volt working oil
 condenser
 50M ohm bleeder
 9" x 17" drilled chassis
 Sockets, switches, pilot
 lights, fuse mount, small
 parts, instructions, etc.

Be sure to visit our new

"BARGAIN COUNTER"

Lots of good parts at low prices!

OIL FILLED CONDENSERS



SPECIAL!

Here's a compact, modern radio filter condenser in a cylindrical aluminum container, only 2 1/2" long by 2" in diameter. Impregnated and filled with recently developed condenser oil. Full 2 mfd. 1000 volt DC continuous duty rating (guaranteed for 10% higher). Universal mounting bracket for above or below chassis.

Because of the extremely low price, we cannot mention the name of the maker, one of the largest. But you'll recognize the high quality!

Former Regular Net Price — \$2.00

84c each — Three for \$2.37

- Mail and Phone orders delivered promptly
- Time Payments
- Charge Accounts

12 West Broadway • New York • Worth 2-6276

• **HARRISON** •
 RADIO COMPANY

Phone K7GNN	320-10- 16-B- 5	W6PDV	12834-46-146-B-24
Idaho W7IY W7IYQ	5154-31- 67-A-28 144- 6- 12-B- 4	W6PWE	720-12- 24-A- 6
Phone W7FER	2000-20- 40-A-14	Phone W6GSSB	25650-57-225-B-37
Montana W7BSU W7HCV W7IEI W7EDJ W7HDM W7CME W7BCE W7HVV W7GDB	40484-58-350-B-37 22542-51-222-B-33 11986-43-116-A-26 6408-36- 91-B-21 3180-30- 53-B- 6 2775-30- 40-A-13 1620-24- 27-A- 8 718-14- 21-A- - 660-12- 21-A-18	Santa Clara Valley W6HPT W6PBV W6NHV W6SSA	71631-63-560-B-40 37400-55-275-A-34 35980-56-261-A-38 10512-36-146-B-20
Phone W7C9Y W7FTO	352-11- 16-B- 2 2- 1- 1- - -	Phone W6YX ¹² W6RQG ¹⁴ W6QNK W6MRL	14560-52-141-B-17 10290-49-105-B-17 5400-30- 72-A-26 935-17- 22-A- -
Oregon W7ECI W7HNY W7GPP W7HHH W7GUP W7QY W7HJU*	35269-55-258-A-40 12965-42-143-A-20 11200-35-130-A-18 6972-42- 84-B-17 2600-20- 52-A-29 32- 4- 4-B- 2 - - - 38- - -	East Bay W6ONQ W6TT W6MVQ W6PHZ W6IPH W6LJZ W6JHJ W6RXX W6EJA W6SFT W6LVI W6RRH W6BI* W6DHS	68246-61-543-B-39 45600-60-380-B-37 40963-58-280-A-27 34119-53-261-A-35 24048-54-231-B-39 24192-54-224-B-32 13100-46-114-A- - 4200-24- 70-A-16 1938-22- 44-B- 7 550-11- 20-A-14 460-10- 24-B- 5 450-12- 16-A- 5 120- 6- 10- - 2 24- 3- 4-B- 1
Phone W7GUX W7GNJ W7ABB W7HKO*	13018-41-131-A-32 5600-35- 81-B-26 320-10- 16- - - 8- 2- 2- - -	Phone W6IHF W6HS W6MLZ*	52542-63-417-B-40 1176-21- 28-B- 8 18- 3- 3- - -
Washington W7RT W7ENW W7HAD W7GOE W7GTD W7HZG W7HAV W7FPN W7IEE W7ETO W7BDB W7IC	51545-61-342-A-40 28015-52-222-A- - 14800-40-148-A-17 9847-43-117-B-33 6392-34- 94-B-11 1600-20- 34-A- - 1480-16- 37-A-17 570-15- 19-B- - 163- 5- 13-A- 7 89- 5- 7-A- 3 83- 6- 6-A- 7 63- 5- 5-A- 2	San Francisco W6GWW W6MUT W6OOC W6JNU W6AHI	41477-59-352-B-37 22410-54-166-A-30 2750-22- 50-A-13 1121-13- 35-A-12 960-16- 24-A- 7
Phone W7DQX W7FLD W7DZX W7CNM W7EVT W7HET W7ANI W7BFI	7866-46- 87-B- - 7720-40-100-B-15 5550-30- 74-A-23 2300-25- 46-B-16 688-11- 25-A- 5 656-16- 21-B-11 406- 7- 29-B-13 8- 2- 2- - -	Phone W6BZ W6RPA W6DBB W6RKM W6RMP W6AHI W6QYU*	108- 6- 9-B- 5 37800-56-270-A-37 18130-49-187-B-27 10030-34-118-A-18 6192-36- 87-B-12 3328-26- 65-B-15 18- 3- 3-B- 1
PACIFIC DIVISION Hawaii K6CGK K6PAH K6LKN K6QYI K6PHD K6BKE K6SDY	31919-59-272-B-30 22048-53-208-B-38 16200-50-162-B-26 10710-45-119-B-14 8908-34-133-B-22 2208-23- 48-B- - - - - - 32- - -	Phone W6GYM W6AYZ	14400-50-146-B-30 4368-28- 79-B-14
Nevada W6RWX	25691-51-204-A-39	Philippines KA1AK KA7FS	56- 4- 7-B- 2 4- 1- 2- - -
		Phone KA7FS	8- 2- 2- - 1
		San Joaquin Valley W6PYQ W6BVM W6NJQ W6JCB W6DQV W6FYM W6RFN W6QXF	35560-56-255-A-40 34404-61-283-B-36 12850-40-131-A-21 9805-37-136-B-25 9500-38-100-A-21 3531-25- 57-A- - 2228-21- 53-B- 8 680-17- 20-B- -

RADIO

ENGINEERING, broadcasting, aviation and police radio, servicing, marine radio telegraphy and telephony, Morse telegraphy and railway accounting taught thoroughly. 48 weeks' engineering course, equivalent to three years of college radio work. School established 1874. All expenses low. Catalog free.

DODGE'S INSTITUTE, Day Street, Valparaiso, Indiana

SICKLES COILS

ALL TYPES OF RF AND IF WINDINGS

Manufactured by
F. W. SICKLES COMPANY

P. O. Box 920

Springfield, Mass.

An ELECTRONIC Vibrator Type Power Supply *Never Lets You Down!*

The dependable, trouble-free Electronic Vibrator Type Power Supply is winning new friends every day for Marine, Police and Amateur communications. Here's why: Provides instantaneous current . uses less current . saves space . requires almost no attention . plug-in vibrator easily replaced . positive performance under strenuous operating conditions . used regularly by U. S. Army, Navy, and Coast Guard. . . . A custom engineering service is always available for your special applications.

Order from your nearest supplier, or write us for complete information.



Plug-In Vibrator Unit

ELECTRONIC LABORATORIES, INC.
Indianapolis, Indiana

NEW YORK CITY LOS ANGELES TORONTO, ONT.
100 Varick St. 1406 S. Grand Ave. 560 King St., W.



**ELECTRONIC
Power Supplies**

We've been SHOWN UP!



BY W5IGJ

In last month's advertising we extolled the virtues of the SIGNAL SHIFTER as an efficient, compact, low-power transmitter; we told how its ability to place its "crystal-toned signal anywhere you want it, on any band—and keep it there—offsets much of the advantage of higher power!" We even claimed that "Reports prove that the entire country is its playground!"

In the same issue of one of the magazines in which this ad appeared, was printed the brief news item shown below, under the heading "DX NOTES." Frank Campbell, W5IGJ, has shown that our claims were far too mild! And is our face red?! At any rate, here is sufficient proof that we haven't overstepped the bounds of reason when we claim that the SIGNAL SHIFTER makes a swell transmitter!

most even sent after 10:30 p.m. A.S.T., on 14, using only a Meissner Signal Shifter (rated at 7 watts) and a half-wave doubler, W5IGJ raised KB6GJX, K8SXX, KC4AUB and K4GNM all within a few hours one night. All were 100% contacts, using the bug, and the KC4 QSO lasted 55 minutes! . . . W5IGJ was awarded the 6-11-41

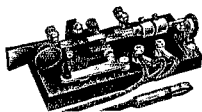
GST—May, 1941

AMATEUR RADIO LICENSES

Day and Evening Classes in Code and Theory
HOME STUDY COURSES

Reasonable, Efficient and Thorough, Hundreds of Licensed Students Now on the Air

American Radio Institute, 1123 Broadway, New York, N. Y.



TELEGRAPH SPEED KEYS

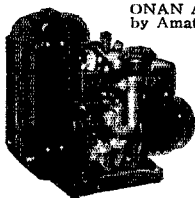
Radio Type in Kits—\$2.89

Send Card for Complete Information

ELECTRIC SPECIALTY MFG. COMPANY
Box 645, Cedar Rapids, Iowa

ONAN ELECTRIC PLANTS

OVER 40 STOCK MODELS—350 TO 10,000 WATTS



ONAN A. C. ELECTRIC PLANTS are used by Amateurs ALL OVER THE WORLD for Emergency Power during shut-down caused by Hurricanes, Floods and Sleet Storms. AMATEUR RADIO CLUBS participating in recent Field Day scored High with ONAN Powered Equipment.

ONAN PLANTS used in Radio and Electrical Work, operate Radio Transmitters and Receivers, Telephonic Communication Systems, News and Advertising Cars, Lights, All Appliances.

NEW MODELS — Any Voltage — Any Frequency Air or Water-Cooled — Any Starting Method, Gasoline, Natural Gas, Oil or Diesel Powered. Write for Complete Details.

D. W. ONAN & SONS

483 Royalston Avenue

Minneapolis, Minnesota

DON'T DELAY—GET YOURS TODAY!

See your Meissner Distributor at once or write for further details to the address below—now!

Write for Free Complete Catalog!

Dept. Q-6

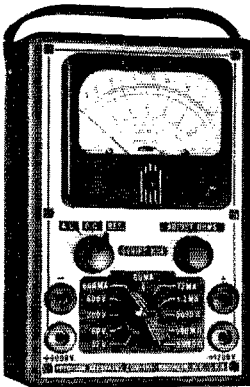
Meissner MT. CARMEL, ILLINOIS
"PRECISION-BUILT PRODUCTS"

A MODERN GENIE

at your command to solve YOUR testing problems 24 hours a day

The NEW "PRECISION" SERIES 834

31 Range AC-DC compact circuit tester
 ● 6000 Volts ● 600 MA
 ● 5 Megohms ● 70 DB



★ All ranges self-contained—NO EXTERNAL multipliers or batteries. ● 6 AC—6 DC—6 output voltage ranges—12/60/300/600/1200/6000 V. ● 1000 ohms per volt ● 4 current ranges—1.2/12/60/600 mils ● 3 resistance ranges—0—5000 /500 M/5 Megs ● 6 DB ranges from -10 to +70 DB ★ All measurements from ONLY TWO pin jacks except 1200 and 6000 volts ★ New type, extra large, easy reading 400 microampere rectangular meter ★ 1% multipliers and wire wound bobbins. ★ Overall size only 7" x 4 1/2" x 3".

AN INCOMPARABLE "PRECISION" value at only \$17.95 net—WRITE FOR "PRECISION" CATALOG 41-E describing more than 40 radio and electrical test equipment models... Tube Testers, Combination Tube and Set Testers, AC-DC Multi-range Testers, Signal Generators, Industrial Circuit Testers, etc.

PRECISION TEST EQUIPMENT

Standard of Accuracy SEE THEM AT YOUR JOBBER

PRECISION APPARATUS COMPANY
 647 Kent Avenue Brooklyn, New York
 Export Div.: 458 Broadway, New York, U. S. A. — Cable: Morhanex

AN ACUTE SHORTAGE OF RADIOMEN

Letters and telegrams received from Airlines indicate they are faced with a shortage of skilled radio operators and radio maintenance men. Midland offers thorough training and real employment service. Here's our record:

★ After an inspection of approximately 143 radio schools, Midland is one of three chosen by the U. S. Army Signal Corps to provide enlisted men with three months' radio training. ★ Recognition by the Air Transport and Radio Industries. ★ Airline instructors secured from major Airlines. ★ Training directed by a 9-Airline Advisory Board. ★ Graduates employed in more than 32 states, at more than 50 airports, and by all major Airlines. ★ Demand for qualified graduates exceeds the supply.

WRITE US TODAY

Midland Schools specialize in training men for positions as Airline Radio Operators and Radio Maintenance Men, with more than \$40,000.00 in equipment available for training. Write us today for a copy of our new 58-page catalog and training outline, containing photos and information provided by Airlines and aircraft manufacturers. No obligation.

Listen in on the Midland Grad Circuit, 7225 kc.,
 CQ call, "CQ—MR."

MIDLAND RADIO
 AND TELEVISION SCHOOLS INC.

Dept. Q-6, 29th Floor

Power & Light Bldg. Kansas City, Missouri

Phone
 WQMH 33289-33-405-A-27
 WEIWU 5355-34-64-A-26

ROANOKE DIVISION

North Carolina

W4ERG 32580-48-274-A-34
 W4QXB 28392-56-255-B-34
 W4WX¹⁵ 27840-48-234-A-39
 W4MR 26796-58-231-B-24
 W4ATC 3619-39-111-B-
 W4TTP 3080-40-101-B-18
 W4GFN 550-11-20-A-8
 W4QIV* - - - - 25- - -
 W4GNP* 33480-84-328-B-34

Phone

W4CYB 11094-43-129-B-18
 W4EMV 1710-19-36-A-7
 W4CXV 18-3-3- - -
 W4OC 2-1-1- - - -

South Carolina

W4BPD 57092-59-387-A-38
 W4DMT 37974-55-350-B-40
 W4EMT 26981-49-227-A-
 W4CZA 7673-33-93-A-20
 W4FRK 360-8-18-A-14

Phone

W4DAM 520-13-16-A-2
 W4CXO 122-7-7-A-1

Virginia

W3IWM 73200-61-480-A-40
 W3EQQ 12750-40-131-A-25
 W3ALF 8060-32-112-A-40
 W3HWJ 1734-19-37-A-11
 W3CUA 158-7-9-A-2
 W3IWS* 60-4-6-A-6
 W3HW3* - - - - 85- - -

Phone

W3FQP 19024-58-164-B-29
 W3EGR 2136-24-45-B-10
 W3BAG 901-17-27-B-9
 W3CPL 263-10-11-A-3

West Virginia

W8KWI 55275-55-404-A-40
 W8RCN 51700-55-376-A-40
 W8TGH 51185-58-360-A-40
 W8UTO 12100-40-123-A-40
 W8BWK 5438-29-75-A-16
 W8CSF 3575-22-65-A-12
 W8JM 3125-25-50-A-6
 W8TDG 23-3-3-A-1

Phone

W8CWY 18704-56-160-B-39
 W8OJL 1280-18-32-A-11
 W8JM 617-13-19-A-3

ROCKY MOUNTAIN DIVISION

Colorado

W9TWT 54103-59-459-B-38
 W9FYY* 26884-47-286-B-19
 W9MTF 21010-44-191-A-37
 W9YFL 20445-47-174-A-32
 W9CAA 17193-46-150-A-28
 W9OTE 10800-45-121-B-
 W9TFP 10800-40-127-B-28
 W9SBB 3084-32-60-B-9
 W9BML 3420-24-58-A-14
 W9SJT 1128-11-42-A-4
 W9GKW 864-18-25-B-13
 W9QDC 63-5-5-A-3
 W9IYT* 2-1-1- - -

Phone

W9ZLX 23313-57-207-B-38
 W9BQO 4020-24-67-A-33
 W9UXT* 180-8-9-A-
 W9IYT* 12-2-3- - -

Utah-Wyoming

W7HMQ 33860-58-269-A-38
 W7HRM 30250-55-275-B-39
 W7GQR 18170-46-160-A-32
 W7GCO 13818-49-144-B-18
 W6SDI/6 3983-27-59-A-18
 W6RIM 1050-14-33-A-21

Phone

W6DTB 31860-59-270-B-27
 W7HEY 30745-55-280-B-32
 W7GBY 12384-48-129-B-19
 W6QQE 840-21-32-A-4
 W6RPX 8-2-2- - -

SOUTHEASTERN DIVISION

Alabama

W4EDJ 43768-61-287-A-38
 W4GJW 27030-51-221-A-34

W4EOX 25563-50-206-A-
 W4FZG 22140-54-208-B-34
 W4FSZ 19631-47-169-A-23
 W4FOM 17430-42-170-A-40
 W4GBV 11562-41-140-B-27
 W4AKP 4056-26-76-B-13
 W4BYW 3710-28-53-A-8
 W8EMW/4 1770-24-30-A-7
 W4GVP 1733-21-34-A-12
 W4BLL 1580-20-41-B-15
 W4GMB 860-16-23-A-13

Phone

W4ECI 38763-59-336-B-38
 W4FLS 33855-61-279-B-39
 W4ERX 15700-50-157-B-25

East Florida

W4ERU 43004-58-372-B-40
 W4GOG 29382-52-277-B-30
 W4BYF 26712-53-255-B-33
 W4AKH 24500-56-175-A-16
 W4EOE 9908-39-132-B-24
 W4FWZ 8225-35-97-A-
 W4DBF 2804-22-68- - -
 W4DZ 2014-9-94-A-32
 W4DTV 825-15-28-B-
 - - - -

West Florida

W4EPT 64610-56-468-A-39
 W4AXP 432-12-18-B-5
 W4GIP* 12-2-3- - -

Phone

W4FWY 108-6-9-B-5

Georgia

W4CYC/4 60450-60-403-A-39
 W4FLJ 41114-61-337-B-38
 W4AQL 18963-49-197-B-20
 W4DJT 17400-50-178-B-25
 W4GTO 8235-36-93-A-34
 W4GKO 3553-29-52-A-30
 W4DLW* - - - - 64- - -

Phone

W4EGT 5720-40-72-B-18

West Indies

W2NBF/E4 20000-50-163-A-37
 K4FVC 18753-47-200-B-22
 K4KQ 1188-18-33-B-
 - - - -

Phone

K4FKC 19581-51-195-B-33

SOUTHWESTERN DIVISION

Los Angeles

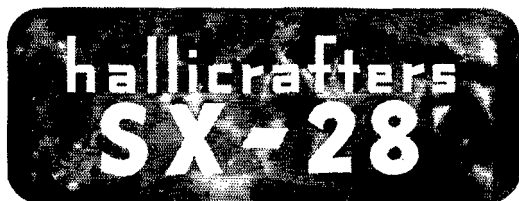
W6IDZ¹⁷ 83223-63-663-B-40
 W6IOJ 81763-62-532-A-40
 W6NLI 57000-60-380-A-39
 W6ONG 56578-61-372-A-39
 W6MBA 52155-61-342-A-38
 W6PMA 47733-61-313-A-40
 W6RDR 45169-55-330-A-33
 W6QKB 42750-60-287-A-39
 W6MJP 21965-46-191-A-35
 W6QYE 20790-42-253-B-
 W6VB 20350-55-185-B-
 18144-54-168-B-
 W6IOX 17289-51-171-B-30
 W6JQB 16300-50-163-B-21
 W6NNV 14280-40-181-B-30
 W6DBT* 13950-50-140-B-16
 W6KSX 13860-42-264-A-23
 9500-35-100-A-33
 W6MYT 7140-34-84-A-13
 W6NSN 6068-37-82-B-4
 W6QOZ 1705-22-43-A-7
 W6SES 1476-18-41-B-14
 W6LVQ 788-15-21-A-11
 W6GVU 688-14-25-B-
 W6STY 255-6-17-A-7
 W6DIO 160-8-10-B-
 W6KTY* 160-8-10-B-
 W6DLL 44-4-6-B-
 W6HDV 18-3-3- - -
 W6QPU 18-3-3- - -
 W6VRH* 2-1-1- - -
 W6SUD* 2-1-1- - -

Phone

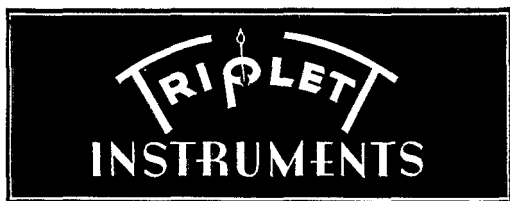
W6AM 21360-51-211-B-21
 W6SPQ 19370-52-153-A-13
 W6PKZ 14484-51-143-B-34
 W6NHK 13536-47-145-B-32
 W6MEP 11891-47-131-B-38
 W6GOM 7200-45-80-B-23
 W6BUK 1672-19-44-B-13
 W6QOZ 1314-18-37-B-7
 W6GVU 900-18-25-B-
 - - - -

Where to buy it

A directory of suppliers who carry in stock the products of these dependable manufacturers.



ALBANY, N. Y. Uncle Dave's Radio Shack 356 Broadway
ATLANTA, GEORGIA 265 Peachtree Street
 Radio Wire Television Inc.
BOMBAY, INDIA Eastern Electric & Engineering Company
BOSTON, MASS. Radio Shack 167 Washington Street
BOSTON, MASS. 110 Federal Street
 Radio Wire Television Inc.
BRIDGEPORT, CONN. 177 Cannon Street
 Hatry & Young, Inc.
BRONX, N. Y. 542 East Fordham Rd.
 Radio Wire Television Inc.
BUFFALO, N. Y. 1531 Main Street
 Dymac
BUTLER, MISSOURI 211-215 N. Main Street
 Henry Radio Shop
CHICAGO, ILL. 833 W. Jackson Blvd.
 Allied Radio Corp.
CHICAGO, ILL. 901-911 W. Jackson Blvd.
 Radio Wire Television Inc.
CINCINNATI, OHIO 1103 Vine Street
 United Radio, Inc.
DETROIT, MICH. 325 E. Jefferson Ave.
 Radio Specialties Co.
DETROIT, MICHIGAN 11800 Woodward Ave.
 Radio Specialties Co.
HARTFORD, CONNECTICUT 297 Asylum Street
 Radio Inspection Service Company
HOUSTON, TEXAS 1021 Caroline Street
 R. C. & L. F. Hall
INDIANAPOLIS, INDIANA 34 West Ohio Street
 Van Sickle Radio Supply Co.
JAMAICA, L. I. 90-08 166th Street
 Radio Wire Television Inc.
KANSAS CITY, MO. 1012 McGee Street
 Burstein-Applebee Company
LITTLE ROCK, ARKANSAS 409 W. 3rd Street
 Beem Radio Company
NEW HAVEN, CONN. 1172 Chapel Street
 Hatry & Young, Inc.
NEW YORK, N. Y. Harrison Radio Co. 12 West Broadway
NEW YORK, N. Y. 100 Sixth Ave.
 Radio Wire Television Inc.
NEWARK, N. J. 24 Central Ave.
 Radio Wire Television Inc.
READING, PENN. 404 Walnut Street
 George D. Barbey Company
SCRANTON, PENN. 519-21 Mulberry Street
 Scranton Radio & Television Supply Co.
WASHINGTON, D. C. 938 F Street, N. W.
 Sun Radio & Service Supply Co.



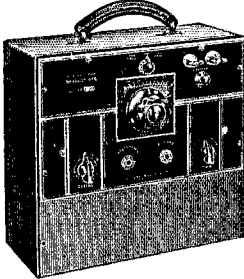
ALBANY, N. Y. Uncle Dave's Radio Shack 356 Broadway
ATLANTA, GEORGIA 265 Peachtree Street
 Radio Wire Television Inc.
BOSTON, MASS. Radio Shack 167 Washington Street
BOSTON, MASS. 110 Federal Street
 Radio Wire Television Inc.
BRIDGEPORT, CONN. 177 Cannon Street
 Hatry & Young, Inc.
BRONX, N. Y. 542 East Fordham Rd.
 Radio Wire Television Inc.
BUFFALO, N. Y. 1531 Main Street
 Dymac
BUTLER, MISSOURI 211-215 N. Main Street
 Henry Radio Shop
CHICAGO, ILLINOIS 833 W. Jackson Blvd.
 Allied Radio Corp.
CHICAGO, ILL. 901-911 W. Jackson Blvd.
 Radio Wire Television Inc.
CINCINNATI, OHIO 1103 Vine Street
 United Radio, Inc.
HARTFORD, CONN. 203 Ann Street
 Hatry & Young, Inc.
JAMAICA, L. I. 90-08 166th Street
 Radio Wire Television Inc.
LITTLE ROCK, ARKANSAS 409 W. 3rd Street
 Beem Radio Company
MINNEAPOLIS, MINNESOTA 1211 LaSalle Avenue
 Lew Bonn Company
NEW HAVEN, CONN. 1172 Chapel Street
 Hatry & Young, Inc.
NEW YORK, N. Y. 100 Sixth Avenue
 Radio Wire Television Inc.
NEWARK, N. J. 24 Central Ave.
 Radio Wire Television Inc.
READING, PENN. 404 Walnut Street
 George D. Barbey Company
SCRANTON, PENN. 519-21 Mulberry Street
 Scranton Radio & Television Supply Co.
WASHINGTON, D. C. 938 F Street, N. W.
 Sun Radio & Service Supply Co.

Listings on this page do not necessarily imply endorsement by QST of the dealers or of other equipment sold by them.

DON'T FORGET FIELD DAY

JUNE 7th-8th

Here's some prize portable equipment bound to give you endless fun and keep you in the SUN all Summer.



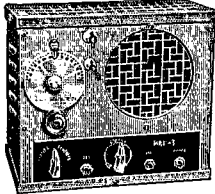
ABBOTT DK-3 2 1/2 METER TRANSCIVER

\$17.35
NET

(Less tubes, batteries and accessories)

A self-contained, battery operated ultra-high frequency radiotelephone transmitter-receiver that has everything! Clear, powerful signal reception and transmission on 112 to 116 Mc. band. Inductive antenna coupling variable from front of panel. Extremely small, compact. Ideal for car, boat, plane or portable work. Requires 1-6J5GT, 1-6G5G; three 45 V. B batteries (Eveready 482 or Burgess M30) and four 1 1/2 V. batteries (Burgess 4FH or Eveready 742.) Case size: 11" x 11" x 4", grey wrinkle finish metal, heavy leather handle.

Set of RCA tubes — as described above..... \$1.10
Set of batteries — as described above..... 4.47
1 Abbott 2 1/2 meter antenna..... .60
Universal No. 820 telephone handset..... 5.88



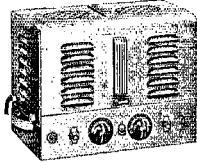
ABBOTT MRT-3 MOBILE TRANSCIVER

\$27.63
NET

(Less tubes and accessories)

The highest powered 2 1/2 meter mobile transceiver on the market. 20 watts of input — 6 or 7 times more powerful than ordinary units of this type. Very compact — 9" x 8" x 4" — including built-in P.M. dynamic speaker. Easily installed in your car.

Tube kit — HY75, 6C5, 6V6..... \$5.05
Mallory VP-552 Vibrapak — 300 V. 100 MA..... 10.88
Universal No. 820 telephone handset..... 5.88
1-Abbott 2 1/2 meter antenna..... .60



STANCOR 12-F EMERGENCY X'MITTER KIT

\$17.50
NET

(Less tubes and accessories)

Build this crystal controlled 1.7-7.3 Mc. phone and CW transmitter yourself. Works from 6 V. storage battery on synchronous vibrator supply. Simple band changing, self-contained antenna tuning system. Chassis size: 7" x 12" x 3".

Tube kit — 1-HY69, 2-6A4, 1-6J6G..... \$5.75
Metal dust cover..... 1.85
Mallory VP-552 Vibrapak..... 10.88
Air-wound plug-in coil for any frequency..... .88

★ —> MAIL ORDERS FILLED FROM THIS AD —< ★
New York's Oldest "Ham" House

W2JEH — W2LFV — W2CLH — W2EMR — W2NSX



RADIO CO.

212 Fulton Street, Dept. XT New York

Circle Address SUNRADIO NEW YORK

W6QMJ	420-12-18-B-5	W5TAC	340-8-17-A-10
W6SFL	230-4-24-A-13	W5IOS	36-3-6--
W6LYP	18-3-3--	Phone	
W6RBI*	18-3-3--	W5FJP	8234-46-90-B-18
W6RDR	5-1-2-A-1	W5QA	1170-18-26-A-7
W6REI	3-1-1-A--	Oklahoma	
W6QGI	2-1-1--	W5LW	49200-60-410-B-40

Arizona		W5BDX	36108-59-306-B-33
W6QAP	88273-62-570-A-40	W5CPX	32450-55-237-A-37
W6RAM	11550-42-110-A-21	W5TOW	2744-28-49-B--
W6GBN	1544-10-33-A-5	W5PMF	1930-24-33-A-13
W6RWV	40-4-5--	W5JFY	1536-12-65-B-17
		W5JQL	270-8-15-A-16

Phone		Phone	
W6PQQ	12015-45-135-B-25	W5ELXK	10976-49-112-B-28
W6PQG	405-9-18-A-5	Southern Texas	
W6NRI	72-6-6--	W5CWW	58800-56-420-A-40

San Diego		W5DBR	53100-59-364-A-38
W6ITY	81420-63-554-A-39	W5PHD	50801-57-360-A-34
W6PCE	82373-62-523-A-37	W5HZZ	35819-55-279-A-37
W6NIK	78415-62-493-A-40	W5JGU	22388-45-200-A-37
W6ROI	19210-30-155-A-30	W5PNA	18020-53-170-B-25
W6RGY	13366-41-164-B-37	W5HZZ/5	16260-48-139-A-27
W6PAX	12540-39-140-A-34	W5GWL	14123-42-135-A-17
W6LDJ	1898-23-33-A--	W5PTM	3861-33-60--
W6PFO	538-10-22-A-5	W5DE*	32-4-4--
W6SKW	36-3-8--	W5IRM*	2-1-1--
W6QJ*	--- 54--	W5JAJ*	--- 49--

Phone		Phone	
W6CHV	23513-55-172-A-36	W5BB	40504-61-332-B-40
W6PFQ	600-15-20-B-3	W5PH	20295-55-185-B-22
		W5TUC	10058-47-107-B-23

WEST GULF DIVISION

Northern Texas		New Mexico	
W5AAN	72600-60-485-A-40	W5HAG	46669-57-329-A-38
W5AWT	40425-55-306-A-34	W5CJP	4185-31-70-B-14
W5HQH/5	37484-56-335-B--	W5HJF	2700-27-40-A-15
W5DQW	30810-52-235-A-40	W5HPV	990-18-22-A-6
W5PFR	22442-49-239-B-37	W5IOA	893-14-26-A-27
W5DWO	21150-56-151-A-30	W5HOY	125-5-11-A-0
W5HPG	16525-45-176-B--	W5GSD*	40-4-5--1
W5EN*	15300-40-153-A--	Phone	
W5DLM	15006-49-123-A-22	W5GXG	14382-51-144-B-24
W5HRA	12425-35-181-A-33	W5IKH	3808-28-68-B-17
W5IVG	1440-20-36-B-6		

FULFILL YOUR AMBITION

Train yourself at home for that technical radio job or promotion you want. Study under personal direction of A. R. Nilson — for twenty years expert author-instructor. Three up-to-the-minute, low-cost, home-study technical radio courses:

1. Essentials of Radio Communication
2. Advanced Radiotelegraphy
3. Broadcast Operating

will help you succeed in your job or on license examinations

FREE BOOKLET, "What the Modern Radioman Must Know" describes these courses in detail. Send for your copy now!

NILSON RADIO SCHOOL

51 East 42nd St., New York, N. Y.



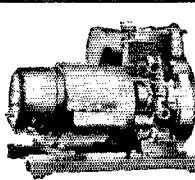
Piezo-Electric Crystals Exclusively

- Quality crystals of all practical frequencies supplied SINCE 1925. Prices quoted upon receipt of your specifications.

Our Pledge: QUALITY FIRST

SCIENTIFIC RADIO SERVICE

"The Crystal Specialists Since 1925" University Park, Hyattsville, Md.



110-VOLTS A.C. Anytime! Anywhere! With KATALIGHT PLANTS

Have special plant for operating portable radio receivers and transmitters. Gives voltage regulation. Filtered and Shielded. 400 watt A.C., Amateur's price, \$67.50
Other sizes up to 10,000 watts. Also converters, AC and DC generators, Diesels and frequency changers.

"Ask your jobber"

KATALIGHT, 2 Elm St., Mankato, Minn.

BUY ON EASY TERMS · MAIL ORDERS PROMPTLY FILLED · WRITE FOR FREE CATALOG

WANTED!

100 USED RECEIVERS

Yes Sir . . .

We have outstanding trade-in allowances to make for 100 used receivers . . . and we urge you to **ACT AT ONCE — WRITE — WIRE — AIRMAIL** for your allowance on a new up-to-date communications receiver.

Your receiver in most cases will take care of the down payment.

NO CASH NECESSARY where your receiver covers the same amount as the cash down payment.

Immediate delivery on all models National, Hammarlund, RME, and Hallicrafters. If you do not have a receiver to trade, send 10 per cent of the purchase price of the receiver which you want, balance payable in equal monthly payments at a carrying charge of **ONLY 6 per cent**.

Liberal Trade-in Allowance

The **RADIO SHACK**
167 WASHINGTON ST., BOSTON, MASS., U.S.A.

Model EC-1. All the necessary features for top communication performance. Tunes from 550 kc. to 30 mc., on 3 bands. Electrical bandspread on all bands. 6 tubes. Self-contained speaker. AC/DC-115-125 Volts. Model EC-1 now at this incredibly low price of \$19.95.

\$19.95

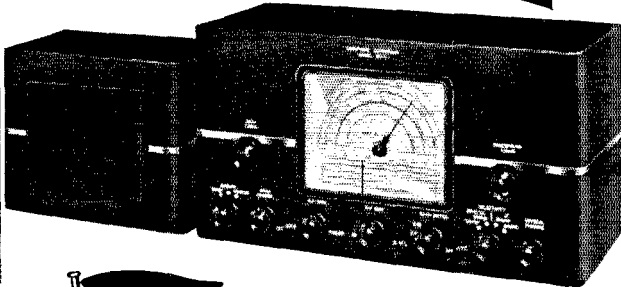


*2nd place in
less than One Year!*
A TRIBUTE TO
Echophone Values!



Model EC-2. Never before have you been offered these outstanding Communications features at this amazingly low price. 8 tubes; 3 bands; covers 550 to 2100 kc.—2.1 to 8.1 mc.—7.9 to 30 mc.; Self-contained 5" PM dynamic speaker; pre-selection on all bands; calibrated bandspread scale on 80/40/20/10 meter amateur bands; automatic noise limiter; electrical bandspread at all frequencies in the tuning range; operates on 115 volts AC/DC. A real communications receiver for only \$29.95.

\$29.95



\$49.95

Model EC-3. Now you can have all these communications features at this remarkably low price. Crystal filter (from position variable selectivity); calibrated bandspread; automatic noise limiter; preselection on all bands; 2 stage IF amplifier; fly-wheel tuning; separate 6" PM speaker; CW monitor; 10 tubes; 3 bands; covers 550 to 2100 kc.—2.1 to 8.1 mc.—7.9 to 30 mc.; electrical bandspread. Operates on 115 volts AC/DC. Model EC-3. All these outstanding features for only \$49.95.

Echophone "The Ears
COMMERCIAL of the World"

Echophone Radio Co. • 201 East 26th Street, Chicago, U. S. A.

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.

(3) The Ham-Ad rate is 15¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.

(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League takes the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 15¢ rate. Provisions of paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

Having made no investigation of the advertisers in the classified columns, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products advertised

QUARTZ — direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals.
Diamond Drill Carbon Co., 719 World Bldg., New York City.

QSL'S. Cartoons. Albums. Free samples. Theodore Porcher, 7708 Navahoe, Philadelphia, Pa.

CALLBOOKS — Summer edition now on sale containing complete up-to-date list of radio hams throughout entire world. Single copies \$1.25. Canada and foreign \$1.35. Radio Amateur Call Book, 610 S. Dearborn, Chicago.

COMMERCIAL radio operators examination questions and answers. One dollar per element. G. C. Waller, W5ATV, 6540 Washington Blvd., Tulsa, Okla.

CRYSTALS: police, marine, aircraft. C-W Mfg. Co., 1170 Esperanza, Los Angeles.

QSL'S — Brownie, W3CJI, 1725 Frankfield Ave., Allentown, Pa.

1000 watt G.E. transformers 1100-2200-4400 volts each side c.t. Guaranteed \$13.50. Dawson, 5740 Woodrow, Detroit, Mich.

CRYSTALS, mounted, 80-160 medium drift \$1.50; low drift 40-80-160 \$2.25. R9 Crystals, 338 Murray Ave., Arnold, Pa.

TELEPLEXES, Instructographs bought, sold. Ryan's, Hanibal, Mo.

QSL'S, SWL'S. 100 — 3 color — 75¢. Lapco, 344 W. 39th, Indianapolis, Ind.

CRYSTALS in dustproof, low-loss, plug-in holders. Active oscillators. 160 and 80 M low-drift AT \$1.25; 40X \$1.75. State frequency desired. Pacific Crystals, Box 6679, East Los Angeles Branch.

QSL'S — Fritz, 1213 Briargate, Joliet, Ill.

LEO, W9GFQ, offers the hams more and a better deal always. Lowest terms, no red tape (as finance own paper) on all new and used equipment. Free trial, personalized service. Write for big Spring Flyer and get acquainted. Wholesale Radio Laboratories, Council Bluffs, Iowa.

TRANSMITTING headquarters on latest Stancor Thordarson & other kits — commercially wired at low cost. New 70 watt transmitter kits complete only \$35 — speech amplifier modulator up to 80 watts \$25 — up to 160 watts \$49.50. Genuine Utah ham transformers at less than 1/2 original cost. 600 volts — 200 ma. \$2.25 — kilowatt modulation types \$13.95. Big list. Easy terms. Write Leo, W9GFQ, today.

CRYSTALS: famous P.L., mounted in latest Alesimag 35 holders — 40, 80 meter PR-X, 160 meter PR-Z, \$3; 40, 80 meter PR-Z (low drift), \$3.50; 20-meter PR-20, \$4.50; unconditionally guaranteed. Immediate shipment. Quality blanks, 65¢. Wholesale Radio Labs., Council Bluffs, Iowa, W9GFQ.

RECEIVERS: All makes and types new and reconditioned. New SX-23 Hallicrafters with crystal \$79.50. Get acquainted with Leo W9GFQ to-day.

NATIONAL 600 watt factory built transmitter complete, practically new. Less than one-half net ham price. W3DQ, Wilmington, Del.

QSL'S? — SWL'S? Unbeatable. Free samples? W8DED, Holland, Mich.

SELL Instructograph Jr. eight rolls tape \$7 postage paid. W6RVH.

WANTED: Broadcast coils for late model HRO. W8PNF.

QSL'S — Printed by W2AEY, are the best.

WANT latest model HRO Sr. complete. Send serial number. Lieut. Macy, A.F.R.C., Ft. Knox, Ky.

FACTORY built 500 watts CW xmitter, 40 & 20 6 volt HRO. W8TVQ.

FOR sale: Composite broadcast transmitter FCC rating 250 watts, Class B modulation, temperature controlled crystal oven, excellent for 160 meter phone. Write for particulars. WGNV, Newburgh, N. Y.

QSL'S — SWL's? Samples? W9BRD, 1517 Fargo, Chicago.

SW3 like new, complete with tubes, power supply, 10 — 20 — 40 meter coils. Any reasonable offer takes it. Frank Governale, 56-16 62nd Ave., Maspeth, N. Y.

SELL HRO Sr. Best offer takes it. W1BVL.

GENERAL 3 element rotary — sell or swap for good photo enlarger. Kilowatt 10 meter amplifier PP 100-TI's, \$35. W4DID.

QRR. Don't miss A.R.R.L.-member Richard Sale's sparkling and static-free story of hams across the sea. QRR will buzz through the pages of the Argosy for June 28, on sale June 18. Put this down in your log — you won't want to miss it.

QSL'S. Finest quality. Samples. Maleco, 1805 St. Johns Place, Brooklyn, N. Y.

SELL — Utah 400 watt phone transmitter complete \$250. 860-17th St., Cedar Rapids, Iowa.

HRO cost \$192 new, used 7 months. What are we offered? WBRW, Welch, W. Va.

TRADE QST's — W1BPI, Paxton, Mass.

WRITE Bob Henry — W9ARA, for best deal on all amateur receivers, transmitters, kits, parts. You get best terms (financed by myself); largest trade-in allowances; personalized service; lowest prices. NC-200's and all other latest receivers positively in stock. Henry Radio Shop, Butler, Mo.

RECEIVERS wanted: Cash or trade-in. Best deal. Typical allowances: \$19R \$22.50, \$20's \$30, \$20R's \$40, SX-24's \$52.50. Write. W9ARA, Butler, Mo.

BARGAINS: Brand new in factory-sealed cartons — Howard 435's \$24.95, Howard 436's \$29.25; Hallicrafters SX-23's \$79.50. Henry Radio Shop, Butler, Mo.

RECONDITIONED guaranteed amateur receivers and transmitters. All makes and models cheap. Lowest prices. Free trial. Terms. List free. Write. W9ARA, Butler, Mo.

MAKE offer bound volumes QST nos. 1, 2, 3, 4, 5 part 2 only, 13 to 18 inclusive. Want low power Vibrapack 160 & phone transmitter. Folger Udin, Cooperstown, N. Y.

ECO-4, full coverage four bands 160 to 20, plug-in coils. Varium circuit January QST, temperature compensated. Buffer also serves as crystal oscillator. Kit, drilled chassis, instructions, less coupler, dial, \$19.50. W8VSK (x-W9KEH), 7667 Grand River, Detroit.

PEAK preselector, reconditioned, \$9. Guthman 5 & 10 converter, \$9. Norman Kriebel, Ambler, Pa.

SWAP — sale — 200 watt CW xmr with modulator for fone. Want — cameras or cash. W9KXS.

STANDARD relay rack cabinets. Heavy gauge. Available panel space 35%". Wrinkle finish. Just right for ham rigs. \$6.75. Write for bargain list. Earl Webber Co., 4358 Roosevelt Rd., Chicago, Ill.

CRYSTALS in plug-in holders — 160M-80M AT \$1; 40X \$1.35, guaranteed. Coppel, 344 S. Fetterly, Los Angeles.

216 different QST's, best offer over \$30. Late HRO, power, speaker, \$125. \$40 worth popular UTC Linear Standard, PA transformers, \$10. Green Flyer dual speed recording motor \$10. Reko-kut 16" recorder on 60 lb. synchronous motor, \$28. Hal Justice, W4TS, Canton, No. Carolina.

ATTENTION transmitter hunters. Get there sooner with compensated airplane-type Auto Compass. Constantly shows direction of travel. Free illustrated folder. Wm. D. Hayes, Dealer in Instruments, Box 1433-Q, Oakland, Calif.

HOUR-counting meters, comprising 110v. sixty cycle synchronous motor, sealed reduction gear, Veeeder counter. Records up to 9999.9 hours. Consumes one watt. Manufactured by large public utility for field surveys. Practically new (used 200 hours). Determine operating costs of transmitter, refrigerator, oil-burner, photofloods, etc. Measure tube life, hours on the air; indicate oilburner tank level. Exposed drive shaft (one R.P.M.) excellent for time-delay purposes, window displays, etc. Equivalent instruments cost \$20 new. While supply lasts, \$3.95 post-paid. Allan Schumacker, Box 25, Ampere, N. J.

CRYSTALS; commercial and amateur: Send for catalog of Eidson fine commercial units, attractively priced. Amateurs: buy those unbeatable T9 crystals, 40, 80 and 160 meters \$1.60. Amateur spot frequencies, army, navy, defense and emergency nets, special \$2. T9 ceramic holders \$1. Fully guaranteed. COD accepted. Sold by: Tele-Radio Supply, Knoxville, Tenn.; Frank Anzalone, 375 W. 46th, N. Y. C.; Radio Doc, 721 S. Main, Los Angeles, Calif.; Henry Radio Shop, Butler, Mo.; Radio Service and Supply, Laredo, Texas; Pemberton Labs., Ft. Wayne, Ind.; Cass Edison, Havana, Cuba; and Eidson's, Temple, Texas.

WANTED: General Radio 617-C calibrated beat oscillator, or equivalent. W5AMK.

SELL 32 volt 350 watt gasoline generator. Complete television power supply. 200 watt output transformer. 110 volt a.c. generator only. Two new 500 watt transmitting tubes, sockets. Want communication receiver. W2IBK.

SELL NC101X receiver perfect condition \$75. New Hughes Mitchell XEC \$32. W8JDB.

AIRPLANE receivers battery operated self contained intership communication tower control beam bc stations complete crystal mike headphones, \$33.45. Technical Equipment Co., 135 Liberty St., N. Y.

SELL 1933-1938 QST. 1 kw. rack mounted transmitter. One NC-101X. Trade small B.C. receiver. Salvador Carbonell, Box 893, Mayaguez, Pto. Rico.

WANTED: 110 volt 60 cycle a.c. generator, 2 to 3 1/2 kw. B. S. Hyde, W6TLY, Cameron, Ariz.

MAC Auto code machines, low monthly rental, 50,000 words practice tapes. For those who own MacAutos, tapes for Macs, recording ink and blank tapes for sale. Write C. M. Ayers, 711 Boyiston St., Boston, Mass. Tel. GRAnite 7189-W.

SELL SX-16 \$60 or SX-17 \$70, with speaker. R. M. Allen, NRRS, Navy Yard, Charleston, So. Carolina.

FOR sale — Hammarlund Super-Pro Type B. Perfect condition. With 12" speaker and converter to permit optional use on D.C. First \$150 takes it. Joan I. Powers, 387 Woodbine St., Brooklyn, N. Y.

FOR sale: 150 W (809) phone transmitter, complete with tubes for ten meter operation less crystal. 4 RTL 5-10 superegen receivers, 3 with 6 volts supplies and 1 110 volts, complete with 5-10 meter coils and tubes. 2 Harvey UHX-10 transmitters, complete 5-10 coils, tubes, 6 volt Genemotor, less crystals. Make offer, single units or whole works. W8RTW.

RADIO TECHNOLOGY

RCA Institutes offer an intensive course of high standard embracing all phases of Radio and Television. Practical training with modern equipment at New York and Chicago Schools. Also specialized courses in Aviation Communications, Radio Servicing and Commercial Operating.



Illustrated Catalog on request.

RCA INSTITUTES, INC. Dept. ST-41

A Radio Corporation of America Service

75 Varick St., New York 1154 Merchandise Mart, Chicago

A. R. R. L.
NEEDS THE
LOYAL SUPPORT OF
EVERY
LICENSED AMATEUR

JOIN
NOW!

USE THE
BILLING CARD IN
THIS ISSUE OF
QST

★ NOW ★ IS THE TIME!

TO INCREASE YOUR CODE SPEED
BY THE EASY, PRACTICAL
CANDLER SYSTEM.

The call of the U. S. NAVY Communication Reserve for 5400 expert radio operators shows the growing need for trained operators in NATIONAL DEFENSE, as well as in the commercial radio field. For a promising future start training now under the Candler System of SPECIALIZED TRAINING — the system backed by over a quarter of a century of success.

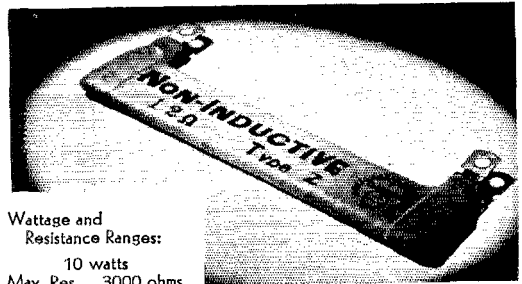
WRITE TODAY FOR THIS FREE BOOK!

A penny post card brings you the most interesting book you have ever read. This 52-page **BOOK OF FACTS** is crammed full of information on — how the Naval Reserve speeds up its operators, how you too can become a *high speed expert* by using the Candler System, and other vital information. Why not send for this *free book* today? No obligation, of course.



**CANDLER
SYSTEM CO.**

DEPT. Q-6, ASHEVILLE, N. C., U.S.A.



Wattage and
Resistance Ranges:

10 watts
Max. Res. 3000 ohms

25 watts
Max. Res. 7500 ohms

50 watts
Max. Res. 12,500 ohms

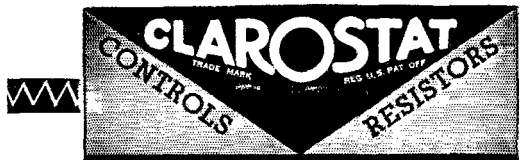
100 watts
Max. Res. 25,000 ohms

For one-half power ratings, multiply max. res. available by four.

Also note Series 581 wire-wound non-inductive potentiometers for attenuators, where voltage ratio is independent of frequency.

**It does
the trick . . .**

★ Yessir, this new Series Z non-inductive resistor may be used for (1) Terminating resistance for Rhombic antennae; (2) Dummy antenna for checking before going on the air; (3) For high-frequency applications; (4) Grid leaks; (5) Parasitic suppression; (6) Interstage power measuring instruments. Lowest inductance of any presently-available resistor of this type. Ask your jobber about our Series Z. Or write to Clarostat Mfg. Co., Inc., 285-7 N. 6th St., Brooklyn, N. Y.



Your Nearby Dealer Is Your Best Friend

Your nearby dealer is entitled to your patronage. He is equipped with a knowledge and understanding of amateur radio. He is your logical source of advice and counsel on what equipment you should buy. His stock is complete. He can supply your needs without delay. His prices are fair and consistent with the high quality of the goods he carries. He is responsible to you and interested in you.

One of these dealers is probably in your city — Patronize him!

ATLANTA, GEORGIA

Radio Wire Television Inc.
265 Peachtree Street
"The World's Largest Radio Supply House"

BALTIMORE, MARYLAND

Radio Electric Service Co.
3 N. Howard St.
Everything for the Amateur

BOSTON, MASS.

Radio Wire Television Inc.
110 Federal Street
"The World's Largest Radio Supply House"

BRONX, NEW YORK

Radio Wire Television Inc.
542 East Fordham Road
"The World's Largest Radio Supply House"

BUFFALO, NEW YORK

Radio Equipment Corp.
326 Elm Street
W8PMC and W8NEL — Ham, service and sound equipment

BUFFALO, NEW YORK

Dymac Radio
1531 Main Street — Cor. Ferry
Owned and operated by Hams for Hams GA. 0252

HARTFORD, CONNECTICUT

Radio Inspection Service Company
227 Asylum Street
What do you want? We have it. Radio exclusively

HARTFORD, CONNECTICUT

Hatry & Young, Inc.
203 Ann Street
Stores also in Bridgeport and New Haven

HOUSTON, TEXAS

R. C. & L. F. Hall
1021 Caroline Street (C 0721)
"Specialists in Amateur Supplies"

JAMAICA, L. I., NEW YORK

Radio Wire Television Inc.
90-08 166th Street (Merrick Road)
"The World's Largest Radio Supply House"

NEWARK, N. J.

Radio Wire Television Inc.
24 Central Avenue
"The World's Largest Radio Supply House"

NEW YORK, N. Y.

Radio Wire Television Inc.
100 Sixth Avenue
"The World's Largest Radio Supply House"

NEW YORK, N. Y.

Harrison Radio Company
12 West Broadway
Harrison Has It! Phone WOrth 2-6276 for information or rush service

PHILADELPHIA, PENNSYLVANIA

Eugene G. Wile
10 S. Tenth Street
Complete Stock of Quality Merchandise

PROVIDENCE, RHODE ISLAND

W. H. Edwards Company
85 Broadway
National, Hammarlund, Hallicrafter, Thordarson, Taylor, RCA

RICHMOND, VIRGINIA

The Arnold Company
Broad at Harrison St.
W3EQQ — "The Virginia Ham Headquarters" — W3FBL

SCRANTON, PENNSYLVANIA

Scranton Radio & Television Supply Co.
519-521 Mulberry Street
Complete Stock of Quality Amateur Supplies

YOU CAN BE SURE
WHEN YOU BUY FROM

QST

ADVERTISERS

“Advertising for QST is accepted only from firms who, in the publisher’s opinion, are of established integrity and whose products secure the approval of the technical staff of the American Radio Relay League.”

Quoted from QST’s advertising rate card.

Every conceivable need of a radio amateur can be supplied by the advertisers in QST. And you will know the product has the approval of the League’s technical staff

Index to Advertisers

	PAGE
Abbott Instrument, Inc.	80
Aerovox Corporation	90
American Radio Institute	101
Asstatic Corporation, The	75
Barker & Williamson	90, 97
Billey Electric Company	74, 91
Brill Company, W. D.	108
Candler System Company	108
Capitol Radio Engineering Institute	97
Cardwell Mfg. Corp., Allen D.	70
Centralab	5
Clarostat Mfg. Company, Inc.	108
Collins Radio Company	Cov. 2
Commercial Radio Institute	94
Cornell-Dubilier Electric Corp.	72
Dodge’s Institute	100
Echophone Radio Company	106
Eitel-McCullough, Inc.	77
Electric Specialty Mfg. Company	101
Electronic Laboratories, Inc.	101
Gardiner-Levering Company	89
General Electric Company	81
General Test Equipment Company	91
Hallcrafters Company, The	1, 2
Hammarlund Mfg. Company, Inc.	71, 73
Harrison Radio Company	100
Harvey Radio Company	96
Henry Radio Shop	82, 111
Hipower Crystal Company	89
Instructograph Company, The	86
Janette Mfg. Company	99
Kato Engineering Company	104
Kenyon Transformer Company, Inc.	99
Mallory & Company, Inc., P. R.	68
Massachusetts Radio School	91
Meissner Mfg. Company	101
Midland Radio & Television Schools, Inc.	102
Millen Mfg. Company, Inc., James	95
National Company, Inc.	Cov. 3, 67, 89
New York YMCA Schools	89
Newark Electric Company	79
Nilson Radio School	98, 104
Ohmite Mfg. Company	97
Onan & Sons, D. W.	101
Par-Metal Products Corp.	91
Pioneer Gen-E-Motor Corp.	95
Port Arthur College	86
Precision Apparatus Co.	102
Premax Products	98
RCA Institutes, Inc.	108
RCA Mfg. Company, Inc.	Cov. 4
Radio Control Headquarters, Inc.	98
Radio Shack, The	105
Scientific Radio Service	104
Shure Brothers	95
Sickles Company, F. W.	100
Solar Mfg. Corporation	86
Speer Carbon Company	69
Standard Radio Parts Company	108
Sun Radio Company	104
Taylor Tubes, Inc.	87
Teleplex Company	91
Terminal Radio Corp.	88
Thordarson Electric Mfg. Company	78
Triplett Elec. Instr. Company, Inc.	99
United Electronics Company	76
United Transformer Corp.	112
Wholesale Radio Laboratories	104
Vaxley	68

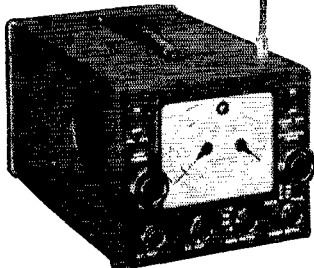
BUY HALLICRAFTERS ON BOB HENRY'S (W9ARA)

Easy Terms!

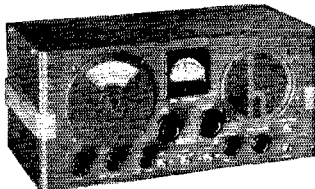


You always get satisfaction in a purchase from me. . . I personally guarantee you can't buy for less or on better terms elsewhere. You can't beat my friendly credit plan. Write and tell me what you want — I sell all makes and models of receivers and amateurs parts — remember we can always arrange the terms.

BOB HENRY W9ARA)



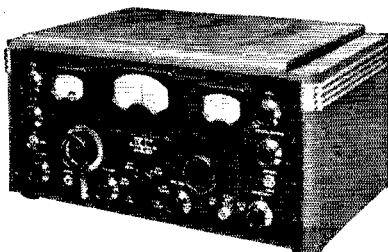
The Sky Traveler (Model S-29). A universal receiver, you can take it with you anywhere. Operates on 110 volt AC-DC or from self-contained batteries. 9 tubes. Covers from 542 kc. to 30.5 mc. (553 to 9.85 meters) on 4 bands. Self-contained extension type antenna. Wt. including batteries \$59.50
18 lbs.



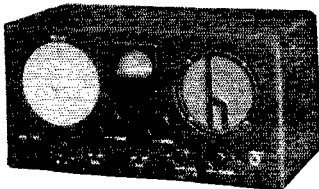
The 1941 Sky Champion (Model S-20R.) Represents one of the best values in the communications field. 9 tubes; 4 bands; covers 545 kc. to 44 mc.; separate electrical bandspread; inertia bandspread tuning; battery-vibrapack DC operation socket. . . \$49.50



Model SX-25. Incorporates every worthwhile advancement that has been made in the communications field. 12 tubes, covers from 540 kc. to 42 mc. in 4 bands. Separate calibrated bandspread dial for the 10/20/40/80 meter amateur bands. 10" heavy duty PM dynamic speaker in matching metal cabinet. Complete with speaker crystal and tubes. \$99.50



New 1941 Super Skyrider Model SX-28. Sets a new high in quality performance. 15 tubes; two stages preselection; 80/40/20/10 meter amateur bands calibrated; 6 step wide range variable selectivity; calibrated bandspread inertia controlled; frequency coverage 550 kc. to 42 mc. With crystal and tubes \$159.50



The Sky Buddy (Model S-19R). Designed to produce superior performance at a moderate price. 6 tubes; 4 bands; continuous coverage 44 mc. to 545 kc.; electrical bandspread; built-in line filter. \$29.50



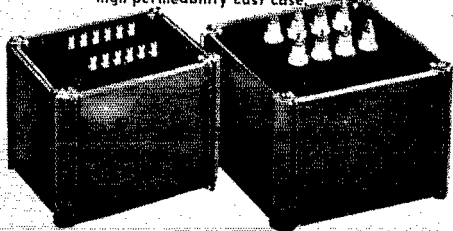
Model SX-24. A great communications receiver value. 9 tubes; 4 bands; frequency range of from 540 kc. to 43.5 mc.; one stage of preselection; single-signal crystal filter standard equipment; DC operation socket-battery or vibra-pack. \$69.50

HENRY RADIO SHOP - BUTLER, MISSOURI

FOR THE BROADCAST STATION

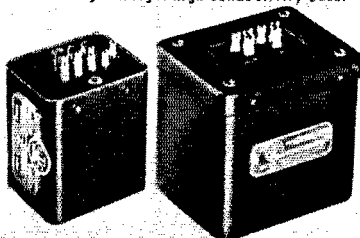
★ LINEAR STANDARD

Ideal, rugged, high fidelity units for broadcast, recording and laboratory service. ± 1 DB 30 to 20000 cycles... high permeability cast case.



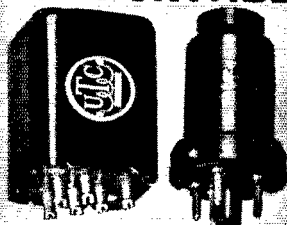
★ HIPERM ALLOY

Similar to Linear Standard units, but of a more compact design with a light weight high conductivity case.



FOR PORTABLE SERVICE

FOR THE AMATEUR



★ ULTRA-COMPACT

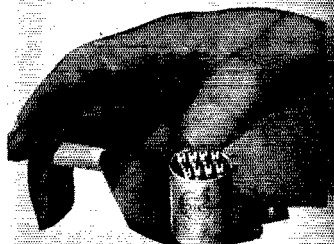
Light weight units (5 1/2 ounces) for remote pick-up and similar compact applications. Hum shielded coil structures... high conductivity case.

A Complete Transformer Line



★ SPECIAL SERIES

A complete series of audio and power units for every amateur application. Uniform grey wrinkle cases... unprecedented value.



★ OUNCER UNITS

The acme in compact quality units. Weight one ounce... Diameter 7/8". Uniform 40 to 15,000 cycles.

FOR EVERY PURPOSE



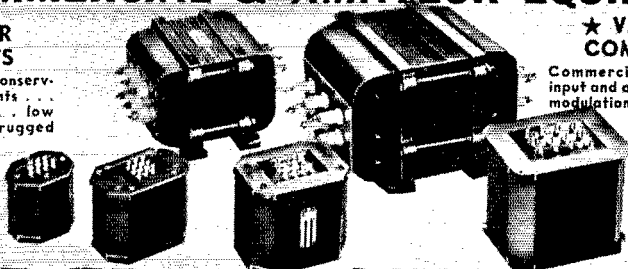
★ VARITRANS

Continuously variable transformers for every application from 200 watts to 5 Kw. Output variable 0-130 or 0-260 Volts.

FOR COMMERCIAL & AMATEUR EQUIPMENT

★ PA POWER COMPONENTS

A complete series of conservative power components... commercial design... low temperature rise... rugged construction.



★ VARIMATCH COMPONENTS

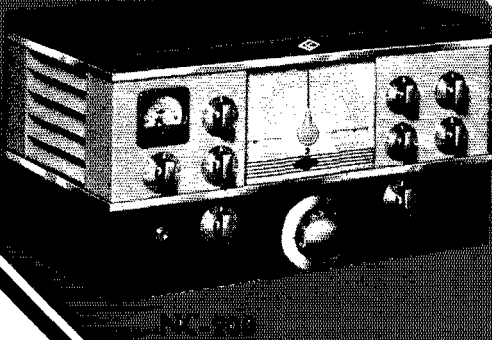
Commercial grade, universal input and output units for every modulation and PA application.

UNITED TRANSFORMER CORP

Write: COMMUNICATIONS DIV. ★ 150 VARICK ST. ★ NEW YORK, N. Y.
EXPORT DIVISION: 100 VARICK STREET NEW YORK, N. Y. CABLES: "ARLAB"



No matter what the price or purpose, National builds an outstanding receiver to fill the bill.



NC-200

Ten coil ranges, six of which provide continuous coverage from 490 KC to 30 MC. Four separate independent ranges provide extreme bandspread on the 10, 20, 40 and 80 meter bands.

Wide range crystal filter with selectivity adjustable in six steps from 200 to 7600 cycles bandwidth.

Movable coil tuning system which has proved its efficiency through many years of use in the NC-100 Receivers.

Portable or AC operation by merely shifting plugs at the back of the receiver.

Ten-inch speaker in cabinet to match the receiver.

NC-44

Four coil ranges covering from 550 KC to 30 MC, with switch on front panel, and separate bandspread condenser.

Full vision dial with inertia-type tuning.

Separate controls for RF and AF gain, and switches for AVC and CW oscillator.

Extremely low price.

ONE-TEN

Six coil ranges covering the span from 1 to 10 meters. Four tubes used in a self-quenching superregenerative circuit giving excellent performance even at one meter. Two acorn tubes are used.

NATIONAL COMPANY, INC., MALDEN, MASSACHUSETTS

RCA-815

Push-Pull R-F Beam Power Amplifier

- Operates at full power to 2 meters — operates at reduced power at 1¼ meters.
- Tops for standard band use.
- Push-pull operation with one bulb, one socket, one cathode resistor, one screen resistor.
- No neutralization required.

AMATEUR NET \$4.50



...AFTER A YEAR OF PRACTICAL FIELD SERVICE

After passing every conceivable laboratory and field test in the months since this tube was announced, RCA engineers now have given the "go ahead" signal on the RCA-815. This is consistent with the RCA policy against ever asking the customer to be the subject of experiment. Production facilities are now being expanded in an earnest effort to meet the great demand for this spectacular tube.

RCA-815 contains two beam power units in one small bulb—a beam unit that has symmetry for proper circuit balance on the ultra high frequencies and a push-pull unit that will help to minimize troubles with even-order harmonics on the standard bands. It is unexcelled for the amateur who wants a compact push-pull beam tube that will work from 160 meters to 2 meters with plenty of punch, requires very little driving power and driver equip-

ment, gets along at full power with plate voltage of only 400 to 500 volts, and generally needs no neutralizing.

A single 815 in push-pull c-w service is capable of handling 75 watts (ICAS) with less than 0.2 watts of driving power—at frequencies as high as 150 Mc. It operates at reduced input up to 225 Mc. (1¼ meters)!

A radically new glass-button type stem structure makes practical a compact but powerful tube only 4 9/16 inches high, having short leads and low lead inductance. Total maximum plate dissipation is 25 watts (ICAS). The large-wafer octal type, metal-shell base has low-loss "Micanol" insulation.

Instruction book is free upon request from RCA Tube and Equipment Distributors or the Commercial Engineering Section, RCA Manufacturing Co., Inc., Harrison, N. J.

Maximum ICAS Ratings for class C telegraph service are:
(All values are for both units)

D-C PLATE VOLTAGE	500 Volts	D-C GRID CURRENT	6 Ma.
D-C SCREEN VOLTAGE	200 Volts	PLATE INPUT	75 Watts
D-C PLATE CURRENT	150 Ma.	SCREEN INPUT	4 Watts
	PLATE DISSIPATION		25 Watts



Transmitting Tube

PROVED IN COMMUNICATION'S MOST EXACTING APPLICATIONS

RCA MANUFACTURING CO., INC., CAMDEN, N. J. • A Service of The Radio Corporation of America

